



THE NATIONAL ENERGY EFFICIENCY ACTION PLAN FOR LEBANON

NEEAP 2011-2015



JANUARY 2012



THE NATIONAL ENERGY EFFICIENCY ACTION PLAN FOR LEBANON

NEEAP 2011-2015



Approved by
The Council of Ministers of Lebanon
on 10 November 2011

Prepared by the Lebanese Center for Energy Conservation (LCEC)
Updated on November 1, 2011 - Beirut, Lebanon

The NEEAP has been developed by the LCEC team thanks to the administrative and financial support of the United Nations Development Programme (UNDP) Lebanon through funding by the Global Environment Facility (GEF).



This report has been printed (2,000 hard copies) thanks to the EU-funded MED-ENEC Project.

Section 2 of the NEEAP (tabulated format) is developed according to the Arab Framework on Energy Efficiency as per الإطار الاسترشادي العربي لتحسين كفاءة الطاقة الكهربائية (المستخدم النهائي) the requirements of the League of Arab States (LAS) and as generated by the Regional Center for Renewable Energy and Energy Efficiency (RCREEE).



The development of section 2 is done thanks to the financial and technical support offered by the EU-funded project MED-ENEC.



Copyright © Ministry of Energy and Water/ Lebanese Center for Energy Conservation (LCEC) - 2012

Reproduction is authorized provided the source is acknowledged and provided the reproduction is not sold.

For further information: Lebanese Center for Energy Conservation, www.lcecp.org.lb

Note: The information contained within this document has been developed within a specific scope, & might be updated in the future.

December 1, 2011

Foreword to the NEEAP

For the past few years, Lebanon witnessed some impressive developments in the energy efficiency and renewable energy sectors. Although the different actions and pilot projects implemented during the period 2005-2010 had had a positive overall impact on the country, however there was no clear road map for the development of these vital sectors. It was necessary for Lebanon to have a national action plan for energy efficiency and renewable energy- a strategic document to pave the way for our overall national objective: to reach 12% of renewable energy by 2020.

Back in August 2010, the teams at the Ministry of Energy and Water gathered their efforts to develop the first action plan of its kind in the country: the National Energy Efficiency Action Plan for Lebanon 2011-2015, or NEEAP. Following many reviews and updates, the Ministry of Energy and Water adopted the NEEAP on 21 December 2010 and forwarded this important document for adoption by the Council of Ministers of Lebanon.

It is a real pleasure to publish the NEEAP of Lebanon 2011-2015 following the approval of the Council of Ministers on 10 November 2011. It is also a pride to see that Lebanon is the first Arab country to develop its NEEAP. Still, the challenge remains in the implementation of the national initiatives mentioned in the NEEAP.

In this regard, the Ministry of Energy and Water will keep investing all needed efforts to push for this growing momentum in Lebanon towards strengthening and developing the energy sector and finding new ways and opportunities to fight climate change.

The Ministry of Energy and Water is also aware that the achievements of the national objectives in energy efficiency, renewable energy, and green buildings cannot be achieved without the active involvement of other ministries, local players, key national experts and in close collaboration with our regional and international partners and friends.

On behalf of the Ministry of Energy and Water, I would like to thank all those who contributed to the development of the NEEAP, hoping Lebanon will witness the implementation of all these national plans, making our country a better place for the upcoming generations.

Gebran Bassil
Minister of Energy and Water

ACKNOWLEDGEMENTS

The current version of the National Energy Efficiency Action Plan (NEEAP) 2011-2015 for Lebanon is the result of many reviews and discussions by more than 80 national and regional experts and consultants. In fact, the current version is the 10th revision of the initial NEEAP prepared by the Lebanese Center for Energy Conservation (LCEC).

In this regard, LCEC is keen to thank all those who reviewed the different versions of this document and who contributed with their comments and suggestions. LCEC is also keen to thank the friends and colleagues at the League of Arab States, the EU-funded projects MED-EMIP and MED-ENEC, as well as the Regional Center for Renewable Energy and Energy Efficiency (RCREEE). Their joint efforts and motivation have been a great support for LCEC in developing the NEEAP for Lebanon, especially the tabulated format part which is based on the Arab EE Directive.

LCEC would also like to thank Dr. Ahmed Badr (Programme Manager- Water and Energy- European Union Delegation to Egypt) for his continuous support to LCEC through the efforts of the MED-ENEC project, which supported the development of this document both financially and technically. The efforts invested by the MED-ENEC team and its partners from Ecofys- Germany are appreciated.

On the other hand, the efforts of Dr. Farid B. Chaban (Professor at the American University of Beirut (AUB)- National Energy Expert) are highly appreciated, especially his dedication in the development and update of the tabulated format of the NEEAP. It is thanks to the efforts of Dr. Chaban that Lebanon became the first Arab country ever to develop the national NEEAP.

LCEC would also like to thank the United Nations Development Programme (UNDP)- Energy and Environment Programme, namely Mr. Edgard Chehab and Ms. Jihan Seoud for their continuous support and trust in the activities undertaken by LCEC.

Finally, it is crucial to note that this current document would not have taken the importance it deserves without the embracement of the Minister of Energy and Water H.E. Mr. Gebran Bassil.

LCEC team

January 2012

Beirut, Lebanon

Report Conceptualization

Mr. Pierre El Khoury, Manager, LCEC

Lead Author (Section 1- Narrative NEEAP)

Mr. Pierre El Khoury, Manager, LCEC
Mr. Nader Hajj Shehadeh, Energy Engineer, LCEC

Lead Author (Section 2- NEEAP in Tabulated Format)

Dr. Farid Chaban, Professor in Electrical Engineering, American University of Beirut (AUB)

Main Reviewers and Update

Dr. Rayan Slim, Professor in Thermal Energy, Lebanese University (LU), American University of Beirut (AUB)
Mr. Ziad El Zein, PR Coordinator, LCEC
Mr. Rani Al Achkar, Technical Engineer, LCEC

MED-ENEC and RCREEE Main Reviewers

Mr. Daniel Becker, Unit Manager Energy and Climate Policies, Ecofys GmbH, Germany
Dr. Kurt Wiesegart, Team Leader, MED-ENEC
Mr. Ammar Al Taher, Key Expert, MED-ENEC
Ms. Florentine Visser, Key Expert Low Energy Building and Urban Planning, MED-ENEC

Layout and Cover Design

Ms. Tracy Barakat, Graphic Designer

Reviewers and Contributors (listed in alphabetical order)

Mr. Abdo Tayyar, Ministry of Energy and Water
Dr. Ahmad Houry, Lebanese American University (LAU), Lebanese Solar Energy Society (LSES)
Mr. Ali Berro, Beta Engineering
Mr. Ali Berro, LCEC
Ms. Amal Khreiss, Tomorrow's Advice
Mr. Antoine Nasrallah, EU Cub Engineering
Mr. Bassam Mouawad, Lebanese Electricity Utility (Electricité du Liban- EDL)
Mr. Bechara Attiyeh, Lebanese Electricity Utility (Electricité du Liban- EDL)
Mr. Chafic Abi Said, Lebanese Solar Energy Society (LSES)
Mr. Edgard Chehab, United Nations Development Programme (UNDP) Lebanon
Mr. Ghassan Dib, American University of Beirut (AUB)
Judge Hassan Chami, Ministry of Energy and Water
Dr. Hassan Harajli, CEDRO, UNDP Lebanon
Mr. Hussein Salloum, Council for Development and Reconstruction (CDR)
Dr. Imad Hajj Shehadeh, Industrial Research Institute, IRI
Mr. Jean-Paul Sfeir, Solarnet

Mr. Jihad Gheddiyeh, Lebanese Electricity Utility (Electricité du Liban- EDL)
Ms. Jihan Seoud, United Nations Development Programme (UNDP) Lebanon
Dr. Joseph Al Assad, Université Saint Esprit de Kaslik (USEK)
Ms. Léa Hakim, Ministry of Finance
Ms. Maha Chalouhi, NEEDS
Mr. Mahmoud Baroud, Ministry of Energy and Water
Mr. Mazen Halawi, Central Bank of Lebanon
Mr. Melhem Khattar, Lebanese Electricity Utility (Electricité du Liban- EDL)
Cheikh Mohammad Alaya, Lebanese Electricity Utility (Electricité du Liban- EDL)
Mr. Mohammad Meouch, Lebanese Electricity Utility (Electricité du Liban- EDL)
Dr. Mounir Yehia, NEEDS
Dr. Mourad Younes, Ministry of Energy and Water
Ms. Nada Boustany, Ministry of Energy and Water
Mr. Naji Tannous, Beta Engineering
Dr. Raymond Ghajar, Lebanese American University (LAU), Ministry of Energy and Water
Dr. Riad Chedid, American University of Beirut (AUB)
Dr. Rida Nuwayhid, Hariri Canadian University (HCU)
Ms. Rola Khazen, United Nations Development Programme (UNDP) Lebanon
Mr. Ronald Diab, National Energy Consultants (NEC)
Mr. Vahakn Kabakian, Ministry of Environment
Mr. Walid El Baba, Webco
Mr. Wassim Nasr, Lebanese Electricity Utility (Electricité du Liban- EDL)
Mr. Wissam Chbat, Ministry of Energy and Water
Mr. Wissam Zahabi, Prime Minister Office

TABLES OF CONTENTS

FOREWORD OF THE MINISTER OF ENERGY & WATER, HE. ENGINEER GEBRAN BASSIL	2
ACKNOWLEDGEMENTS	3
LIST OF CONTRIBUTORS	4
LIST OF SYMBOLS	7
INTRODUCTION	8
SECTION 1: INITIATIVES	9
Initiative 1: Towards Banning the Import of Incandescent Lamps to Lebanon	11
Initiative 2: Adoption of the Energy Conservation Law and Institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the National Energy Agency for Lebanon.....	13
Initiative 3: Promotion of Decentralized Power Generation by PV & Wind Applications in the Residential & Commercial Sector	15
Initiative 4: Solar Water Heaters for Buildings and Institutions	17
Initiative 5: Design and implementation of a national strategy for efficient and economic public street lighting in Lebanon	19
Initiative 6: Electricity Generation from Wind Power	21
Initiative 7: Electricity Generation from Solar Energy	22
Initiative 8: Hydro Power for Electricity Generation	24
Initiative 9: Geothermal, Waste to Energy, and Other Technologies	25
Initiative 10: Building Code for Lebanon	26
Initiative 11: Financing Mechanisms and Incentive.....	28
Initiative 12: Awareness and Capacity Building	29
Initiative 13: Paving the Way for Energy Audit and ESCO Business	30
Initiative 14: Promotion of Energy Efficient Equipment	31
SECTION 2: NEEAP IN TABULATED FORMAT	33
INTRODUCTION	35
OVERVIEW : OVERALL NATIONAL INDICATIVE TARGET	36
1.1 Key indicators	
1.2 Indicative target	
1.3 Name of mandated national entity and contact person	
1.4 Calculation methodology of the national indicative energy savings target	
SECTORIAL PRESENTATION : PLANNED & ONGOING ENERGY EFFICIENCY MEASURES FOR 2011-2013	38
2.1 Sector 1	
2.1.1 Overview table of EE measures	
2.1.2 Detailed information of individual measures	
2.2 Sector 2	
ADDITIONAL MEASURES	51
3.1 Public sector : exemplary role	
3.1.1 Overview table of all EE measures	
3.1.2 Detailed information of individual measures	
3.2 Utilities responsibilities	
3.2.1 Overview table of all EE measures	
3.2.2 Detailed information of individual measures	
3.3 Measures for power sector	
3.3.1 Overview table of all EE measures	
3.3.2 Detailed information of individual measures	
HORIZONTAL AND CROSS-SECTORIAL MEASURES	53
4.1 Overview table of all EE measures	
4.2 Detailed information of individual measures	
4.3 Supportive measures that difficult to quantify savings Energy efficiency policy progress assessment	
CRITERIA TO ASSESS ENERGY EFFICIENCY POLICY IMPLEMENTATION PROGRESS	54

LIST OF SYMBOLS

BoL	Central Bank of Lebanon
CDM	Clean Development Mechanism
CDR	Council for Development and Reconstruction
CEDRO	Country Energy Efficiency and Renewable Energy Demonstration
CFL	Compact Fluorescent Lamps
CSP	Concentrated Solar Power
EC	European Commission
EDL	Electricite Du Liban
ESCO	Energy Services Companies
EU	European Union
GEF	Global Environment Facility
IPP	Independent Power Producers
IRI	Industrial Research Institute
LAS	League of Arab States
LCEC	Lebanese Center for Energy Conservation
LED	Light Emitting Diode
LIBNOR	Lebanese Standards Institution
MED-ENEC	Euro- Mediterranean Project on Energy Efficiency in the
MED-EMIP	Euro- Mediterranean Energy Market Integration Project
MoF	Ministry of Finance
NEEREA	National Energy Efficiency and Renewable Energy Action
PV	Photovoltaic
RCREEE	Regional Center for Renewable Energy and Energy Efficiency
TA	Technical Assistant
UNDP	United Nations Development Program
USAID	US Agency for International Development
WB	World Bank

INTRODUCTION/ BACKGROUND

The current document presents the national energy efficiency action plan (NEEAP) for Lebanon for the upcoming years 2011-2015. The action plan is presented in two different formats: Section 1- including the 14-initiative narrative NEEAP, and Section 2- including the tabulated format.

The proposed NEAAP is a required document that was called upon in the first point of the strategic initiative 6 of the "Policy Paper for the Electricity Sector", announced by the Ministry of Energy and Water (MEW) on July 21, 2010 (reference COM #1- 21/06/2010). The contents of the proposed NEEAP are in accordance with the different action steps of the MEW policy paper, specifically: 5a, 5b, 5c, 5d, 6a, 6b, 6c, 6d, 6e, 8b, and 8c (reference COM #1- 21/06/2010).

The proposed NEEAP is also developed in accordance with the different points mentioned in the declaration of the Lebanese Government relating to energy efficiency and renewable energy, namely the set strategic target of 12% renewable energy by 2020. It also mentions the different initiatives taking place in Lebanon, including the supporting national activities of the United Nations Development Programme (UNDP), especially through the two projects: the Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon (CEDRO) funded by the Spanish Government and the Global Solar Water Heaters Project (GSWH) funded by the Global Environment Facility (GEF).

The NEEAP 2011-2015 is approved by the Council of Ministers of Lebanon on 10 November 2011 (Decision No. 26).

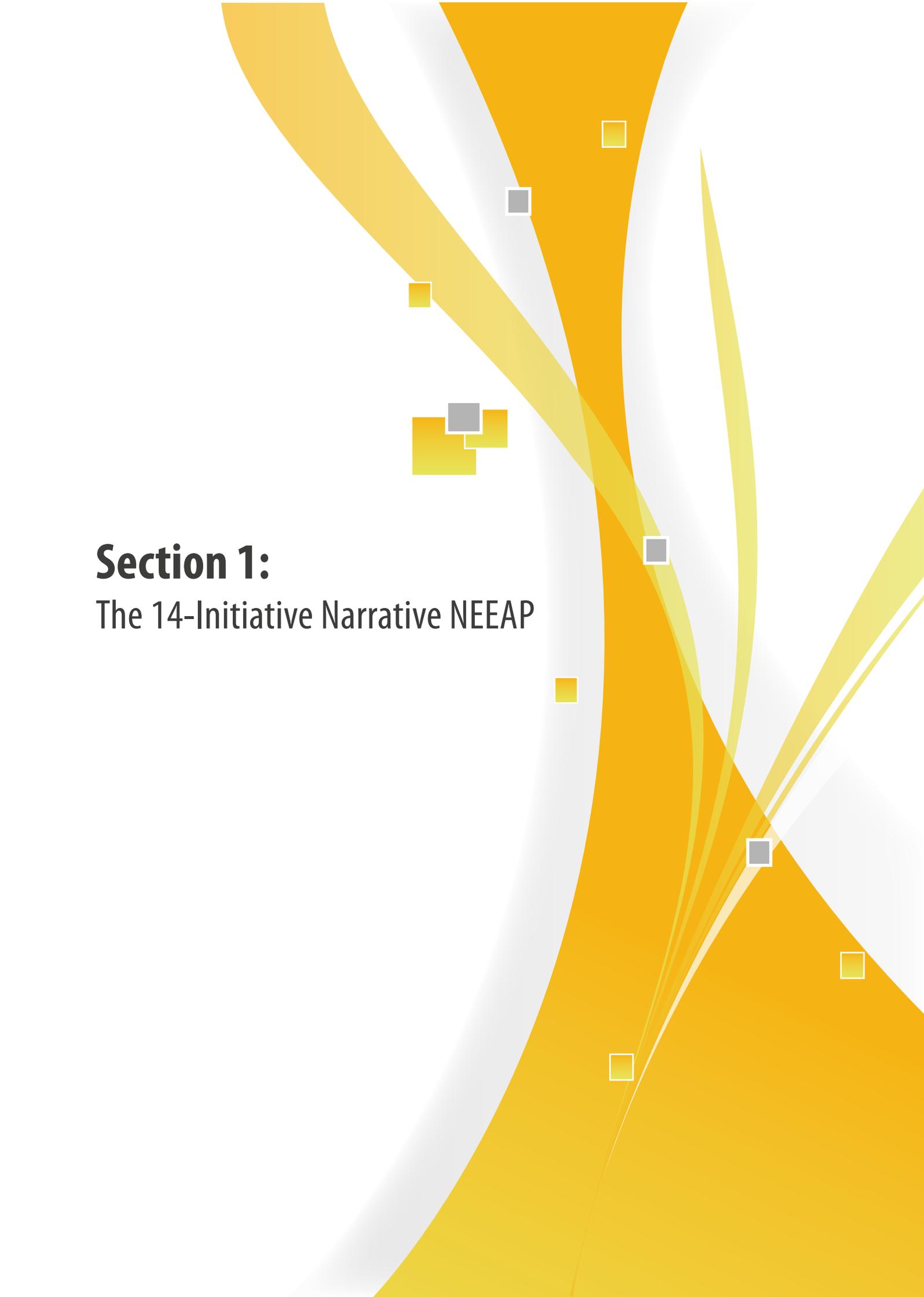
The current version of the NEEAP includes 14 independent but correlated activities in the energy efficiency and renewable energy sectors. As mentioned earlier, the same contents of the NEEAP is presented in two different formats:

Section 1 is the 14-Initiative Narrative NEEAP presenting separately all 14 initiatives. The discussion of each and every initiative includes a vision; policy reference; the current situation; milestones and proposed steps; and budget, investments, and benefits.

Section 2 presents the same contents of the NEEAP in the tabulated format adopted by the League of Arab States (LAS) as the official template for the Arab Energy Efficiency Directive. The Arab Energy Efficiency Directive has been developed jointly between the League of Arab States (LAS), MED-EMIP and RCREEE based on the Directive 2006/32/EC of the European commission (EC) on energy end-use efficiency and energy services.

The current document is developed by the Lebanese Center for Energy Conservation (LCEC) with the support and comments of the different reviewers. LCEC has made its utmost efforts to have a comprehensive document that could be used as a reference document for the energy efficiency and renewable energy sectors. LCEC is keen to keep updating this document to include actual achievements and any additional measures or steps that need to be included in the national action plan.

All comments and suggestions are welcome at the following email address: [*energy@lcecp.org.lb*](mailto:energy@lcecp.org.lb)

The background features a series of overlapping, curved bands in shades of orange and yellow, creating a sense of movement and depth. Scattered across these bands are several small squares in various colors, including yellow, orange, and grey, some of which are slightly offset from each other, suggesting a dynamic or layered structure.

Section 1:

The 14-Initiative Narrative NEEAP

Initiative 1: Towards Banning the Import of Incandescent Lamps to Lebanon

This initiative aims at banning the import of incandescent lamps to Lebanon by the end of the year 2012. This decision can only be reached through the application of different independent but interrelated actions, mainly the 3 million CFL's project.

Policy References:

- The MEW policy paper initiative 6, action step b: "Widely spread the use of Compact Fluorescent Lamp (CFL), starting in 2010, with the aim of banning energy guzzling devices in the future."

Current Situation:

- Based on the request of the Ministry of Energy and Water, the Government of Lebanon committed to invest 7 million USD to design and implement the replacement of 3 million incandescent lamps with 3 million compact fluorescent lamps (CFL's) (Council of Ministers decision No. 59, on March 10, 2010).
- The Ministry of Energy and Water has finalized the purchase of 3 Million compact fluorescent lamps (CFL's) on July 16, 2010.
- The 3M CFL's project's Project Management Unit (PMU) has been setup. A team of 9 professionals has been selected to supervise the distribution of the lamps.
- The Lebanese Center for Energy Conservation (LCEC) has completed the distribution of 90,000 CFL's in 31 villages in South Lebanon. These CFL's are one component of a grant by the Greek Government for the reconstruction of the South after the July 2006 war. The Greek grant project is supervised and managed by the United Nations Development Programme (UNDP).
- The Lebanese Center for Energy Conservation (LCEC) has selected the energy efficiency standard for CFL's in Lebanon. Libnor has adopted the standard as elective on March 15, 2007.
- The Council of Ministers decision No. 38 dated September 21, 2010 regarding the adoption of the standards for the CFL and the SWH as mandatory.
- The ministry of energy and water launched a nationwide awareness campaign on the CFL's project and its benefits in October 2010.
- The Industrial Research Institute (IRI) completed the setup of a testing facility for CFL's.
- The CDM Project Idea Note (PIN) was updated and submitted to the Designated National Authority (DNA) at the Ministry of Environment (MoE) which approved and issued a letter of endorsement.

Milestones and Proposed Steps:

- ✓ Complete a conceptual design for a monument to host 3 million incandescent lamps and build the monument by the end of 2011.
- ✓ Complete the distribution of the 3 million CFL's by the end of 2011 in coordination with EDL, municipalities, and civil society.
- ✓ Negotiate with CDM carbon credits purchaser and signature of agreement by December 2011.
- ✓ Coordinate with the carbon credits purchaser for the preparation of the Project Design Document (PDD) and for submittal to the DNA by December 2012.
- ✓ Coordinate with the Ministry of Finance on the possibility of financial "decentives" on the import of incandescent lamps and of financial incentives on the import of CFL's by the first half of 2012.
- ✓ Conduct a market survey on the use of incandescent lamps/ CFL's to test the market transformation in the country by the end of 2012.
- ✓ Ban the import of incandescent lamps in Lebanon by a governmental decree expected by December 2012.
- ✓ Initiate a national momentum towards the use of LED lights in newly constructed buildings by September 2011. The initiative shall include close coordination with the Order of Engineers and Architects, buildings developers, architects, but also suppliers and importers.

Budget, Investments, and Benefits:

- ✓ The 90,000 CFL's are part of a grant by the Greek Government. The price of the CFL's is 153,000 USD.
- ✓ The total budget for the 3 million CFL's project is 7 million USD, out of which the cost of the lamps is 4.55 million USD. The remaining amount will be used for the PMU, the marketing cost, and mainly for the distribution costs.
- ✓ The CDM project is expected to result in earnings for the Ministry of Energy and Water amounting to around 6 million USD (the exact amount would only be defined after the approval of the project).
- ✓ The distribution of the 3 million CFL's will reduce the electricity demand by a minimum of 160 MW. In terms of energy and money savings, it is estimated that the project will result in savings of around 76 million USD annually for a period of 4 years.
- ✓ The emissions reduction of the 3 million CFL's project is estimated at 245,000 tons of CO2 equivalent for the first year of the project.
- ✓ The budget for the incandescent lamps monument is to be covered by a grant from the UNDP/ CEDRO project and other donors as well as the government initiative.

Initiative 2: Adoption of the Energy Conservation Law and Institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the National Energy Agency for Lebanon

This initiative aims at the adoption of an energy conservation law for Lebanon, including the institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the national energy agency for Lebanon. The law offers a legal framework for the following subjects: energy audits, energy efficiency standards and labels, financial incentives for energy efficiency appliances, and net-metering and the LCEC's national role.

Policy References:

- The MEW policy paper initiative 6, action step a: "Adopt the Energy Conservation law and institutionalize the Lebanese Center for Energy Conservation (LCEC) [...]"

Current Situation:

- A committee of 4 experts has developed and finalized the draft energy conservation law.
- A national workshop to discuss the draft energy conservation law was held on July 2, 2010 including more than 30 participants representing all concerned parties.
- The final version of the draft energy conservation law was amended and finalized as per the comments of the national stakeholders.
- The final version of the draft energy conservation law to the Lebanese was forwarded to the Lebanese Cabinet in preparation for transmission to the Lebanese Parliament
- The Lebanese Center for Energy Conservation (LCEC) is considered as an independent organization under the supervision of the Ministry of Energy and Water, through the issuance of its foundation acknowledgment from the ministry of interior.
- The United Nations Development Programme (UNDP) is maintaining the administrative and financial support of LCEC that started back in 2005.
- The European Union (EU) has dedicated an amount of 500,000 Euros as a technical assistance (TA) to LCEC at the legislative, financial, and technical support to strengthen its position as the national energy agency for Lebanon.
- LCEC is the national focal point for the EU--funded regional projects of MED-EMIP and MED-ENEC.
- LCEC is the official representative of Lebanon in the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) based in Cairo, Egypt.
- LCEC is coordinating with the team of the selected experts by the EU TA starting October 2010 and ending October 2011

Milestones and Proposed Steps:

- ✓ Present the draft energy conservation law to the Lebanese Government by June 2011.
- ✓ Present the draft energy conservation law to the Lebanese Parliament by August 2011.
- ✓ Discussion of the law by the Energy Committee of the Lebanese Parliament by September 2011.
- ✓ Adoption of the energy conservation law for Lebanon by end of 2011.
- ✓ Work on the issuing of the decrees and decisions related to the requirements of the law regarding mandatory energy audits, financial incentives/decentives, and others by June 2012.
- ✓ Dedicate a piece of land owned by the Ministry of Energy and Water to build the new headquarters of LCEC as an energy-plus building by first half of 2012 (green building).
- ✓ Announce the conceptual design of the LCEC building and launch a fund raising initiative, and complete all design requirements of the LCEC building by first half of 2013.
- ✓ Start-up the construction of the LCEC building by second half of 2013 (upon availability of funding) and inaugurate the operation of the LCEC building by the end of 2014 .

Budget, Investments, and Benefits:

- ✓ The discussion group workshop was organized by the LCEC and financed from the Lebanese Center for Energy Conservation budget, funded by the Global Environment Facility.
- ✓ Making the LCEC the regulating body of the carbon credits trading in Lebanon would generate considerable revenue by buying at discount, bundling and selling at market price.
- ✓ Target the banks with green corporate image for fund raising to help in the construction of the LCEC building.
- ✓ The UNDP/CEDRO project has assigned an amount of 100,000 USD to develop the conceptual design of the LCEC headquarter.
- ✓ The Ministry of Energy and Water has dedicated a considerable budget for the construction of the new facility of the LCEC (green building).

Initiative 3: Promotion of Decentralized Power Generation by PV and Wind Applications in the Residential and Commercial Sectors

This initiative aims to support the residential and commercial uses of wind energy and solar photovoltaic systems by increasing decentralized power generation by renewable energy sources with a target to achieve an installed capacity of 50 to 100 MW by 2015. This requires technical, marketing, as well as financial support with necessary actions to be taken at the legal framework.

Policy References:

- The MEW policy paper initiative 6, action step e: "Set-up the National Energy Efficiency and Renewable Energy Action (NEEREA) as a national financing mechanism and develop the ESCO (Energy Service Company) business dealing with energy audit applications."

Current Situation:

- The UNDP/CEDRO project has installed more than 20 PV standalone systems of capacities between 1.2 and 1.8 kW with a few being grid-connected to examine feed-in policy.
- The UNDP/CEDRO project is preparing for the implementation of small-scale pilot projects for the use of wind energy as well as more than 20 new PV sites with a total capacity of around 40 kW.
- The UNDP is finalizing a new initiative to be supported by the Global Environment Facility (GEF) to reduce greenhouse gas emissions by increasing decentralized power generation by renewable energy sources.
- The UNDP/CEDRO project published the wind atlas for Lebanon that studies the onshore and offshore wind energy potential. The atlas focuses on the constrained potential, i.e. only on sites where wind farms can be constructed (for e.g. no wind farm is possible on natural reserves or urban areas).
- Solar radiation data is being collected in different locations all over the country.
- The Lebanese Center for Energy Conservation (LCEC) has conducted a market survey to identify the local suppliers and dealers of solar PV solutions.
- The Central Bank of Lebanon, in cooperation with the European Union (EU) and the United Nations Development Programme (UNDP) issued the circular related to the setup of the National Energy Efficiency and Renewable Energy Action (NEEREA) that offers interest-free long-term loans to energy efficiency and renewable energy projects with full risk guarantee.
- A series of training seminars were carried out throughout 2011 to raise awareness and build the technical know-how (design and operation) of engineers, technicians, developers, bankers, and others on wind energy potential in the residential and commercial sectors.
- Throughout 2011, efforts were initiated and coordinated to launch the operation of the National Energy Efficiency and Renewable Energy Action (NEEREA) aiming to leverage 100 Million USD until 2015 in renewable energy investments including decentralized solar PV and wind energy applications.
- LCEC coordinated with the officials at the Electricite du Liban (EDL) to overcome technical constraints related to the power quality and grid stability in order to allow gridconnected PV and wind systems in 2011.

Milestones and Proposed Steps:

- ✓ Launch and finalize micro-wind energy pilot projects for public buildings at different locations in Lebanon by first half of 2012 (around 10 sites) by the UNDP/CEDRO project.
- ✓ Launch and finalize solar PV energy pilot projects for public buildings at different locations in Lebanon by first half of 2012 (around 20 sites) by the UNDP/CEDRO project.
- ✓ Conduct a pilot project to install solar powered pumps off the grid in agricultural areas to help farmers by first half of 2012 .
- ✓ Coordinate with the Ministry of Finance to assess and develop financial incentives on the import of solar PV and wind energy equipment in 2013 .
- ✓ Conduct solar PV and wind market surveys to identify the barriers and obstacles in 2012.
- ✓ Adopt a grid code to serve as an implementation decree regulating the connection of the renewable energy producers to the grid by end of 2011.

- ✓ Adopt the final legal and regulatory package needed to implement the concept of net-metering to allow grid-connection of renewable energy systems by end of 2012.
- ✓ Implement the required amendments into the current construction and building norms to ensure integration and increased utilisation of different solar energy technologies in buildings by end of 2013.
- ✓ Development and integration into the curricula of educational institutes of materials programs related to the different aspects of decentralized renewable energy power generation by first half of 2013.
- ✓ Adopt a quality control scheme with related market surveillance and enforcement mechanism for renewable energy products by end of 2013.

Budget, Investments, and Benefits:

- ✓ The wind atlas is financed by the UNDP/CEDRO project with an approximate cost of 85,000 USD.
- ✓ Pilot projects are supervised and funded by UNDP through CEDRO & other projects. Additional sources of finance are required for the implementation of all proposed pilot projects.
- ✓ A total budget of around 2-3 Million USD is required for the implementation of the complete strategy related to the development of this initiative, especially those actions targeting the legal, financial, and quality control aspects.
- ✓ An approximate investment of around 250 to 500 Million USD is required to reach the target of 50 to 100 MW of decentralized renewable energy production.
- ✓ NEEREA could cover part of the needed investments. Other financing mechanisms and grants must be looked for.

Initiative 4: Solar Water Heaters for Buildings and Institutions

This initiative aims at promoting the use of solar water heaters mainly in the residential sector with the aim to facilitate the installation of 190,000 m² of solar collectors by 2014. This can be achieved through different actions including proper financial and technical schemes.

Policy References:

- The MEW policy paper initiative 6, action step c: "Increase the penetration of Solar Water Heaters (SWH) and devise innovative financing schemes in collaboration with the banking sector to achieve the slogan 'A solar heater for each household'"

Current Situation:

- Based on the request of the Ministry of Energy and Water, the Government of Lebanon committed to invest 1.5 million USD to implement a financing mechanism to subsidize residential solar water heaters and offer no-interest loans (Council of Ministers decision No. 59, on March 10, 2010).
- The Lebanese Center for Energy Conservation (LCEC) has selected the energy efficiency standard for the Solar Water Heaters in Lebanon. Libnor has adopted the standard as elective on March 15, 2007.
- The Council of Ministers decision No. 38 dated September 21, 2010 regarding the adoption of the standards for the CFL and the SWH as mandatory.
- The Lebanese Center for Energy Conservation (LCEC) is following a capacity building plan to develop a strong technical knowledge through leading pilot projects and conducting trainings and workshops for solar thermal technicians and engineers.
- The UNDP/CEDRO project is implementing pilot projects for public buildings and facilities. The experiences and data from these projects will be disseminated through event held with the LCEC.
- The Lebanese Center for Energy Conservation (LCEC) has launched the "Developing of Solar Water Heaters Market in Lebanon" initiative aiming to accelerate market development and add more than 50,000 m² of solar water heaters annually, and thus escalating the installed capacity to reach more than 1 million m² in 2020.
- The Lebanese Center for Energy Conservation (LCEC) conducted a solar thermal market study to identify the obstacles and barriers decelerating the development of the market and come up with possible solution based on which the "Developing of Solar Water Heaters Market in Lebanon" initiative is coordinated.
- The EU support team to LCEC and the World Bank strongly recommended the promotion of compulsory SWH in residential buildings in two reports (EU: "Solar Water Heaters in Lebanon, proposal for financing mechanism" January 2011, and TWB: "Development of a large scale Solar water heater market in Lebanon; LebSol Program", July 2011)
- The Ministry of Energy and Water has started distributing solar water heaters for 400 residences all over Lebanon received as a donation by the Chinese government.
- The Lebanese Center for Energy Conservation (LCEC) is coordinating the delivery of 350 Solar Water Heaters to Safad Al Batikh
- South Lebanon. These SWHs are a part of a grant by the Greek Government for the reconstruction of the South after the July 2006 war. The Greek grant project is supervised and managed by the United Nations Development Programme (UNDP).
- The Industrial Research Institute (IRI), as a part of a grant by the Greek Government for the reconstruction of the South after the July 2006 war, has finished the installation of a solar water heating testing laboratory. The Greek grant project is supervised and managed by the United Nations Development Programme (UNDP).
- The United Nations Development Programme (UNDP) in Lebanon and the Lebanese Center for Energy Conservation (LCEC) are conducting an assessment of the use of solar water heaters and analyze the market performance.
- The United Nations Development Programme (UNDP), in cooperation with the Central Bank of Lebanon and the European Union Fund, the National Energy Efficiency and Renewable Energy Action (NEEREA) are offering interest-free long-term loans to energy efficiency and renewable energy projects with full risk guarantee.

Milestones and Proposed Steps:

- ✓ Finalize the distribution of the 400 solar water heaters by end of 2011.
- ✓ Coordinate and push for the installation of 350 solar water heaters by first half of 2012 .
- ✓ Continue subsidizing 7500 solar water heaters with 200\$ each for a sum of 1.5 millions USD and offer 0% interest rate 5-year loans, saving 20 Million USD yearly.
- ✓ Build a specific solar water heating website to be updated regularly and to become a central reference.
- ✓ Launch a nationwide awareness campaign on the “A solar heater for each household” project by end of 2011
- ✓ Organize an annual solar water heaters trade seminar by the end of 2011.
- ✓ Provide technical support to solar water heaters manufacturers and suppliers to improve their product quality in 2011.
- ✓ Coordinate with the Ministry of Finance on the design of feasible financial incentives on the import of solar water heaters by first half of 2011.
- ✓ Prepare a draft law incorporated into building code to enforce the use of solar water heaters in new and existing buildings in 2012.
- ✓ Conduct awareness campaigns and plans for technical issues to educate consumers and dealers.
- ✓ Promote the use of solar water heating systems for collective use and water heating purposes in big facilities.
- ✓ Submit the draft law incorporated into building code to the Government of Lebanon and ensure the adoption by end of 2012.

Budget, Investments, and Benefits:

- ✓ The 400 solar water heaters are donated by the Chinese government. The price of the SWH's is around 400,000 USD.
- ✓ The 350 solar water heaters supply and installation for Safad al Batikh are a donation by the Greek Government with a budget of around 350,000 USD.
- ✓ The solar thermal testing facility supply and installation at the Industrial Research Institute premises is a donation by the Greek Government with a budget of around 80,000 USD.
- ✓ The total budget for solar water heaters financing mechanism is 1.5 million USD, and it is expected to get 3 million USD at a later stage.
- ✓ The National Energy Efficiency and Renewable Energy Action (NEEERA) is a joint effort of several players, with a fund from the European Union of 15 Million Euros (around 21 Million USD), and try to assure other funds.
- ✓ Three awareness campaigns will be conducted with a budget of 50,000 USD.

Initiative 5: Design and Implementation of a National Strategy for Efficient and Economic Public Street Lighting in Lebanon

This initiative aims at the design and implementation of a national strategy for public street lighting in Lebanon in order to offer a safe and energy efficient street lighting with an intelligent monitoring, control, and maintenance procedure. This initiative can be achieved by updating, replacing, and installing new photo-sensor devices in the different street lighting sectors in order to illuminate the roads when needed, and to develop technical specifications for the energy efficient street lighting lamps, as well as the increase in the know-how and capacity of the personnel working on the operation and maintenance.

Policy References:

- The MEW policy paper initiative 6, action step d: "Encourage the use of energy saving public lighting [...]"

Current Situation:

- Based on the request of the Ministry of Energy and Water, the Government of Lebanon committed to invest 500,000 USD in public street lighting to replace and install photosensors and establish a technical specifications document (Council of Ministers decision No. 59, on March 10, 2010).
- On August 4, 2010, the Ministry of Energy and Water has assigned an internal committee to update the technical specifications used for public street lighting at the Ministry.
- The Lebanese Center for Energy Conservation (LCEC) has already launched a technical and economic study to assess the different lamps technologies used in public street lighting.
- The UNDP/CEDRO project has installed two pilot projects in public street lighting in the historic sea port of Jbeil and the village of Assia, Batroun. Furthermore, an LED street lighting project is being implemented at Moukhtara, while a dimming project is going to be launched and co-financed with Solidere in downtown Beirut. A centralised PV street lighting is also being prepared for the main street in Nabateyeh. All in all, CEDRO will document its experiences and coordinate with the LCEC and the Ministry of Energy and Water on this issue.
- The 3M Lamps team and LCEC have completed a technical review on photo-sensor devices and finalized the technical specifications for the purchase of these devices (total budget of 300,000 USD) by January 2011.
- The Ministry of Energy and Water launched a bid for the purchase of photo-sensor devices.
- Coordination with the Ministry of Public Works (MPW), the Ministry of Interior and Municipalities (MIM), and the Council for Development and Reconstruction (CDR) was made for the adoption of the new technical specifications of the public street lighting.
- Lessons learnt from the PV street lighting system installed in the municipality of Assia were analysed.

Milestones and Proposed Steps:

- ✓ Establish a hotline to collect and compile all problems facing public street lighting systems all over Lebanon. The hotline will be operational for a period of 3 months, starting December 2011.
- ✓ Launch a national awareness campaign targeting Lebanese citizens regarding the hotline by November 2011.
- ✓ Install new photo-sensor devices all over Lebanon by first half of 2012.
- ✓ Launch a maintenance and calibration campaign of the existing photo-sensor devices used for public street lighting. Verify the good operation of photo-sensor devices by first half of 2012.
- ✓ Develop and implement different training and capacity building workshops for municipalities, ministries officials for a period of 3 months ending by first half of 2012.
- ✓ Implementation of a typical pilot project on new efficient lamps in a typical village with smart control and monitoring by first half of 2012 (in cooperation with major lamps supplier).
- ✓ Complete a study on solar PV street lighting potential and elaborate an installation map defining most critical points to be illuminated across Lebanon by first half of 2012 .
- ✓ CEDRO/LCEC are to prepare a joint study based on experiences of all energy efficient and/or renewable street lighting types – to map the way forward in Lebanon for street lighting.

- ✓ Cooperate with the UNDP/CEDRO project for the installation of a small pilot project on LED street lighting and analyse the lessons learnt by first half of 2012 2011.
- ✓ Involve the municipalities in data collection about the types and conditions of the fixtures.
- ✓ Enforce the usage of renewable energy sources on street lighting poles when replacing and/or adding new fixtures.
- ✓ Enhance the deployment of renewable energy sources in remote villages (up to 100%) as to benefit from the reduction of the technical losses.
- ✓ Standardize the type of lamps to be used (LED, induction and Low Pressure Sodium) in addition to determining the national norms for height and distance in between the poles as to achieve the desired Lux level.
- ✓ Adopting a hybrid charging of batteries using renewable source and EDL grid power where applicable with priority to renewable charging.

Budget, Investments, and Benefits:

- ✓ Out of the total amount of 500,000 USD committed by the Government of Lebanon for the efficient use of public street lighting, the total budget for the purchase of new photo-sensor devices is 250,000 USD.
- ✓ The remaining amount will be used as follows: 50,000 USD for marketing, capacity building, and awareness raising campaigns, and 200,000 USD will be dedicated to the Project Management Unit (PMU) for the installation of the photo-sensor devices, the supervision of the project, and the follow-up on the results.
- ✓ The good management of the public street lighting systems in the country will allow the reduction of the inefficient use of these systems during the day and to the useful use at night.
- ✓ The PV system pilot project will be financed by the UNDP CEDRO project. The estimated budget is around 80,000 USD.
- ✓ The typical public street lighting will be installed by the supplier of the system.

Initiative 6: Electricity Generation from Wind Power

This initiative aims to promote the generation of electricity through the use of wind energy. This can only be achieved through technical and policy related actions.

Policy References:

- The MEW policy paper initiative 5, action step a: "Complete a wind atlas for Lebanon and launch IPP wind farms with the private sector (2010)"
- The MEW policy paper initiative 1, action step f: "Introduce wind power via the private sector by building wind farms (60 -100 MW)

Current Situation:

- The UNDP/CEDRO project is preparing for the implementation of small-scale pilot projects for the use of wind energy.
- The UNDP/CEDRO project published the wind atlas for Lebanon that studies the onshore and offshore wind energy potential. The atlas focuses on the constrained potential, i.e. only on sites where wind farms can be constructed (for e.g. no wind farm is possible on natural reserves or urban areas).
- The Lebanese Center for Energy Conservation (LCEC) has conducted a market survey to identify the local suppliers and dealers of wind energy solutions.
- The United Nations Development Programme (UNDP), in cooperation with the central bank of Lebanon and the European Union, the National Energy Efficiency and Renewable Energy Action (NEEREA) will offer interest-free long-term loans to energy efficiency and renewable energy projects with full risk guarantee.
- Coordination with the officials at the Electricite du Liban (EDL) was carried out to overcome technical constraints related to the power quality and grid stability in order to allow grid-connected wind systems.

Milestones and Proposed Steps:

- ✓ Conduct a wind energy market survey to identify the barriers and obstacles in 2012.
- ✓ Adopt a grid code to serve as an implementation decree regulating the connection of the renewable energy producers to the grid by end of 2012 .
- ✓ Adopt the final legal and regulatory package needed to implement the concept of net-metering to allow wind farms energy systems by June 2013.
- ✓ Build the first wind farm in Lebanon by the Ministry of Energy and Water by end of 2012.
- ✓ Build wind farms for power generation and launch Independent Power Production (IPP) with the private sector to reach a capacity of 100-200 MW by 2014.
- ✓ Coordinate with the Ministry of Finance for the application of financial incentives on the import of wind energy equipment in 2012.

Budget, Investments, and Benefits:

- ✓ The wind atlas is financed by the UNDP/CEDRO project with an approximate cost of 85,000 USD.
- ✓ Wind farms for power generation would be financed by the private sector in addition to private investors.
- ✓ The CDM revenues would result in earnings that would only be defined after the approval of the project.
- ✓ The budget for building the first wind farm in Lebanon by the Ministry of Energy and Water could be available through grant funding and low-interest loans.

Initiative 7: Electricity Generation from Solar Energy

This initiative aims to start the development and promote the generation of electricity through the execution of Photovoltaic (PV) and Concentrated Solar Power (CSP) farms. For this to be achieved, proper policy and technical actions are to be taken in addition to ensuring the right financial modalities.

Policy References:

The MEW policy paper initiative 5, action step b: "Start a pre-feasibility study on Photovoltaic (PV) farms"

Current Situation:

- *The UNDP/CEDRO project is implementing pilot projects in the public sector for hospitals and schools with capacities ranging from 1.2 to 1.8 kW*
- *The Council for Development and Reconstruction (CDR) is developing a pilot project PV farm with a rated capacity between 1 MW and 5 MW.*
- *The Lebanese Center for Energy Conservation (LCEC) has conducted a market survey to identify the local suppliers and dealers of solar PV solutions.*
- *The UNDP/CEDRO project has initiated a number of studies to identify the necessary requirements to support PV and CSP (and other small-scale generation systems) including net metering, feed-in tariffs, subsidies, and so forth in length and come out with recommendations.*
- *The CSP study is accomplished and undergoing final revisions.*

Milestones and Proposed Steps:

- ✓ Finalize the prefeasibility study for PV farms and CSP farms by CEDRO in first half of 2012.
- ✓ Coordinate with the Ministry of Finance for the application of financial incentives on the import of PV equipment in 2012.
- ✓ Conduct a solar PV market survey to identify the barriers and obstacles in 2012.
- ✓ Ensure the needed financing through grants and loans to ensure the installation of the first PV farm in Lebanon in full coordination with the Council for Development and Reconstruction (CDR), Electricité du Liban (EDL), and the donors' community by first half of 2012.
- ✓ Coordinate with the officials at the Electricite du Liban (EDL) to overcome technical constraints related to the power quality and grid stability in order to allow grid-connected wind systems in 2012.
- ✓ Adopt a grid code to serve as an implementation decree regulating the connection of the renewable energy producers to the grid by June 2012.
- ✓ Adopt the final legal and regulatory package needed to implement the concept of net-metering to allow Photovoltaic (PV) and Concentrated Solar Power (CSP) farms energy systems by June 2013.
- ✓ Build PV and/or CSP farms for power generation and launch Independent Power Production (IPP) with the private sector to reach a capacity of 100-200 MW by 2014.

Budget, Investments, and Benefits:

- ✓ The prefeasibility study for PV farms and CSP farms are financed by the UNDP/CEDRO project with an approximate cost of 40,000 USD.
- ✓ The pilot PV farm will be funded by international donors and is currently discussed with the Chinese Embassy in Lebanon.
- ✓ PV power plants for power generation would be financed by the private sector in addition to private investors.

Initiative 8: Hydro Power for Electricity Generation

This initiative aims to encourage and promote the use of hydro power to produce electricity. This is to be achieved through support of hydro and micro- hydro projects and working on better exploitation of water resources.

Policy References:

- The MEW policy paper initiative 1, action step e: "Increase the share of hydraulic power production through maintenance, rehabilitation and/or replacement of existing hydro plants, and facilitate the implementation of additional capacity on BoT basis, and storage dams [...]"
- The MEW policy paper initiative 5, action step d: "Encourage all individual and private initiatives to produce hydro power; even micro-hydro"

Current Situation:

- The installed capacity of all hydro plants is 274 MW with an actual generation capacity of 190 MW.
- The share of electricity generated through Litani, Nahr Ibrahim, and Bared is around 4.5% from the total production.
- The Litani power plants would become obsolete in a few years, following the imminent execution of Conveyor

Milestones and Proposed Steps:

- ✓ Rehabilitation of existing power plants to improve their performance by an additional 20 to 30 MW by June 2013.
- ✓ New generation of around 10 MW through building two additional hydropower plants by June 2013.
- ✓ Add an additional set at Richmaya power plant with a capacity of 3MW by December 2012.
- ✓ Promotion of micro hydro and supporting small scale projects starting end of 2011.
- ✓ Build a national hydro power strategy for Lebanon to indentify and assess the potential for hydro power in Lebanon by mid 2012.
- ✓ Conduct a feasibility study by the engineering office of management and public works for the execution of two hydro power plants in Kadisha.

Budget, Investments, and Benefits:

- ✓ The hydro power strategy is to be funded the UNDP/CEDRO project with an estimated budget of around 200,000 USD.
- ✓ Funding of the rehabilitation and execution of new hydropower sets would be secured by the Government of Lebanon and other contributors.

Initiative 9: Geothermal, Waste to Energy, and Other Technologies

This initiative aims to help reduce waste and benefit from waste to energy conversion techniques in addition to the geothermal power to produce electricity. This is to be achieved through several actions including finding a solution to solid waste treatment.

Policy References:

- The MEW policy paper initiative 1, action step g: "Encourage the private sector to adopt the technologies of "waste to energy" for power generation and investigate geothermal energy"
- The MEW policy paper initiative 5, action step c: "encourage public and private sectors to adopt incineration technologies to produce electricity from waste"

Current Situation:

- The UNDP/CEDRO project is preparing a national strategy for the biomass potential in Lebanon.
- The government of Lebanon has adopted a plan that transforms waste to energy.
- Projects in South and North Lebanon has been implemented to produce energy from municipal waste through bio-digesters

Milestones and Proposed Steps:

- ✓ Finalize the biomass strategy for Lebanon in the second half of 2012.
- ✓ Build waste to energy power generation units to reach a capacity of 15-25 MW by 2014.
- ✓ Work on preparing a study for the potential of geothermal energy in Lebanon useful for electricity and thermal energy generation
 - ✓ At the same time drilled wells to investigate the geothermal potential could also serve to draw some information about the mineralogical map of the areas investigated (coring).
 - ✓ Initiate and coordinate the National Energy Efficiency and Renewable Energy Action (NEEREA) in 2011 aiming to leverage 100 Million USD until 2015.
 - ✓ Research the potential of isolated geothermal applications especially in HVAC and agriculture (heating greenhouses in winter).

Budget, Investments, and Benefits:

- ✓ The biomass strategy is financed by the UNDP/CEDRO project with an approximate cost of 210,000 USD.
- ✓ The National Energy Efficiency and Renewable Energy Action (NEEREA) is a joint effort of several players, with a fund from the European Union of 15 Million Euros (around 21 Million USD)
- ✓ The CDM revenues would result in earnings that would only be defined after the approval of the project.
- ✓ Isolated geothermal applications such as HVAC and heating green houses in winter can be up to 70% more efficient than current used equipment.

Initiative 10: Building Code for Lebanon

This initiative aims at setting a building energy efficiency code for new buildings and major retrofits in Lebanon. This code defines the minimum acceptable energy performance for buildings by addressing equipment energy efficiency and envelope thermal requirements accordingly with Lebanese climatic conditions.

Policy References:

- The MEW policy paper initiative 8, action step b: “Develop rules and laws that promote the largest penetration of Green Buildings and Energy Efficiency in collaboration with concerned institutions”
- The MEW policy paper initiative 8, action step d: “Comply and respect international norms and standards in the energy efficiency, environment and public safety domains”

Current Situation:

- In 1999, a thermal insulation standard was established by LIBNOR and registered as a Lebanese standard NL68 1999, “Guide to the Thermal Insulation and Summer Comfort of Buildings in Lebanon”.
- The project “Capacity Building for the Adoption and Application of Thermal Standards for Buildings”, managed by UNDP and executed in the General Directorate of Urban Planning, developed a thermal standard for Lebanese buildings in 2005.
- Based on the outcome of 2005 thermal standard project, incentives for double walls were accounted for in the 2005 amendments of the Lebanese building code.
- The Order of Engineers and Architects of Beirut and the ADEME (Agence de l’Environnement et de la Maîtrise de l’Energie) published a draft report about the thermal standards for new residential and non-residential buildings in Lebanon during mid-2010.
- The Central Bank of Lebanon, in cooperation with the European Union (EU) and the United Nations Development Programme (UNDP) issued the circular related to the setup of the National Energy Efficiency and Renewable Energy Action (NEEREA) that offers interest-free long-term loans to energy efficiency and renewable energy projects with full risk guarantee.
- The World Bank has launched in September 2010 a call for tender for the “thermal building standards review and implementation plan” in conjunction with the Lebanese Center for Energy Conservation (LCEC).
- International Finance Corporation (IFC) subsidiary of World Bank has signed an agreement of cooperation with the Lebanon Green Building Council (LGBC) aiming at developing a rating system for existing Commercial buildings, due to be completed by mid June 2011.
- Lebanon Green Building Council (LGBC) is developing an energy Efficient Air Conditioning Equipment Standard with the support of Amideast/USAID grant.
- The Lebanese Center for Energy Conservation (LCEC) coordinated with the World Bank assigned experts to review the two thermal standards for buildings prepared by the UNDP project and the Order of Engineers and Architects of Beirut. The experts proposed a roadmap for the proper implementation of the code.

Milestones and Proposed Steps:

- ✓ The UNDP and GEF to launch a 5-year project aiming to prepare and study the building code for Lebanon. The project will be managed and administered by the UNDP under GEF funding.
- ✓ The United Nations Development Programme to assign an international consultant with a short-term mission to study the Lebanese situation and propose a project document for the Building Code in line with the international best practices.
- ✓ LCEC to update and amend thermal standards according to World Bank recommendations.
- ✓ LCEC to define capabilities and requirements of energy simulation software to be used to check the building compliance with requirements of thermal standards.
- ✓ LCEC to develop minimum performance energy standards for equipment, lighting and HVAC at a first stage, followed by other energy consuming devices.
- ✓ LCEC to conduct a workshop and a discussion group including involved parties and institutions to discuss the building code and thermal standards for Lebanon.

- ✓ In collaboration with international and national actors, LCEC to manage a series of capacity building workshops and trainings for registered engineers and architects on energy efficiency for equipment, thermal requirements for building envelope and energy simulation software.
- ✓ In coordination with the Order of Engineers and Architects and other concerned parties, LCEC to prepare a national proposal for a building energy efficiency code to be submitted to the Council of Ministers for approval.
- ✓ Speed up the building code issuance as to cover the current construction boom in Lebanon.
- ✓ Make university students familiar with the energy efficiency requirements for buildings by integrating building energy efficiency code in the engineering curriculum.
- ✓ Establish testing facilities for equipment and building materials through central testing facilities like IRI or accredited third party independent agencies.

Budget, Investments, and Benefits:

- ✓ The “Capacity Building for the Adoption and Application of Thermal Standards for Buildings” project was funded by the Global Environment Facility (GEF)
- ✓ The thermal standards for new residential and non-residential buildings in Lebanon draft study is funded by ADEME
- ✓ The experts to review the thermal standards for building and propose an implementation methodology are funded by the World Bank with a budget of 60,000 US dollars.
- ✓ The Building Code UNDP project is financed by the Global Environment Facility with a budget of 2 million US dollars.
- ✓ The National Energy Efficiency and Renewable Energy Action (NEEREA) is a joint effort of several players, with a fund from the European Union of 15 Million Euros (around 21 Million USD) The IFC support for the green building rating is through hiring international consultants at a cost of 100,000 USD.
- ✓ The air-conditioning standards project is supported by the Amideast through a donation of 46,200 USD.

Initiative 11: Financing Mechanisms and Incentives

This initiative aims to provide proper financing mechanism in order to promote the use of energy efficiency and renewable energy. This is mainly linked to the collaborative work with the Ministry of Finance and the Central Bank of Lebanon.

Policy References:

- The MEW policy paper initiative 6, action step e: "Set-up the National Energy Efficiency and Renewable Energy Action (NEEREA) as a national financing mechanism and develop the ESCO (Energy Service Company) business dealing with energy audit applications."

Current Situation:

- The Central Bank of Lebanon, in cooperation with the European Union (EU) and the United Nations Development Programme (UNDP) issued the circular related to the setup of the National Energy Efficiency and Renewable Energy Action (NEEREA) that offers interest-free long-term loans to energy efficiency and renewable energy projects with full risk guarantee.

Milestones and Proposed Steps:

- ✓ Coordinate with the Ministry of Finance for the application of financial incentives on the import of solar water heaters by 2011.
- ✓ Initiate and coordinate the National Energy Efficiency and Renewable Energy Action (NEEREA) in 2011 aiming to leverage 100 Million USD until 2015.
- ✓ Propose the creation of an Energy Efficiency Fund dedicated to finance and eventually subsidise innovative initiatives to demonstrate their sustainability and open the door to further classical financing tools.
- ✓ Provide a clear procedure for all carbon reducing projects (even to households) to sell their carbon credits.
- ✓ Explore the potential for new lines of credit to be used for the financing of energy efficiency and renewable energy projects by first half of 2012.

Budget, Investments, and Benefits:

- ✓ The total budget for solar water heaters financing mechanism is 1.5 million USD.
- ✓ The National Energy Efficiency and Renewable Energy Action (NEEREA) is a joint effort of several players, with a fund from the European Union of 15 Million Euros (around 21 Million USD)
- ✓ The Energy Efficiency Fund requires up to 150 million \$ in the next 5 years to support NEERA initiatives

Initiative 12: Awareness and Capacity Building

This initiative aims to raise awareness and build the capacity of all stakeholders working in the energy efficiency and renewable energy sectors. It also focuses on analyzing and disseminating good practices, creating skills and experience in energy efficient technologies, as well as strengthening existing ones.

Policy References:

- *The declaration of the Lebanese Government: “[...] to encourage all energy conservation measures with special focus on the development of the solar water heaters market and the energy efficient lighting [...]”*

Current Situation:

- *The LCEC, Ministry of Energy and Water, and UNDP launched national awareness campaigns on solar water heaters, energy audit, and residential energy efficiency.*
- *The ministry of energy and water launched a nationwide awareness campaign on the CFL's project and its benefits in September 2010.*
- *The ministry of energy and water launched national awareness campaigns targeting general as well as specific audience in July 2011.*

Milestones and Proposed Steps:

- ✓ Launch pilot projects for public buildings at different locations in Lebanon by 2012.
- ✓ Launch a nationwide awareness campaign on the “A solar heater for each household” project by the end of 2011.
- ✓ Coordinate with the League of Arab States and the MED-ENEC to launch a regional energy efficiency awareness campaign by end of 2011.
- ✓ Conduct seminars and awareness raising activities in schools, universities, and other institutions by 2012.

Budget, Investments, and Benefits:

- ✓ The solar water heaters awareness campaign is financed by the Ministry of Energy and Water costing 50,000 \$ for three campaigns.
- ✓ The Arab Energy Efficiency Awareness Campaign is funded by the European Union through the MED-ENEC project.

Initiative 13: Paving the Way for Energy Audit and ESCO Business

This initiative aims to support the development of the Energy Service Companies (ESCOs) working in the energy audit business and provide them with financial, fiscal, and technical incentives to remove barriers and promote energy audit activities.

Policy References:

- *The MEW policy paper initiative 6, action step a: "Adopt the Energy Conservation law and institutionalize the Lebanese Center for Energy Conservation (LCEC) [...]"*
- *The MEW policy paper initiative 6, action step e: "Set-up the National Energy Efficiency and Renewable Energy Action (NEEREA) as a national financing mechanism and develop the ESCO (Energy Service Company) business dealing with energy audit applications."The statement of the parliamentary workshop on March 1 and 2, 2010:"[...] emphasis on the importance of producing the energy conservation law and presenting it to the parliament for approval [...]"*

Current Situation:

- *The Lebanese Center for Energy Conservation launched an energy audit support program resulting in more than 100 energy audits with 2 qualified ESCOs and 6 qualified energy audit companies.*
- *The LCEC, UNDP, and the Ministry of Energy and Water launched a comprehensive campaign to promote energy efficiency in facilities and energy auditing for buildings and companies.*
- *Several capacity building programmes and trainings have been conducted to train engineers, technicians, and project managers on energy auditing techniques.*
- *The EU support team wrote a report aiming to describe various successful experiences and tools to promote ESCOs and audits, including qualification and third party financing of energy improvement.*
- *LCEC and the BDL initiated the National Energy Efficiency and Renewable Energy Action (NEEREA) in 2011 aiming to leverage 100 Million USD until 2015.*

Milestones and Proposed Steps:

- ✓ Offer trainings, workshops, and seminars on energy audit activities and procedures to engineers, technicians, bankers, and developers by 2012.
- ✓ Set governmental buildings as example and audit all their facilities and study transforming some of them into green buildings by 2012.
- ✓ Create the platform for coordination between existing ESCO's and Lebanese commercial banks by the first half of 2012.
- ✓ Finalize the final version of the draft energy conservation law that indicates mandatory energy audits for big facilities with high energy consumption.
- ✓ Promote the suggestion of EU to integrate the standard "ISO 50001: Energy Management" near all energy auditors, ESCO, and construction managers.

Budget, Investments, and Benefits:

- ✓ The National Energy Efficiency and Renewable Energy Action (NEEREA) is a joint effort of several players, with a grant from the European Union of 15 Million Euros (around 21 Million USD)

Initiative 14: Promotion of Energy Efficient Equipment

This initiative aims to promote the use of energy efficient equipment in households and other commercial buildings. This includes focusing on electrical equipment and establishing a national energy efficiency standard.

Policy References:

- The MEW policy paper initiative 8, action step b: "Develop rules and laws that promote the largest penetration of "Green Buildings (GB)" and "Energy Efficiency (EE)" in collaboration with concerned institutions."
- The MEW policy paper initiative 8, action step c: "Comply and respect international norms and standards in the energy efficiency, environmental and public safety domains."

Current Situation:

- The Lebanese Center for Energy Conservation (LCEC) has selected the energy efficiency standard for CFLs in Lebanon. Libnor has adopted the standard as elective on March 15, 2007.
- The Council of Ministers issued the decision of the No. 38 dated September 21, 2010 regarding the adoption of the standards for the CFL and the SWH as mandatory.
- The ministry of energy and water launched a nationwide awareness campaign on the CFLs project and its benefits in September 2010.
- The Lebanese Center for Energy Conservation launched the Energy Efficiency House Doctor program that offers residential users in Lebanon the opportunity to have an expert visiting their house and recommending energy conservation measures and introducing the use of efficient electrical equipment.

Milestones and Proposed Steps:

- ✓ Coordinate with the Ministry of Finance on the possibility of financial "decentives" on the import of incandescent lamps and of financial incentives on the import of CFLs by July 2011.
- ✓ Start an awareness raising strategy to promote the use of electrical equipment with high performance rating.
- ✓ Issue a list of electrical appliances with the necessity to develop energy efficiency norms and standards by February 2012.
- ✓ Reactivate the energy efficiency house doctor project by January 2012.

Budget, Investments, and Benefits:

- ✓ An approximate investment of around 1 Million USD is needed to initiate a national strategy on energy efficiency norms and standards for electrical appliances.

The background features a series of overlapping, curved, organic shapes in shades of yellow, orange, and light grey. Scattered throughout these shapes are several small squares, some solid and some with white outlines, in various colors including yellow, orange, and grey. The overall aesthetic is modern and abstract.

Section 2

NEEAP in Tabulated Format

Introductory Note

Through the framework of the Arab EE Directive, the Arab countries that are interested in adopting the directive are requested to set an energy efficiency target and assign an existing or a new public entity to draw or apply a 3-year (or 5-year) National Energy Efficiency Action Plan (NEEAP). The public sector should lead by example (exemplary role) and power utilities should provide services or contributing to a fund to implement EE measures. An annual progress report will be submitted to the League of Arab States and RCREEE showing the achieved savings.

This document developed jointly by RCREEE and MEDEMIP proposes a template and structure to report the salient features of the first NEEAP. The latter will be prepared for the first three year reporting period 2011-2013 by national entities. The template is not mandatory but a tool to assist the stakeholders to communicate essential measures and impact of their NEEAPs and will also assist RCREEE to summarize and analyze the results to be published on an annual basis by the Arab League.

The objective of this template is to report already ongoing, or planned measures to generate, transmit, distribute and use electricity more efficiently in order to meet any indicative national energy efficiency target that may be, or has been already stated for the 1st NEEAP period of three years 2011-2013.

RCREEE, as a regional platform promoting the development and harmonization of energy efficiency policies in the MENA region, with the support of the Arab League, will play an important role in providing technical assistance on the subject area to the Arab member states.

RCREEE will assist the Arab states in drafting their NEEAPs, discussing and assisting them in assessing the impact of national EE targets and supporting them in jointly identifying cost effective EE measures. Moreover, RCREEE will contribute in developing methodologies to measure and quantify the energy saving impact of the NEEAP's according to the recommendations framed in the Arab EE directive. RCREEE will furthermore explore various strategies to monitor progress of implementation of NEEA's, formulating recommendations for effective delivery mechanisms, participating in and providing input to various technical committees.

RCREEE will jointly explore with LAS and entities participating in implementation of the Arab EE Directive to apply and register for nationally appropriate mitigation actions (NAMA) as a basis for international recognition of many meaningful measures under NEEAP, that can be build under the existing Clean Development Mechanism (CDM) and may even fit into a regional program of activity type CDM measure.

1. Overview: Overall National Indicative Target

1.1 Key Indicators:

No	Indicator	Unit	Year 2010	Year 2020 ¹
1	Electricity intensity	GWh/\$ ²	0.44kWh/\$	0.42
2	National end use electricity consumption ³	GWh/year	15000**	
3	Projected electricity consumption growth rate ⁴	% /year	7***	
4	Share of electricity in final energy consumption ⁵	%	47	
5	Share of electricity consumption by sector ⁶			
	Sector 1 Industrial	26%	3900 GWh	5% reduction in growth rate
	Sector 2 Building	38%	5700 GWh	
	Sector 3 Governmental	17 %	2550 GWh	
	Sector 4 Others + losses	19 %	2850 GWh	
6	Marginal cost of kWh supplied (2011-2013) ⁷	\$/kWh	21 cents/kWh	

** MEW/EDL anticipated demand, production and purchases: 11522 GWh

*** MEW: new 150MW by 2014, and 1000MW after 2014, in addition to around 200MW from rehabilitation

1.2 Indicative Target:

The national indicative target is to be calculated according to paragraph 1.4 and the sectorial indicative targets will be estimated based on the sectors baseline and the sector EE measurers reported in chapter 2 in order to meet the national target.

	Baseline consumption GWh/5 years average	National indicative Energy Efficiency target			
		2020		2013(FirstNEEAP)3years	
		%	GWh	%	GWh
Total					
Sector 1	Industrial – 3627 GWh	5		2	80
sector 2	Building – 5570 GWh	5		12	1000(SWH)
Sector 3	Governmental – 2500 GWh	5			

¹ Official projection by the power industry or national Bureau of statistics or any other entity

² LC: GDP in local currency at current prices

³ The amount of electricity in GWh that has been supplied by public or private power plants to national transmission and distribution systems, or in the case of captive power plants used for own consumption. In this definition transmission and distribution networks are considered consumers of electricity since technical losses occur. Import of electricity has to be accounted for as well.

⁴ The average growth rate for the next 10 years 2011 to 2020 as reported by authorities

⁵ Based on the national electricity consumption, the national average Gross Heat Rate of power plants and the national primary energy consumption as published in the official energy intensity indicator reporting of a nation

⁶ Sector will be classified according to utilities statistics and as published in the annual power industry reports

⁷ The average generation costs for the next power plants or power blocks to be built in the reporting period based on given design fuels and predicted fuel prices using regulator approved life cycle cost analysis with assumed ROI and weighted average capital costs.

1.3 Name of Mandated National Entity and Contact Person:

Name: Dr. Farid Chaaban
Function: National Expert
Organization: MEW/LCEC
Postal address: American University of Beirut, PO box 11-0236, Beirut, Lebanon
Telephone: 00961 3 706474
Fax: 00961 1 744462
Email: fbchaban@aub.edu.lb

1.4 Calculation Methodology of the Baseline Electricity Consumption and the National Indicative Electricity Savings Target for 2020:

- Member States shall use the end use electricity consumption for the most recent five year period previous to the implementation of this Directive for which official data are available, to calculate an average amount of annual electricity consumption as per footnote 3.
- This electricity shall constitute the average amount consumed during the five-year period, not adjusted for degree days, structural changes or production changes.
- On the basis of this average amount of electricity consumption, called the baseline consumption, the national indicative electricity savings target shall be calculated for the total duration of this Directive.

Example-1: If the five year averaged national end use electricity consumption has been 10,000,000 MWh and the indicative target for 2020 has been set at 20% than $10,000,000 \times 0.20 = 2,000,000$ MWh of electricity need to be saved through projects listed in the NEEAP until the end of 2020.

The indicative electricity savings target in MWh for 2020 should be supported by measures listed and described in the national NEEAP. The calculation to reach this target is based on accumulated accounting of annual electricity savings. This methodology does not require by definition to select only measures producing sustainable electricity savings for all years up 2020; nor does it require "infinite" sustainability. However a realistic sustainability of each measure should be given to calculate the accumulated electricity savings up to and including 2020.

2. Sectorial Presentation: Planned and Ongoing EE measures for 2011-2015

[Energy efficiency improvement program, energy services, other measures to improve energy efficiency.]

2.1 Sector 1:

2.1.1 Overview Table of all EE Measures:

No	Title & description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011- 2013
1	Towards Banning the Import of Incandescent Lamps to Lebanon: This initiative aims at banning the import of incandescent lamps to Lebanon by the end of the year 2012, through the application of different independent but interrelated actions, mainly the 3 million CFL's project.	2010-2012	160 MW installed capacity or 239 GWh/year
2	Adoption of the Energy Conservation Law and Institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the national energy agency for Lebanon: The law offers a legal framework for the following subjects: energy audits, energy efficiency standards and labels, financial incentives for energy efficiency appliances, and net-metering.	Dec. 2010	Not applicable
3	Promotion of Decentralized Power Generation by PV and Wind Applications in the Residential and Commercial Sectors: This initiative aims to support the residential and commercial uses of wind energy and solar photovoltaic systems by increasing decentralized power generation by renewable energy sources.	By 2015	50-100 MW installed capacity or 131-263 GWh/year
4	Solar Water Heaters for Buildings and Institutions: This initiative aims at promoting the use of solar water heaters mainly in the residential sector.	Sept. 2010-2012	Depending on area equipped: in 2011, 7500 SWH: 26.35 GWh/year

No	Title & description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011- 2013
5	Design and Implementation of a National Strategy for Efficient and Economic Public Street Lighting in Lebanon: This initiative aims at offering a safe and energy efficient street lighting with an intelligent monitoring, control, and maintenance procedure. This initiative can be achieved by updating, replacing, and installing new photo-sensor devices in the different street lighting sectors in order to illuminate the roads when needed, and to develop technical specifications for the energy efficient street lighting lamps, as well as the increase in the know-how and capacity of the personnel working on the operation and maintenance.	Aug.2010	18.6 GWh/year over 3 years
6	Electricity Generation from Wind Power: This initiative aims to promote the generation of electricity through the use of wind energy. This can only be achieved through technical and policy related actions	2010 - 2014	60-100MW 120-200 GWh/year
7	Electricity Generation from Solar Energy: This initiative aims to start the development and promote the generation of electricity through the execution of Photovoltaic (PV) and Concentrated Solar Power (CSP) farms. For this to be achieved, proper policy and technical actions are to be taken in addition to ensuring the right financial modalities.	Feb. 2011 - 2015	100-200 MW installed by 2014. 263-526 GWh/year
8	Hydro Power for Electricity Generation: This initiative aims to encourage and promote the use of hydro power to produce electricity. This is to be achieved through support of hydro and micro- hydro projects and working on better exploitation of water resources.	2010 - 2015	40 MW 140 GWh/year by 2015 (80 MW to be installed later with additional 280 GWh/year saved)
9	Geothermal, Waste to Energy, and Other Technologies: This initiative aims to help reduce waste and benefit from waste to energy conversion techniques in addition to the geothermal power to produce electricity. This is to be achieved through several actions including finding a solution to solid waste treatment.	Sept. 2010-2012	Depending on area equipped: in 2011, 7500 SWH: 26.35 GWh/year

No	Title & description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011- 2013
10	Building Code for Lebanon: This initiative aims to set a standard for the existing and new buildings, to identify the minimum acceptable energy performance and present proper building envelope enhancement for Lebanese territories.	2010 - 2015	815 GWh/year
11	Financing Mechanisms and Incentives: This initiative aims to provide proper financing mechanism in order to promote the use of energy efficiency & renewable energy. This is mainly linked to the collaborative work with the ministry of finance & the central bank of Lebanon.	2011 - 2015	Not Applicable
12	Awareness and Capacity Building: This initiative aims to raise awareness about the importance of energy efficiency and introducing efficient technologies. It also focuses on analyzing & disseminating good practices, creating skills & experience in energy efficient technologies, as well as strengthening existing ones.	Since 2005	Not Applicable
13	Paving the Way for Energy Audit and ESCO Business: This initiative aims to help Energy Service Companies (ESCOs) and to provide them with financial, fiscal, and technical incentives to remove barriers and promote energy audit activities.	Since 2005	Not Applicable
14	Promotion of Energy- Efficient Equipment: This initiative aims to promote the use of energy-efficient equipment in households and commercial buildings. This includes focusing on electrical equipment and establishing a national energy efficiency standard.	2009 - 2013	38 GWh/year from standards and labels

2.1.2 Detailed information of individual measures8:

1

Initiative 1	Banning the Import of Incandescent Lamps to Lebanon
Objective	This initiative aims at banning the import of incandescent lamps to Lebanon by the end of the year 2012, and can only be reached through the application of different independent but interrelated actions, mainly the 3 million CFL's project.
Description of the measure	<p>The Government of Lebanon has committed to design & implement, through LCEC, the replacement of 3 million incandescent lamps with 3 million CFL's.</p> <p>The Lebanese Center for Energy Conservation (LCEC) has selected the energy efficiency standard for CFL's in Lebanon. LIBNOR has adopted the standard and The Council of Ministers has also approved the adoption of the standards for the CFL and the SWH as mandatory.</p> <ul style="list-style-type: none"> ✓ Delivery of CFL's to be completed in two phases: <ul style="list-style-type: none"> • 90,000 CFL's delivered by end of 2010; • 3 million lamps to be completely delivered by March 2011. ✓ Coordination with the Industrial Research Institute (IRI) to setup a testing facility for CFL's. ✓ These 90,000 CFL's are one component of a grant by the Greek Government for the reconstruction of the South after the July 2006 war. The Greek grant project is supervised and managed by the United Nations Development Programme (UNDP). ✓ These 3 million CFL's are one component of an action plan taken by the Government of Lebanon under the Ministry of Energy and water and in coordination with the LCEC. ✓ The ministry of energy and water launched a nationwide awareness campaign on the CFL's project and its benefits in October 2010.
Implementing agency	The LCEC is in charge of this initiative. A team of 9 professionals has been selected to supervise the distribution of the lamps. The LCEC has distributed 90,000 CFL's in 31 villages in South Lebanon.
Stakeholders involved	LCEC, EDL, IRI, Ministry of Finance, LIBNOR, retailers, municipalities
Target group	Residential sector (Lebanese households)
Program cost	\$ 7 million
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	239 GWh saved/year or 23.42 M\$ saved/year
Source of funding	GoL, Greek Government grant, UNDP/CEDRO
Financial instruments	Greek grant, CDM carbon credits purchaser, financial incentives on the import of incandescent lamps, and later banning the import of these lamps.
Awareness	Promotional campaign through local media, MEW's national campaign, national workshops in coordination with Order of Engineers and Architects, building developers, suppliers, and importers, vouchers.
Monitoring and quantification of impact	Assess the pilot project in Safad Al Batikh, 350 households totally fitted with CFLs, SWH, and new metering sets.

2

Initiative 2	Adoption of the Energy Conservation Law and Institutionalization of the Lebanese Center for Energy Conservation (LCEC) as the National Energy Agency for Lebanon:
Objective	The law offers a legal framework for initiatives such as energy audits, energy efficiency standards and labels, financial incentives for energy efficient appliances, and net-metering.
Description of the measure	A committee of 4 experts has drafted the energy conservation law, which was then debated and updated in a national workshop in 2010. Institutionalization of LCEC as an independent organization operating under the supervision of MEW is being finalized. In the meantime, LCEC is still maintained by UNDP. MEW has donated a piece of land to build the center on. Building design is being processed.
Implementing agency	GoL, Parliament, LCEC
Stakeholders involved	MEW, GoL, Parliament, LCEC, UNDP and GEF.
Target group	All sectors, public and private
Program cost	3.7 million (3M from UNDP, and 0.5M Euros from EU)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	Not Applicable
Source of funding	UNDP, GEF
Financial instruments	Banks, GoL, carbon credits trading
Awareness	National workshops, and promotion campaigns.
Monitoring and quantification of impact	LCEC is the national focal point for the EU- funded regional projects of MED-ENEC and MED-EMIP. LCEC is also the official representative of Lebanon in the RCREEE

3

Initiative 3	Promotion of decentralized power generation by PV and wind applications in the residential and commercial sectors.
Objective	This initiative aims to support the residential and commercial uses of wind energy and solar photovoltaic systems by increasing decentralized power generation by renewable energy sources with a target to achieve an installed capacity of 50 to 100 MW by 2015.
Description of the measure	This requires technical, marketing, as well as financial support with necessary actions to be taken at the legal framework. Power generation by private sector will be allowed. Wind atlas was published by CEDRO in January 2010
Implementing agency	UNDP/CEDRO, GoL, LCEC
Stakeholders involved	UNDP, MEW, MoF, EDL, EU.

Target group	Residential, commercial, and agricultural sectors
Program cost	\$250-500 M (strategy implementation) + \$2-3 M (decentralized production 50 to 100 MW) + \$85,000 (Wind Atlas)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	131-263 GWh/year or 13 – 26 M\$/year by 2015
Source of funding	NEEREA, CEDRO (wind atlas)
Financial instruments	NEEREA, long- term loans
Awareness	National workshops, and seminars
Monitoring and quantification of impact	Implementation Management Unit at MEW

4

Initiative 4	Solar Water Heaters for Buildings and Institutions
Objective	To promote the use of solar water heaters mainly in the residential sector so as to obtain around 30% savings.
Description of the measure	To implement a financing mechanism to subsidize residential solar water heaters that comply with pre- set standards. Also, the aim is to assess the use of solar heaters and accelerate their market penetration. Installation of 190,000m ² of solar collectors in the period between 2009 and 2014, adding 50 000 m ² per year till 2020
Implementing agency	LCEC
Stakeholders involved	LCEC, UNDP, Central Bank, Greek Govt, IRI
Target group	Residential and commercial buildings
Program cost	\$1.5-3M(financial mechanism for SWH) +\$750,000 (SWH) + \$80,000 (testing facility) + \$50,000 (awareness campaigns)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	3.5 MWh/year/unit or 343 \$/year/unit In 2011, for 7500 SWH , 26.25 GWh/year or 2.6 M\$/year In 2020,for 250000 SWH, 875GWh/year 85 M\$/year
Source of funding	UNDP, Greek Govt, Chinese Govt., NEEREA, Central Bank, and GoL.
Financial instruments	Long- term Interest- free loans, donations, and tax deduction.
Awareness	Several campaigns will be launched nationwide with a budget of \$50,000.
Monitoring and quantification of impact	1000 SWH installed in August 2011. Testing facility at IRI.

5

Initiative 5	Design and implementation of a national strategy for efficient and economic public street lighting in Lebanon.
Objective	The aim is to offer a safe and energy- efficient street lighting with an intelligent monitoring, control, and maintenance procedure.
Description of the measure	This initiative can be achieved by updating, replacing, and installing new photo-sensor devices in the different street lighting sectors in order to illuminate the roads when needed, and to develop technical specifications for the energy- efficient street lighting lamps, as well as the increase in the know-how and capacity of the personnel working on the operation and maintenance. Mercury lamps will be replaced with sodium lamps.
Implementing agency	MEW & LCEC
Stakeholders involved	MEW, UNDP/CEDRO, LCEC, GoL, Ministry of Public Works, Ministry of Interior and Municipalities, CDR,
Target group	Municipalities, and residential areas
Program cost	\$ 25 million
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	18.6 GWh/year or 2m\$/year (\$0.21/KWh + \$0.315/KWh from voltage regulators)
Source of funding	GoL, and UNDP/CEDRO
Financial instruments	Long- term interest- free loans
Awareness	National campaigns, and a hotline to deal with complaints and problems nationwide. Also, through training and capacity building workshops for municipalities, and ministries staff
Monitoring and quantification of impact	Reduction in municipalities bills, CEDRO analysis document.

6

Initiative 6	Electricity Generation from Wind Power
Objective	This initiative aims to promote the generation of electricity through the use of wind energy. This can only be achieved through technical and policy related actions (600 -100 MW installed capacity by 2014).
Description of the measure	Small scale pilot projects after the wind atlas for the country is published. Regulatory and legal frameworks will also be reviewed by experts. A market survey to identify local dealers and suppliers has been conducted as well.
Implementing agency	LCEC, MEW, and UNDP/CEDRO
Stakeholders involved	LCEC, MEW, UNDP/CDERO, NEEREA, Ministry of Finance, and Central Bank of Lebanon, EDL, and IPP.

Target group	Private utilities, and buildings sector
Program cost	85,000 USD for the wind atlas, and 115-190M (for 60-100MW decentralized production)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	120 -200 GWh/year or 12 -20 M\$/year
Source of funding	UNDP/CEDRO, NEEREA, and private sector
Financial instruments	Long- term interest free loans with full risk guarantee
Awareness	National promotional campaigns and workshops
Monitoring and quantification of impact	Implementation Management Unit at MEW

7

Initiative 7	Electricity Generation from Solar Energy
Objective	This initiative aims to start the development and promote the generation of electricity through the execution of Photovoltaic (PV) and Concentrated Solar Power (CSP) farms (100 to 200 MW of installed capacity).
Description of the measure	Proper policy and technical actions are to be taken in addition to ensuring the right financial modalities. Pilot projects are being implemented in a number of public buildings such as hospitals and schools. A market survey has already been conducted by LCEC to identify eventual dealers and suppliers.
Implementing agency	LCEC, CDR, and UNDP/CEDRO
Stakeholders involved	Ministry of Finance, EDL
Target group	IPP, residential and commercial buildings
Program cost	Feasibility study: 40,000 USD, private funding is still being negotiated.
Total resource cost	\$1.5M
Cost / kWh saved	
Reduction of subsidies	263-526 GWh/year or 26 to 52 M\$/year by year 2104
Source of funding	UNDP/CEDRO, international donors, and private sector
Financial instruments	Long- term interest free loans, and other financial incentives by MoF
Awareness	MEW's national campaign
Monitoring and quantification of impact	Implementation Management Unit at MEW

8

Initiative 8	Hydro Power for Electricity Generation
Objective	This initiative aims to encourage and promote the use of hydro power to generate electricity (40 MW installed capacity by 2015 and 80 MW to be installed later).
Description of the measure	This is to be achieved through support of hydro and microhydro projects and working on better exploitation of water resources, and through rehabilitation of existing plants. A hydro atlas for Lebanon will be developed to assess the potential of hydro power.
Implementing agency	MEW & EDL
Stakeholders involved	MEW, UNDP/CEDRO, IPP
Target group	MEW,EDL, IPP
Program cost	\$ 700 M
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	140 GWh/year or 14 M\$/year till 2015
Source of funding	Private sector and international loans
Financial instruments	NEERA
Awareness	Promotion initiatives and pilot projects
Monitoring and quantification of impact	Implementation Management Unit at MEW

9

Initiative 9	Geothermal, Waste to Energy, and Other Technologies
Objective	This initiative aims to help reduce waste and benefit from waste to energy conversion techniques in addition to using the geothermal power to produce electricity. This is to be achieved through several actions including finding a solution to solid waste treatment.
Description of the measure	Biomass strategy for Lebanon will be finalized. A study on the potential of geothermal energy in the country. Pilot projects for building relevant power plants will be commissioned. To investigate mineralogical map of the region.
Implementing agency	LCEC
Stakeholders involved	LCEC, MEW, UNDP/CEDRO, NEEREA, IPP.
Target group	LCEC, MEW, UNDP/CEDRO, NEEREA, IPP.
Program cost	\$30-50M for 15-25MW

Total resource cost	Program costs plus, if applicable, contributions by beneficiaries
Cost / kWh saved	
Reduction of subsidies	66 – 132 \$ 6-10M/year
Source of funding	UNDP/CEDRO, NEEREA, CDM
Financial instruments	NEEREA
Awareness	Local Media
Monitoring and quantification of impact	Implementation Management Unit at MEW

10

Initiative 10	Building Code for Lebanon:
Objective	This initiative aims to set a standard for the existing and new buildings, to identify the minimum acceptable energy performance and to present proper building envelope enhancement for Lebanese territories.
Description of the measure	To review, update, and promote the thermal standards for Lebanese buildings, and to incorporate these codes into law and practice.
Implementing agency	LCEC, Urban Planning, and UNDP
Stakeholders involved	Order of Engineer and Architects, Lebanon Green Building Council, GEF, WB, International Finance Corporation, USAID/Amideast
Target group	Building sector
Program cost	306,000 USD, in addition to funds from NEEREA (\$100,000 + \$60,000 + \$46,000 + \$2M – UNDP project)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	815 GWh/year or 80 M\$/year
Source of funding	GEF, ADEME, WB, NEEREA, IFC, Amideast
Financial instruments	Interest free and long- term loans.
Awareness	Published reports, workshop and discussion
Monitoring and quantification of impact	Urban Planning

11

Initiative 11	Financing Mechanisms and Incentives
Objective	The aim is to provide proper financing mechanism in order to promote the use of energy efficiency and renewable energy. This is mainly linked to the collaborative work with the MoF, and the Central Bank of Lebanon.
Description of the measure	To collaborate with the MoF to provide financial incentives for the import and market spread of solar water heaters, and to make use of the carbon credits. Also, to define policy interventions (fiscal and economic incentives)
Implementing agency	MoF, LCEC
Stakeholders involved	MoF, NEEREA, UNDP, Central Bank, LCEC, and EU
Target group	Residential sector
Program cost	\$100M by 2015 (NEEREA)
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	
Source of funding	MoF, NEEREA, banking sector
Financial instruments	Long- term interest- free loans, carbon credits
Awareness	Workshops and promotion campaigns
Monitoring and quantification of impact	BoL circulars and reports

12

Initiative 12	Awareness and Capacity Building:
Objective	The aim is to raise awareness about the importance of energy efficiency and to introduce energy- efficient technologies, and energy audit concepts.
Description of the measure	The focus is on analyzing and disseminating good practices, creating skills and experience in energy efficient technologies, as well as strengthening existing ones.
Implementing agency	LCEC, MEW
Stakeholders involved	LCEC, MEW, UNDP, League of Arab States, MED-ENEC, MED-EMIP
Target group	Building and industrial sectors
Program cost	\$1.4M (SWH) \$50,000

Total resource cost	
Cost / kWh saved	
Reduction of subsidies	
Source of funding	MEW, EU, MED-ENEC
Financial instruments	
Awareness	Awareness campaigns, pilot projects and standards and labels.
Monitoring and quantification of impact	Implementation Management Unit at MEW

13

Initiative 13	Paving the Way for Energy Audit and ESCO Business
Objective	This initiative aims to help and promote Energy Service Companies (ESCOs) and to provide them with financial, fiscal, and technical incentives to remove barriers and promote energy audit activities.
Description of the measure	LCEC launched an energy audit support program, and a campaign to promote energy efficiency in the building and industrial sectors.
Implementing agency	MEW, LCEC
Stakeholders involved	MEW, LCEC, NEEREA, UNDP, ESCO companies, private sector, banks
Target group	Building and industrial sectors
Program cost	\$9.7M
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	38 GWh/year or 3.8M\$/year
Source of funding	NEEREA, CEDRO, banks
Financial instruments	NEEREA
Awareness	Promotion campaigns and capacity building programs
Monitoring and quantification of impact	120 audits conducted in various sectors

14

Initiative 14	Promotion of Energy- Efficient Equipment
Objective	This initiative aims to promote the use of energy- efficient equipment in households and commercial buildings.
Description of the measure	This includes focusing on energy- efficient electrical equipment such as CFL, AC units, fridges,... and establishing a national energy efficiency standard.
Implementing agency	LCEC
Stakeholders involved	MEW, MEW, MoF, LIBNOR
Target group	Households and commercial buildings
Program cost	
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	
Source of funding	International funds
Financial instruments	Financial incentives and decentives
Awareness	Promotion campaigns
Monitoring and quantification of impact	LCEC, LIBNOR

2.2 Sector 2:

[Please add a number of sectors according to country sector classification.]

3. Additional Measures

3.1 Measures for Exemplary Role of Public Sector:

3.1.1 Overview Table:

No	Title & description of the EE measure	Implementation period	Electricity savings for the first 3 years 2011- 2013
1	Standards and Labeling	July 2008 -	8GWH
2	Measure 2		
3	Measure 3		
4	Measure 4		

3.1.2 Detailed Information of Individual Measures:

[Please provide information on EE measures using the same table structure of the section above 2.1.2.]

Initiative	Standards and Labeling
Objective	This initiative aims at defining appliances to be subjected to energy efficiency standards.
Description of the measure	Energy efficiency standards will be assigned for SWH, CFLs, Refrigerators, AC split units, and electric/gas water heaters.
Implementing agency	LCEC
Stakeholders involved	Ministry of Industry, LIBNOR
Target group	Households and commercial buildings
Program cost	\$1M
Total resource cost	
Cost / kWh saved	
Reduction of subsidies	
Source of funding	Greek Fund
Financial instruments	Financial incentives
Awareness	Promotion campaigns, local media
Monitoring and quantification of impact	LIBNOR

3.2 Measures under Utility Responsibilities (According to Article 5 of the Arab EE Directive):

3.2.1 Overview Table

No	Responsibility	Qualitative progress
1	Provision of data and information	Data on generation and distribution were used in the MEW recent Policy paper.
2	Providing services	Distribution of 3M CFLs
3	Contributing to an EE fund	CFL and street lighting projects
4	Awareness campaigns	MEW national campaign

Please identify and add relevant measures

3.2.2 Detailed Information of Individual Measures:

[Please provide information on EE measures using the same table structure of the section above 2.1.2.]

3.3 Measures for Power Sector (According to Article 4 of the Arab EE Directive):

3.3.1 Performance Overview:

No	Title & description of the EE measure	Implementation period	Unit (Savings M\$/year)
1	Reduction of net heat rate in power plant operation ⁹ (in MJ, kCal, or kWh per kWh, or %)	20%-30% by 2015	80
2	Reduction of technical losses, the national grid, % ¹⁰	7% by 2014	26
3	Reduction of commercial losses , Millions LC	20% by 2014	11
4	Upgrade of metering and smart grid strategies	2010-2014	669 over 4 years

Please identify and add relevant measures

3.2.2 Detailed Information of Individual Measures:

[Please provide information on EE measures using the same table structure of the section above 2.1.2.]

⁹ Use the most accepted definition of net heat rate by subtracting first from the annual MWh gross generation at the busbar the GWh power station use. Next divide the annual energy input to the power plant based on a Gross Calorific Value also called Higher Heating Value (HHV) by this number. Convenient units are MJ/kWh or kCal/kWh or kWh/kWh.

¹⁰ Reduction of technical losses in the transmission and distribution grid as percentage of gross or net generation

4. Horizontal and Cross-Sectorial Measures¹¹

4.1 Overview Table

No	Title and description of the EE measure	Implementation period
1	Solar panels distribution would trigger the industrial sector to get the know-how related to their manufacturing.	2010 -2013
2	PV cells proven useful for residential as well as agricultural sectors.	2011 -2014
3	Building code and the construction sector	2011 -

4.2 Detailed Information of Individual Measures:

[Please provide information on each measure for horizontal cross sectorial using the same table structure of the section above 2.1.2.]

4.3 Supportive Measures with Difficult to Quantify Electricity Savings Impact:

No	Title and description of the EE measure	Qualitative progress
1	General sector specific stand alone awareness program	Awareness campaigns (local media, vouchers, workshops,...)
2	Research & Development of EE technologies	Testing at IRI
3	University curriculum development in EE	In progress (AUB, LU, USEK,...)
4	Public awareness campaigns	MEW, LCEC (ongoing)

Please identify and add relevant measures

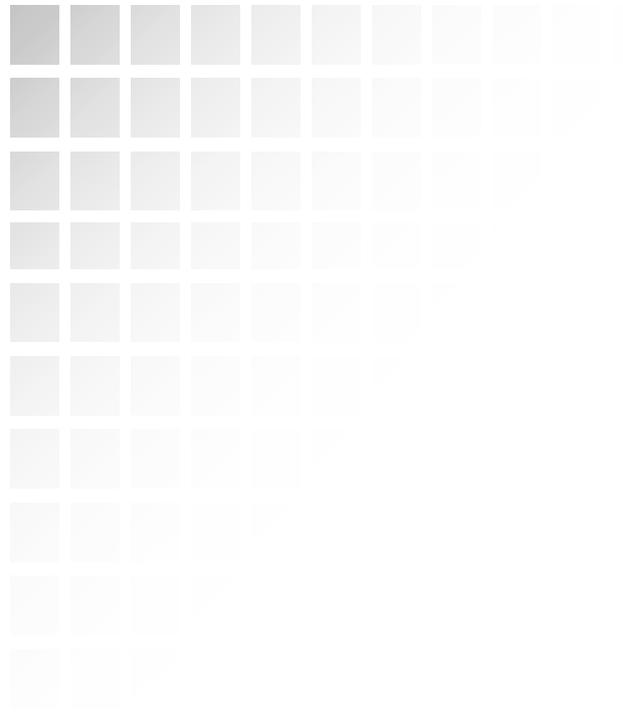
5. Criteria to Assess Energy Efficiency Policy Implementation Progress

[Progress for overall country measures such as energy policies, directives and politics.]

4.1 Overview Table

No	Action/ Activity	Qualitative progress
1	Energy efficiency policy announcement	MEW, law 462/2002, & policy paper of June 2010
2	Technical committee to write a first draft of the EE known and announced	MEW, LCEC
3	EE policy draft was prepared and had been circulated	Still under discussion (NEEAP)
4	EE policy paper released to the public	Still under discussion
5	EE policy paper is also a directive or tabled in parliament as a bill to become a law and contains rules & regulations	Draft law under discussion
6	EE policy paper contains a target or benchmark to be achieved at a specific year	Success stories from Tunisia, Jordan, and Mexico
7	The EE policy or law is backed up by an action plan (business plan). This is the equivalent of a NEEAP	Under discussion
8	The action or business plan contains an estimate of the total resources necessary to implement the policy	\$134 M
9	The Government is providing a full or partial public or PPP budget to finance the action plan	\$25 M over 4 years, relevant bylaws being prepared
10	The Government has decided to treat energy efficiency as a source of energy and publicly tenders the EE business plan as they would tender a new power plant	Service provider tendering

Please identify and add relevant measures



NEEAP 2011-2015



Lebanese Center for Energy Conservation (LCEC)
Ministry of Energy and Water,
Corniche du Fleuve,
Beirut - Lebanon
Tel & Fax : +961 1 565 108 / +961 1 569 101
www.lcecp.org.lb
energy@lcecp.org.lb

JANUARY 2012

NEEAP 2011-2015