Electricity

I - Electricity Sector Overview

The electricity sector constitutes a very sensitive infrastructure directly linked to all daily activities of citizens.

All indicators of the sector point to the extent of the numerous and chronicle problems that hinder the major works, threaten the sector, and inflict heavy damage to the national economy, making it impossible to be resolved unless a radical and a gradual reform policy, able to boost the sector, is adopted. Finance Ministry sources showed that amounts that have been transferred to EDL in 2012 have exceeded US$ 2300 million, 94.4% of which, to cover for fuel expenses. It is noteworthy that the financial deficit of EDL reached the verge of US$ 1472 million in 2008 because of the global increase in oil prices, whereas the deficit surpassed US$ 1430 million in 2009.

Problems and difficulties endured by the electricity sector have been extended to encompass: technical, administrative as well as financial frameworks and whatever links them together. On the technical side, the production, transmission and distribution sub-sectors suffer from several accumulating problems. They start with the unavailability of capacity in energy production to supply the demand. They transit through the existence of obsolete unreliable equipment and installations, the increase in technical and non-technical loss levels, and furthermore, they do not end with the decrease in collection levels and human resource problems.

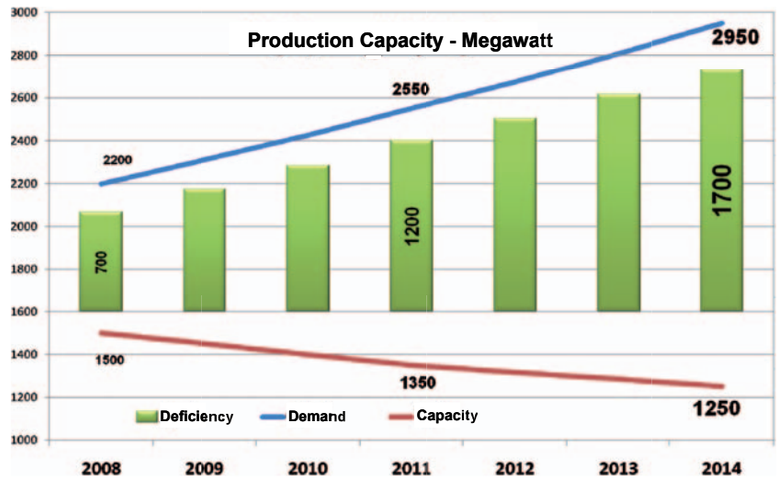
The Current Condition of the Sector

EDL's inability to meet the demand, which clearly appeared at the beginning of the last summer, has caused EDL to enter a critical phase. The imperative issue requires: the reconsideration of the priorities in order to prevent further deterioration in the first phase, bridging the deficit in the second, and anchoring the required stability at the end.

Reforming the electricity sector in Lebanon has become an important challenge for the Lebanese government in the foreseen perspective, particularly after pledging during Paris III to take necessary reform measures in order to be able to transfer the sector from a burden on its treasury and economy into an efficient and sustainable sector, with positive repercussions on the growth of the national income and consequently on the economy.

It has now become clear that the gap between the capacity of supply and the demand has reached, according to Energy and Water Ministry sources, approximately 1300 megawatts of power (about 50% of the demand at peak hours), which is equivalent to 11 hours of daily rationing outside the Beirut administrative and Summer vacation regions. Should this situation prevail, the gap is expected to increase and reach 1700 megawatts in 2014, which is equivalent to 58% of the demand, or about 15 hours of daily rationing.

Currently, the main effective peak capacity does not exceed 1500 megawatts whereas the demand has surpassed 2600 megawatts in 20201. Power generation in Lebanon is mainly concentrated on thermal energy production. Hydropower produced from plants does not exceed 4.5% from the total generation capacity in the country.



Zahrani Power Plant

Power Supply from External Sources

Electric power is drawn from Syria to Lebanon through two main connection networks. The first network links Deir Nbouh plant in the north with the Tartous plant in Syria through two overhead lines of 120 megawatt capacity working on 220 kV of electrical pressure. The second network has a capacity of 80 megawatts through a single overhead line working on 66 KV of electrical pressure linking Aanjar substation plant with the Dimas plant in Syria. Lebanon has been drawing electrical power from Syria for a long time now. In year 2000, Lebanon drew a peak 1418 million kilowatt-hour of electrical energy. It stabilized, at a later stage, at a yearly average of approximately 800 million kilowatt-hours, only 8% of the total power production or the equivalent of 90 megawatts of continuous power capacity throughout the year.

As for the Eight Arab connection network, and the electric energy purchase agreement from Egypt, the construction works and installations of the new Ksara HV substation have been completed. Efforts have succeeded in September 2009 to operate the new 400KV overhead lines, and terminate the new link with the Dimas transmission plant in Syria.

In year 2010, Lebanon benefited from approximately 120 megawatts of additional electrical capacity on the grid at an average feed of 21 hours per day, but the transfer was halted in year 2011. The new grid connection capacity can currently carry up to 300 megawatts of power. Lebanon is currently seeking to increase the import capacity from the countries of the region to cover for the remaining 180 megawatts.

The Main Problems of the Sector

1) The existence of high operational expenses:

- The two combined cycle power plants in Zahrani and Deir Ammar, as well as the two open cycle power plants in Sour and Baalback operate on Gas Oil (Diesel) rather than natural gas.
- The Zouk and Jiyyeh thermal

power plants operate with low efficiency, which necessitate periodical overhauling activities.
- The need to operate Sour and Baalback thermal power plants outside peak times.

2) The existence of rationing and the increase in power failures are due to following reasons:
- Insufficiency of current power generation to meet all the needs, a fact that led to the spread of the local private generation phenomenon.
- Low public investments since at least 12 years (not in the rehabilitation and maintenance of the plants nor in the construction of new ones).
- The incompletion of the 220 kV transmission networks.
- The presence of the "bottle necks" on distribution networks and the increase of local breakdowns in crowded areas on peak times during summer and winter peaks.
- Loss of flexibility of electricity links between the old and the new grid.
- The absence of the usage of electronic accounting programs that study and organize the energy flow to ensure the supply and reduce the technical losses such as GIS.
- Deficiency in periodic maintenance operations by technical expertise for the main power plants, the substations, and the transmission network.
- High percentage of technical losses because of the incompletion of the 220kV distribution grid, which varies from one area to another, exceeding in some areas the 15% average, to reach the 20% line in areas like the Bekaa.
- The problems in the distribution network include:

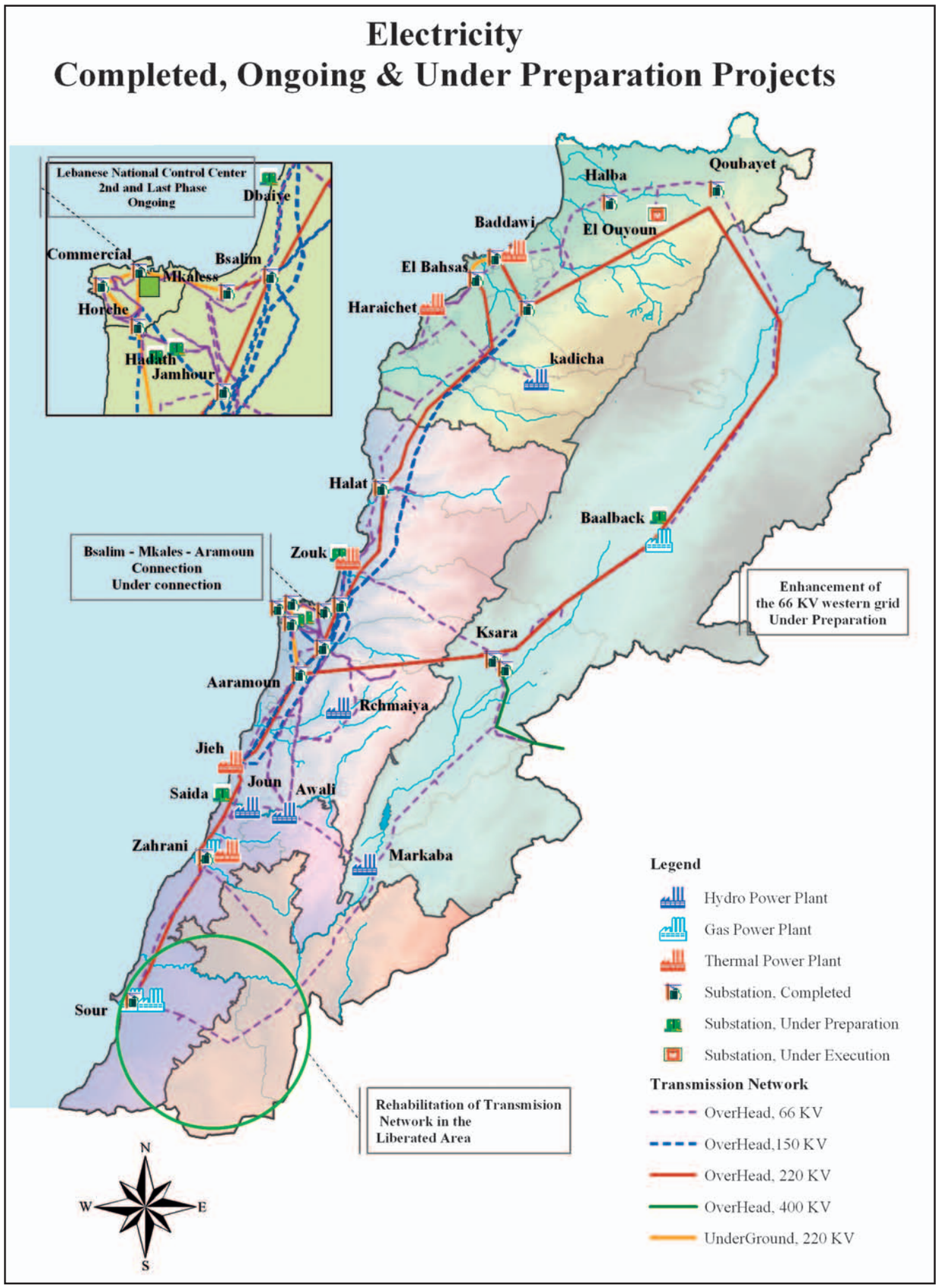
- The existence of old rusty steel distribution poles.
- The inexistence of standby systems.
- The inexistence of efficient monitoring of the meters.
- The inability to prevent theft aggressions.
- The inability to carry out required maintenance preventive measures.
- The inability to match the - Collection and payment monitoring.
- The ill issuance and control of bill settlements.
- The loss of network components in some regions.

- Significant shortage of required equipment tools and machinery necessary to improve and accelerate the needed interventions mainly due to the great financial deficit that EDL is experiencing.

Deir Ammar Power Plant

3) The decline in financial returns of EDL are due to following reasons:
- The global increase in oil prices has aggravated EDL's budget and increased the debt and caused a financial shortage, which became an increasing burden and a source of concern for the national treasury.
- The tariff structure hasn't been reconsidered since almost 15 years now. A transparent policy that decides whether electric energy is sold as a commodity or delivered as a service needs to be adopted.
- Continuous aggressions and illegal connections on the network.
- Incomplete bill collections.

4) The main institutional problems in the management of EDL are as a result of:
- An insufficient authority for the Board of Directors for taking adequate decisions.
- Absence of clear criteria to evaluate the performance of EDL.
- Lack in technical training and difficulty in recruiting new qualified personell.
- Unavailability of reliable and transparent reports (statistics, finance, criteria, performance, etc.) represented, the least to say, in the inadequate account auditing since 2001.
- A huge deficiency in human resources represented by a present body of only 1902 employees when 5027 are needed; a vacancy for 3125 positions. The current body also loses 120 to 150 workers (8%) per annum due to retirement.


Electricity
Completed, Ongoing & Under Preparation Projects
Lebanese National Control Center
2nd and Last Phase
Ongoing
Dbaiye
Commercial
Mkalless
Bsalim
Horche
Hadath
Jamhour
Halba
Qoubayet
Baddawi
El Ouyoun
El Bahsas
Haraichet
kadicha
Halat
Baalback
Bsalim - Mkales - Aramoun
Connection
Under connection
Zouk
Enhancement of
the 66 KV western grid
Under Preparation
Ksara
Aaramoun
Rchmaiya
Jieh
Joun
Awali
Saida
Zahrani
Markaba
Sour
Rehabilitation of Transmision
Network in the
Liberated Area
N
W
E
S
Legend
Hydro Power Plant
Gas Power Plant
Thermal Power Plant
Substation, Completed
Substation, Under Preparation
Substation, Under Execution
Transmission Network
OverHead, 66 KV
OverHead,150 KV
OverHead, 220 KV
OverHead, 400 KV
UnderGround, 220 KV

Deir Ammar Power Plant

The Vision for the Future

In order to set in motion an efficient and sustainable sector, future visions to restructure the sector cannot be implemented unless the action plans include reform programs that would work on the short, medium and long terms in parallel. The reforms must encompass all the technical, financial and institutional aspects that would put in place an end to the financial deficit and ensure the auto-financing for future investments, as well as securing the good service at reasonable prices. Coordination efforts with the Ministry of Energy and Water is currently being carried out in order to crystallize a working paper, based on a medium term strategy, that will include working on the technical, economic, financial and institutional levels.

II - Main Accomplishments (1992 – 2012)

Main projects implemented by CDR for EDL during the 1992 – 2009 periods can be summarized as follows:

1 - Generation

- Construction of two combined-cycle power plants in Deir Ammar and Zahrani with a capacity of 435 MW for each plant at a cost of US $ 575 million, achieved in 1999.
- Rehabilitation of thermal and hydraulic plants at a cost of US $ 109 million, achieved in 1998.
- Construction of two open-cycle power plants in Sour and Baalback with a capacity of 70 MW for each plant at a cost of US $ 61 million, achieved in 1996.
- The initiation of supply of a 120MW of electrical power from Egypt to the new HV transmission plant in Ksara through the Eight Arab connection network.

2 - Transmission

- The construction of the 220 kV network which included the installation of 339 km of overhead lines. Overhead lines that have been completely constructed are: Deir Nbouh to Ksara line, Ksara to Aaramoun line, Aaramoun to Zahrani and Sour line, and the Bahsas to Bsalim line passing through Halat.
- The construction of 220 kV substations in downtown Beirut, Aaramoun, Mkalles, El Horsh, Ras Beirut, Halat, Ksara, Bsalim, and Sour between 1999 and 2001.
- The construction of 61 km of underground buried cables for the 220 kV network in the North and in Beirut in 1999.
- The restructuring of the 150kV and 66 kV transmission networks in 1997.
- The construction of 400 kV network and substation in Ksara allowing for the power exchange between the countries of the region.

3 - Distribution

- Rehabilitation of the distribution networks in 1997 at a cost of US $ 112 million.

III - Progress of works in 2012 - contracts awarded before 2012

The electrical transmission network expansion project: all works related to the expansion project of the electrical transmission network have been completed as specified above, except for the works regarding the installation of cables on poles in Mansourieh – Ain Saadé – Ain Najm, due to the objections expressed by local residents of the area. Efforts are currently being made to resolve the issue. Completion of the works is expected to be sorted out in 2013, if all goes well.

National Control and Dispatch center: works started during the

Eight countries interconnection network - Ksara station

month of July 2006. The project is funded by the Arab Fund for Economic and Social Development and its overall cost is evaluated at approximately US $ 25 million. The project is expected to be completed during 2011 knowing that the proposed amendments have been considered.

Rehabilitation and Expansion of Transmission and Distribution Networks in the Liberated regions:

Efforts are currently being taken to award the rehabilitation and expansion works of the 66 kV and the 20KV/15 kV transmission distribution network in the liberated regions. The project, which is expected to start during 2010, will be funded by the Iranian Protocol. The total cost of the project is estimated at about US $ 25 million.

The rehabilitation and Expansion Project of Al-Ayoun and Fneidek Transmission and Distribution Network in Akkar:

The completion of the 66KV line in Beit Mellat, in the area of Al-Ayoun and Fneidek in Akkar, has allowed the Beit Mellat substation, which was completed in February 2011, to be placed in operation. The 66KV line was completed in year 2012 right after the Kuwaiti funds and the bidding process were settled. The 5,150,000 euros project was designed to raise the transmission and distribution power capacity of the region from 10 to 40 MW.

The Technical Assistance Projects for the Electricity Sector Reform Plan:

Three service contracts were awarded during 2007 when three international tenders were conducted. The three service consultancy projects aim at granting technical assistance within the framework of the electricity sector reform as follows:

- Improve the capacities of the Ministry of Energy and Water to implement the proposed reform actions in the sector policy statement. The main tasks assigned to the consultant will be in assisting the Ministry in the preparation of a national sector policy and fuel oil strategy. Part of the tasks is to review the proposals related to the supply of liquefied natural gas (LNG) to the Zahrani plant, and evaluate the proposals aimed at attracting private investments and reviewing previous studies regarding the establishment of the Electricity Sector Regulation Authority. Works are expected to be completed in September 2009.
- Having secured the funds from the World Bank, CDR, in this respect, and in coordination with the Ministry of Energy and Water, entered into contract in October 2011 with Poten & Partners, a well-known consultancy specialized in strategic studies for building Liquefied Natural Gas facilities, in an effort to help select the best technology and site location for a suggested port aiming at securing the required Natural Gas quantities at the best possible price.

In April 2012, the Consultant completed all of the required tasks and submitted all the relevant reports, which contained:

1) A summary about existing worldwide LNG markets.
2) Lebanon's LNG demand up until year 2030.
3) A summary about the main LNG suppliers.
4) A detailed preliminary study for designing an LNG port after carrying out site assessments to 3 locations (Deir Ammar power plant, Zahrani power plant, and the Setaata area).
5) Three reports related to the Preliminary Environmental Impact Assessments of the 3 sites.

6) One report concerning the existing legal current conditions and the legal frames that should govern this sector.
7) The necessary capacity building for the specialists at CDR and at the Ministry of Water and Energy.
8) The preparation of the "EOI" (Expression of Interest) Terms of Reference for companies interested in bidding to build and operate a sea port for importing LNG including the purchase and operation of the Floating Station Regasification unit (FSRU) and the building of the sea port for receiving LNG through harboring the ships for emptying its loads. The goal of this TOR is to prepare a short list of qualified companies for invitations for bidding.

Through local funding, and in cooperation with the Ministry of Energy and Water, CDR, entered into contract with the same consultant in October 2012, to perform the second phase of these strategic studies. The consultant is expected to complete the required tasks in August 2013 and submit the following reports:

1) Terms of Reference for the selection of consultants willing to conduct the Environmental Impact Assessments in support for the development of the Floating Station Regasification Unit to regasify LNG.
2) Term of Reference for the selection of the developer of the FSRU.
3) Help in selecting 4 companies capable of importing LNG to Lebanon.
4) Help to evaluate companies' bids for the development of the FSRU.
5) A report covering the training works required for the staff of the local institutions.

- The improvement of the operational and financial performance of EDL, where the main duties of the consultant will be the preparation of a plan for improving the efficiency of power generation plants and for assisting in the implementation procedures. Reorganizing the supply duties of EDL, establishing the priorities for reducing technical and non-technical losses, providing assistance to complete current projects, organizing an inventory of assets and survey of audited financial reports and preparing the tender documents for the financial audit contract covering 2005 and 2006 are also included in the tasks. Consultancy services are expected to be completed in May 2009.
- To provide the necessary support for the Higher Council for Privatization for incorporating EDL in conformity with the Electricity Sector Regulation Law and the Ministry's plan for restructuring the sector. The tasks are to propose the organizational structures for companies that will emanate from EDL, including the detailed description of the proposed positions and the procedures to be followed; along with the preparation the preliminary work plans for these companies. It is also required to organize the inventory of assets and determine the capital levels and the share structure of these companies.

Right at the finish line of the first phase of the contract, CDR, entered into a contract with Booz and Co. to undertake another complementing study to the first phase in order to provide the Higher Council for Privatization with the required support in corporatizing EDL. The contract was signed in cooperation with the Ministry of Energy and Water and under finance from the World Bank. Booz and Co completed the studies by the end of May 2012 and submitted the reports related to the detailed implementation procedures to execute the plan.

It should be noted that the estimated total cost of the technical assistance contracts are of approximately US $ 6.5 million, distributed in the following manner:

US $ 5 million from the World Bank grant, about US $1 million from the French Development Agency grant, and US $ 500,000 from local funds to cover for the local tax expenses.

The designated consultants are to submit their reports gradually in due time in accordance with their terms of references, where the revisions by the concerned institutions are expected to constitute an opportunity for a close coordination amongst the involved parties that will facilitate the decision making process regarding the electricity sector reforms.

The Comprehensive Master Plan for the Generation and Transmission of Power: Electricité de France (EDF), which was placed in charge of drafting the Master Plan from a grant financed by the French government, has submitted a draft report regarding power generation. Based on the discussions with concerned officials over the remarks, EDF issued the second version of the report in June 2008 with expectations to issue the final version in 2010.

IV - Main Projects Under Preparation (2013 – 2014)

Generation sector:

- The rehabilitation of Zouk and Jiyyeh power plants:

The installed and actual capacities of the Zouk and Jiyyeh power plant units are as follows:

	Unit number	Installed Capacity in MW	Actual capacity in MW
Jiyyeh plant	1	62	52
	2	62	38
	3	69	58
	4	69	57
	5	69	54
	Total	331	259

	Unit number	Installed Capacity in MW	Actual capacity in MW
Zouk plant	1	145	90
	2	145	100
	3	145	-
	4	172	115
	-	-	-
	Total	607	305

The total installed capacity of both Zouk and Jiyyeh power plants are 938 MW, whereas the average effective operational capacity is 564 MW. EDL is currently conducting the rehabilitation feasibility study for the 2 plants, in addition to detailed studies and the preparation of the tender documents. The Arab Fund for Economic and Social Development expressed its readiness to finance the rehabilitation of units 3, 4 and 5 of the Jiyyeh power plant (since units 1 and 2 which were erected in 1970 are expected be replaced) as well as all the four units of the Zouk power plant in accordance with a 5 to 6 year work plan schedule. Once fulfilled, the rehabilitation is expected to raise the effective capacity of both plants to 800 MW, in addition to the preparation of the required provisions for the replacement of units 1 and 2 of the Jiyyeh power plant. Awarding of the rehabilitation project is expected to start in 2010.

Construction of New Generation Plants: Based on the first outcomes of the master plan conducted by EDF, various proposed options to construct new power plants are overlaid. The Ministry of Energy and Water is expected to settle on the most suitable option during 2010 that will lead to the execution of the new plants. Furthermore, the Ministry of Energy and Water is considering the possibility of purchasing special generators that will cover for a portion of the shortage in power generation on the short run. It should be noted that CDR has already started contacting numerous Arab and international funding parties to secure the necessary funds for these projects.

Transmission sector:

Construction of substations in various regions:

Amongst the current priorities are the five substations that have been determined to treat the suffocations witnessed on the transmission networks, mainly at: The Southern Suburbs (Dahieh), Bahsas (Tripoli), Marina (Dbayeh), and Ashrafieh.

Technical Assistance and Sectoral Studies:

The Master Plan Study for Distribution in Beirut and its Suburbs:

Following EDL's request from CDR to seek funding for the Master Plan study for the Power Distribution in the Greater Beirut area, the French Agency for Development (AFD) has expressed its willingness to finance the study through a grant. The consultant EDF, who prepared the Master Plan of 1998, is expected to be nominated to carry out the works, which are anticipated to be finalized in 2010. The Master Plan of the Greater Beirut area includes: the updating of the Master Plan of 1998 for the city of Beirut, the area extended from Mkalles to Aaramoun, in addition to the Master Plan for the southern and northern suburbs.