**Mid-term Evaluation of the   
Global Solar Water Heating Transformation   
and Strengthening Initiative (GSWH)**

**Reference Number: 00062901 (GSWH)   
on behalf of UNDP Beirut**

**Final Report**

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**Table of contents**

[Abbreviations 3](#_Toc305316687)

[1 Executive summary 5](#_Toc305316688)

[2 Introduction and description of the work conducted 6](#_Toc305316689)

[**2.1** **Methodology used for the evaluation** 6](#_Toc305316690)

[**2.2** **Description of the current situation in Lebanon with  
reference to the GSWH project** 7](#_Toc305316691)

[**2.3** **The GSWH project – description of the project, its   
status and project documents reviewed** 8](#_Toc305316692)

[**2.4** **Stakeholders in the GSWH project** 13](#_Toc305316693)

[**2.5** **Time schedule in the GSWH project** 13](#_Toc305316694)

[3 Findings and conclusions 13](#_Toc305316695)

[4 Recommendations 20](#_Toc305316696)

[5 Bibliography 21](#_Toc305316697)

[6 Annexes 23](#_Toc305316698)

[**6.1** **Brief summary of the key documents reviewed** 23](#_Toc305316699)

[**6.2** **Brief summary of meetings with persons interviewed** 23](#_Toc305316700)

**Abbreviations**

APR Annual Progress Report

AUB American University of Beirut

BoL Central Bank of Lebanon

CCF Country Cooperation Framework

CDM Clean Development Mechanism

CDR Council for Development and Reconstruction

CEDRO Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon

CFL Compact fluorescent lamps

CIDA Canadian International Development Agency

CO Country Office (UNDP)

CSP Concentrated solar power

EC European Commission

EDL Electricité du Liban- Lebanese Electric Utility

EE Energy Efficiency

ESCO Energy Service Company

EU European Union

GEF Global Environment Facility

GHG Greenhouse Gas

GoL Government of Lebanon

GSWH Global Solar Water Heating Transformation and Strengthening Initiative

GTZ Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

IP Implementation Progress

IPP Independent power producer

IRI Industrial Research Institute

LAS League of Arab States

LASI Lebanese Association for Solar Industries

L.C.E.C. Lebanese Center for Energy Conservation

LED Light Emitting Diode

LGBC Lebanon Green Buildings Council

LIBNOR Lebanese Standards Institution

LRF Lebanese Recovery Fund

LSES Lebanese Solar Energy Society

M&E Monitoring and evaluation

MDG Millennium Development Goal(s)

MED-EMIP Euro Mediterranean Energy Market Integration Project

MED-ENEC Euro Mediterranean Project on Energy Efficiency in the Construction Sector

MEW Ministry of Energy and Water, GoL

MoA Ministry of Agriculture, GoL

MoE Ministry of Environment, GoL

MoF Ministry of Finance, GoL

MoJ Ministry of Justice, GoL

MoU Memorandum of Understanding

MSP Medium-sized Project (GEF)

MTR Mid-term Review

MYFF Multi-year Funding Framework

NAP National Action Programme (for UNCCD)

NEX National Execution (UNDP)

ODA Official Development Assistance

OECD Organisation for Economic Cooperation and Development

PIR Project Implementation Report

PM Project Manager

PMT Project Management Team

PSC Project Steering Committee

PV Photovoltaic

RAF Resource Allocation Framework

RCREEE Regional Center for Renewable Energy and Energy Efficiency

RCU UNDP Regional Co-ordination Unit of UNDP

ROAR Result Oriented Annual Report

SESCO Solar Energy Service Company

SIDA Swedish International Development Cooperation Agency

SNC Second National Communication (to UNFCCC)

SRF Strategic Results Framework

SWH Solar Water Heater

TA Technical Assistant

TE Terminal Evaluation

TOR Terms of References

UN United Nations

UNDAF United Nations Development Assistance Framework

UNDG United Nations Development Group

UNDP United Nations Development Programme

UNDP-CO UNDP - Country Office

UNEG United Nations Evaluation Group

UNEP United Nations Environment Programme

UNFCCC United Nations Framework Convention on Climate Change

UNOPS United Nations Office for Project Services

USAID US Agency for International Development

WB World Bank

**1 Executive summary**

A **mid-term evaluation of the GSWH project** (Global Solar Water Heating Transformation and Strengthening Initiative) has been carried out in September and October 2011 in Beirut based on a number of documents provided by the Lebanese side and based on interviews with all the main stakeholders in the project.

The **methodology** of the mid-term evaluation uses current UNDP and GEF procedures for project evaluation.

The **documents reviewed** were as follows: the Inception Report dated September 2009 and all documents and files in the office of L.C.E.C. at the MWE. All publications and reports have been evaluated; a two-day seminar “2nd Beirut Energy Forum” organized by L.C.E.C. was attended in September 2011. In total, 24 meetings with the main stakeholders were held during September 2011 and 27 experts have been interviewed using the UNDP and GEF evaluation schemes.

The main findings from the project are as follows:

(a) Work has progressed at a good level, some of the foreseen activities for 2012 and 2013 are **already finalized**, especially financing schemes and public relations. The main benefit from the project and therefor the main outcome is **the increased interest in energy efficiency and renewable energy by the MWE** and the scientific and business community in Lebanon. But also some activities **are lacking in implementation** (SWH testing facility) and require urgent action. Overall, we acknowledge the results achieved during this two-year-period to be **Satisfactory** (S).

(b) For the future of the project we have the following comments and recommendations: On **the formal side, we urgently recommend the establishment of a clearer reporting system on project achievements**, as for the other projects of L.C.E.C.

(c) On **the content side, there have been a large number (32) of recommendations given by stakeholders**.

* Simple and **more directed information to the final consumers**, with easy to understand information and best practice, more direct information to potential users of SWHs, especially in the rural and remote areas.
* Ensuring the **quality of products and quality of maintenance** is one of the main concerns. A more rigid follow-up for the entire quality insurance should be established at L.C.E.C. with special attention on the progress of the field tests by IRI and continuous training and certification of dealers and installers. For a certain period the L.C.E.C. team should **meet at IRI on a at least weekly base** in order to follow up any progress until full operation of the testing facility is achieved. And, priority should also be given to implement the certification procedures, which start with **definitions of certification criteria** and the support to GoL decision on the **authority organisation** handing out the certificates.
* The project team should prepare a **full list of possible new and advanced projects.** A clear strategy should be developed with the CEDRO team on future co-operation, together with the MWE and UNDP/GEF.

**2 Introduction and description of the work conducted**

**2.1 Methodology used for the evaluation**

The evaluation methodology used is mainly based on the UNDP and GEF procedures as described in the relevant documents. Although these are very detailed terminal evaluation guidelines, they can be used for reference as the mid-term evaluation is much simpler.

* UNDP – United Nations Development Programme: Handbook on Planning, Monitoring and Evaluating for Development Results, New York, 2009
* GEF - Global Environment Facility, Evaluation Office: Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No 3, Washington, DC 2008

Although these are the main methodologies for this mid-term evaluation, other evaluation methodologies had been partly used, namely:

* UNDP - United Nations Development Programme, Evaluation Office: Handbook on Monitoring and Evaluating for Results, New York 2002
* UNIFEM – United Nations Development Fund for Women: Guidance: Quality Criteria for Evaluation Reports, in: Evaluation Guidance Note Series, No. 8, October 2009
* UNEG: UNEG Ethical Standards for Evaluation, 2007
* UNEG: UNEG Standards for Evaluation in the UN System, 2005
* GEF: Evaluation of the GEF Cycle and Modalities. Joint Evaluation of the GEF Evaluation Office and the Evaluation Offices of the Implementing and Executing Agencies of the GEF, GEF/ME/C.30/6 (GEF Council December 5-6, 2006)
* Executive Board of the United Nations Development Programme and of the United Nations Population Fund: The evaluation policy of UNDP, New York February 2011

The questions given to the stakeholders of the GSWH project include:

* **Relevance** of all project activities and the achievements in relation to the given ToR
* **Appropriateness** of the project design, original design of the project in its relation to the objectives and the ToR
* Revised logical framework matrix and **indicators**
* **Effectiveness** of project implementation
* Status of all **project activities**
* **Performance** of the project compared to the ToR
* Project **achievements**
* **Assessment of given recommendations** of the project received
* **Impact** of the project compared to government and UNDP scopes
* Monitoring and **management activities**
* **Recommendations for future** follow-up
* **Additional new approaches** and technical options
* **UNDP partnership** strategy in relation to the project achievements
* **Sustainability** of the project and its outcomes
* **New impacts** from the project

Those questions were posed to the stakeholders and to the project team to discuss both the “approach of the project” and “the outcomes of the project”. The assessment in this mid-term evaluation follows the guidelines for GEF agencies in conducting terminal evaluations as given in the evaluation document No 3 dated 2008. For the assessment of project results we follow three criteria, namely

* Relevance,
* Effectiveness, and
* Efficiency.

The outcomes from the project will be rated as follows:

* Highly satisfactory (HS)
* Satisfactory (S)
* Moderately satisfactory (MS)
* Moderately unsatisfactory (MU)
* Unsatisfactory (U)
* Highly unsatisfactory (HU)

**2.2 Description of the current situation in Lebanon with reference to the GSWH project**

The situation for implementing SWH in Lebanon is generally favourable to achieving the aims of the GSWH project. On the political level, there is new support to the GSWH initiative and on the technical level implementation of SWHs in Lebanon proceeds according to plan. The following documents have been reviewed in order to understand the current political situation in Lebanon in relation to the GSWH project:

* Lebanese Center for Energy Conservation (L.C.E.C.): The National Energy Efficiency Action Plan for Lebanon NEEAP 2011-2015, Beirut July 2011
* Ministry of Energy and Water: Policy Paper for the Electricity Sector, Beirut June 2010
* GoL: Setting the stage for long term reconstruction: The national early recovery process. Stockholm, Conference for Lebanon’s Early Recovery. 31 August 2006. – Beirut 2006
* GoL: Recovery, reconstruction, and reform. “International Conference for Support to Lebanon” 25th January 2007, Paris 2007
* MoE: Country Programme. – Ministry of Environment, Institutional Strengthening Project for the Implementation of the Montreal Protocol in Lebanon, Beirut 2005

The general context of the GSWH project has also to be seen in the light of international institutions. In general, there is compatibility between GSWH and the general aims of international organisations:

* UNDP: Common Country Assessment Lebanon 1998. - UNDP, Beirut 1998
* UNDP: Common Country Assessment Lebanon 2000. - UNDP, Beirut 2002
* CDR & UNDP: Millennium Development Goals. Lebanon Report. - Beirut September 2003
* EU: European Neighbourhood and Partnership Instrument: Lebanese Republic Country Strategy, Paper 2007-2013 and National Indicative Programme 2007-2013. - European Commission, Brussels 2007

The GSWH project must be seen in relation to other similar activities in the field of energy efficiency and use of renewable energy, for example the CEDRO project. The CEDRO project is mainly a demonstration project, which implements a number of technical installments as an example for energy efficiency and use of renewable energy. GSWH is a project to support the approach of renewable energy into the Lebanese market via **administrative, organisational, educational and legal measures**. This must be clearly differentiated between the two projects.

**2.3 The GSWH project – description of the project, its status and project documents reviewed**

The following two documents describing the GSWH project have been reviewed in detail. The first document serves as a source of general information on the aims of the GSWH project; the second document is explicitly named as the **Inception Report** and serves as the main document for evaluation:

* Government of Lebanon, United Nations Development Programme, United Nations Environment Programme: The Country Programme of Lebanon under the Global Solar Water Heating Market Transformation and Strengthening Initiative (PIMS 3611), UNDP Project Document, Beirut, Lebanon, undated
* NN (prepared by the Project Team): The Country Programme of Lebanon under the Global Solar Water Heating Market Transformation and Strengthening Initiative (PIMS 3611), Inception Report, Beirut, September 2009

As of 12th September 2011, there are no additional documents available. Specifically, there is no Progress Report prepared by the Project Team, which could serve as an official document for this evaluation. Besides these two main documents we have considered a number of **additional documents**, which are linked to the GSWH project, especially as political and technical background papers:

* <http://www.undp.org.lb/ProjectFactSheet/projectDetail.cfm?projectId=147>
* http://[www.lcecp.org.lb](http://www.lcecp.org.lb); other related information has been published on this site, and
* the **PIR** serves as a kind of compendium like an ordinary Progress Report, which was agreed with UNDP office in Beirut. Most information on progress of the project can be seen from PIR, but for the general public a conventional Progress Report with a narrative part would give for non-GSWH experts a better overview on the achievements since beginning within the project.

Additional documents considered during this evaluation process are the two following reports, which give an overview on **former evaluations** with reference to the GSWH project:

* United Nations Development Programme, Global Environment Facility: 2011 Annual Project Review (APR), Project Implementation Report (PIR), Excel file without date
* Kasparek, Max: Lebanon: Evaluation of the Energy & Environment Programme, An Outcome Evaluation, Beirut, December 2007

**The documents reviewed** were as follows: The Inception Report dated September 2009 and all documents and files in the office of L.C.E.C. at the MWE. All publications and reports have been evaluated; a two-day seminar “2nd Beirut Energy Forum” organized by L.C.E.C. has been attended in September 2011. **In total 24 meetings** with the main stakeholders were held during September 2011 and 27 experts had been interviewed using a standard procedure based on UNDP and GEF evaluation schemes.

Based on the review of documents available, and based on the interviews and discussions with the all stakeholders in the project, the outcomes of the project were compared to the given contract, in this case the given Inception Report. As described in the following table, the overall achievements are good, the main aim of the project *“Accelerating the market development of solar water heating (as a renewable energy source) in Lebanon“* has been met by the project team. Work has progressed at a **good level**, some of the foreseen activities for 2012 and 2013 are **already finalized**, especially financing schemes and public relations. But also **some activities are lacking in implementation** (SWH testing facility) and require urgent action.

The evaluation of the project clearly shows that the tasks given in the Inception Report for the project are still fully valid and very valuable for Lebanon (**Relevance**): “Solar water heating” still needs support by the team to be brought on a wider scale into the Lebanese market. The project implementation is partly ahead of schedule: for example, for the implementation of new financing schemes. Work has been done efficiently, as the budget of about one million USD for five years requires continuous man-power input to get the planned tasks completed (**Efficiency**). The work programme and its implementation are still valid and effective for Lebanon, even though there are several implementation measures (**Effectiveness**) started and some have been completed, and - as stated before - continuous input from the team is necessary.

The following table compares the main achievements during the first half of the project to the given terms of reference (activities and quality criteria) as in the Inception Report. Column (a) shows the progress of the project since start of the project and the **percentages represent the overall progress for the entire project until the end of the project**, (25/50/75/90%) and not for the period until to date. The next column (b) follows the criteria according to GEF evaluation scheme with evaluation and judgement on **progress and performance until the mid-term evaluation**: •Highly satisfactory (HS), •Satisfactory (S), •Moderately satisfactory (MS), •Moderately unsatisfactory (MU), •Unsatisfactory (U), •Highly unsatisfactory (HU). This does not mean that the project can not meet the requirements until completion, it is just an indication, that some actions are very well advanced before schedule or behind schedule.

|  |  |  |  |
| --- | --- | --- | --- |
| Criteria | Comments | (a) | (b) |
| **General objective: Accelerating the market development of solar water heating (as a renewable energy source) in Lebanon** | **In general, good progress since start of the project, especially larger awareness on EE/RE inside MWE and by the scientific community** |  | S |
|  |  |  |  |
| **1.1 ACTIVITY RESULT 1: Enabling environment to promote SWH market set (policy and financial mechanisms)** | **In general, good progress in this activity as the number of installation of SWH outside this project is increasing and the number of private companies in this renewable segment is raising continuously** |  |  |
| 1.1.1 Review of existing building codes and drafting of amendments to building codes, submission to the MEW | So far only started, the revision of building codes is on the was for Lebanon, implementation of a Lebanese building code can not be promised due to a various number of actors working in this specific field | 25 | MS |
| 1.1.2 Setting specific targets for heat produced by renewable energy for 2020 | Completed, after discussion with MOE finally agreed (12% renewable in 2020) | 90 | HS |
| 1.1.3 Financing instruments and mechanisms identified and operationalized | Very much advanced, quite before time schedule, the funding procedure between partner banks and Lebanese Central Bank has been established, since end of 2010 loans are handed over to private clients on installments of renewable energies. Also the “insurance” of Central Bank by Euroepan Commission has been already established. | 75 | HS |
| 1.2 Quality Criteria |  |  |  |
| 1.2.1 Draft law containing all technical specifications prepared and submitted | Just started | 50 | S |
| 1.2.2 Increased purchase of SWH | Nearly completed, the increase in installations of SWH will allow to meet the criteria set for private installations before end of project in2013 | 75 | HS |
| 1.2.3 SWH equipment and installation companies adopt quality control, certification and labeling | Started, some training measures have been completed, but the certification process has not been started, therefore action on Lebanese certification is of priority | 25 | MS |
| 1.2.4 Availability of financial schemes available for SWH applications | Very much advanced, nearly completed | 90 | HS |
| **ACTIVITY 1 (total)** |  | **61** | **S** |
|  |  |  |  |
| **ACTIVITY RESULT 2: Marketing and awareness raising on SWH strengthened (information/communication)** | **In general, very good progress since start of the project** |  |  |
| 2.1.1 Design and implementation of marketing campaign | Completed, a number of newsletter and leaflets had been produced and distributed, TV campaigns have been produced and broadcasted, the homepage had been continuously updated | 90 | HS |
| 2.1.2 Design and development of awareness/marketing material for public | Nearly completed, especially for professional use in the renewable sector | 75 | HS |
| 2.2 Quality Criteria |  |  |  |
| 2.2.1 Establishment of SWH website | Completed, had been updated on a regular base | 90 | HS |
| 2.2.2 Four national marketing campaigns | Good progress, campaigns are completed or on the way for completion | 75 | HS |
| 2.2.3 Two awareness packages | Good progress, awareness package available on request via the L.C.E.C. office at MEW | 75 | HS |
| **ACTIVITY 2 (total)** |  | **81** | **S** |
|  |  |  |  |
| **ACTIVITY RESULT 3: Certification & quality control schemes established (technical & pilots)** | **In general, activity started, but no final results achieved** |  |  |
| 3.1.1 Development of quality control, certification and labeling scheme for SWH equipment | Only started, not completed, neither a quality scheme nor a certification scheme has been established or at least started | 25 | MU |
| 3.1.2 Implementation of pilot SWH sites | Nearly completed, no direct installment, only support to other projects for example demonstration projects via CEDRO | 90 | S |
| 3.1.3 Installation of a national SWH testing facility | Equipment delivered and unused and partly unpacked,, so far not started with first testing of the testing facility, continuous efforts required (co-financing under the Greek contract via CRES), | 25 | U |
| 3.2 Quality Criteria |  |  |  |
| 3.2.1 Capacity of SWH installers and manufacturers developed | Good progress for training of dealers and installers for SWH equipment, same for maintenance training. But certification so far not started, action needed. | 75 | HS |
| 3.2.2 Three pilot SWH sites (TA) | Nearly completed, demonstration projects supported by other institutions, for example at CEDRO | 90 | S |
| 3.2.3 SWH testing facility installed (TA) | Only technical installation, no operational level, urgent action needed (co-financing under the Greek contract via CRES) | 25 | U |
| 3.2.4 Training system established | Recently started, continuous and additional efforts required at larger input level | 50 | **MS** |
| **ACTIVITY 3 (total)** |  | **59** | **MS** |
|  |  |  |  |
| **ACTIVITY RESULT 4: Institutionalization of support and lessons learnt documented (management)** | **In general, good progress since start of the project** |  |  |
| 4.1.1 Set-up of project team and offices | Completed | 90 | HS |
| 4.1.2 Timely implementation of project activities and technical database established | In preparation | 75 | S |
| 4.1.3 Capacity development on SWH systems and policies at MEW | Nearly completed | 90 | HS |
| 4.2 Quality Criteria |  |  |  |
| 4.2.1 SWH monitoring programme at MEW established | So far only recently started | 25 | MS |
| 4.2.2 Project delivery on schedule | In general good, but reporting should be standardized, so far nearly no reporting available, at least Annual Progress Reports urgently required (can be updated on 6 month basis) | 75 | S/U |
| **ACTIVITY 4 (total)** |  | **71** | S |

Notes: (a) Progress since start of the project (percentage shows the overall progress for the entire project, 25/50/75/90%)

(b) Criteria according to GEF evaluation scheme with evaluation and judgement on progress and performance as to the mid-term evaluation period: •Highly satisfactory (HS), •Satisfactory (S), •Moderately satisfactory (MS), •Moderately unsatisfactory (MU), •Unsatisfactory (U), •Highly unsatisfactory (HU)

*Table 1: Comparison of the main achievements during the first half of the project compared to the given terms of reference (activities and quality criteria) as in the Inception Report (next page)*

**2.4 Stakeholders in the GSWH project**

Financing agencies for the project are UNDP (USD 75,000) and GEF (USD1,025,000). Total budget is USD 1,100,000. The project was signed on the 25th March 2009.

The Board consists of the main stakeholders on solar water heating in Lebanon. One meeting had been held since the beginning, **no minutes of meeting are available from this meeting, minutes should be produced and filed, even at this late state of documentation**. The National Focal Point for the project is Mr Mahmoud Baroud, Director General at the Ministry of Energy and Water (MEW). The project is supervised by UNDP, Ms Jihan Seoud, United Nations Development Programme, Officer in Charge (OIC), Energy and Environment. Execution of the project is done by L.C.E.C., The Lebanese Center for Energy Conservation. The respective project manager responsible for project implementation is Mr Pierre El Khoury from L.C.E.C. office in Beirut, located at the Ministry of Energy and Water.

**2.5 Time schedule in the GSWH project**

The following time schedule is applicable for the project:

* 2008, April Project documents completed
* 2009, March Signature of project document
* **2009, June Start of the project (effective start)**
* 2009, September Inception Report released
* 2010, January First disbursement
* 2010, April Project Manager hired
* 2010, December Steering Committee Meeting
* **2011, October Mid-term evaluation**
* **2013, December Planned closing date of the project**

**3 Findings and conclusions**

With reference to the **project content** we have not seen any deficits, the project is highly welcomed by the “energy community” in Lebanon. All energy and building experts understand this project as a unique chance to implement renewable energy to the market, especially solar water heating. All experts questioned confirm the necessity of the project and welcome the contributions received from outside the country.

On the **formal side** we see a deficit in a normal project procedure: Neither Terms of Reference nor a Contract nor any Interim Reports have been produced. Therefore it is very difficult to evaluate the outcomes of the project. The only reference is the Inception Report signed by UNDP and the Ministry of Energy and Water.

With reference to the **next two years** the following proposals for a certain modification of the GSWH project could be considered. All in all we have received a huge number of proposals and proposals for amendment, out of which we have identified 32 proposals by combining the same aspects of remarks and recommendations and grouped them into 7 areas:

1. Public relations, communication and training
2. Quality aspects
3. Sustainability
4. Legal and regulatory aspects:
5. Organizational aspects
6. Proposals for new projects
7. General aspects for future projects

which are explained and discussed in detail:

1. **Public relations, communication and training**
2. PUBLIC AWARENESS: It is strongly recommended by a number of stakeholders that more publicity should arrive in the media, especially interviews with TV, which is usually cost free. For the demonstration projects a more directed P.R. work (“How attractive is SWH?”) is requested in order to stimulate the market introduction of SWH. The GSWH should develop a market and sales drive for the next two years and target on a more active level the private consumers in order to attract them in the use of financing SWH. It was seen as one of the main obstacles for the use of SWH in a more clear structure, showing how much the investors and house owners could save with the installation of SWHs. It is recommended to reduce the gap of guidance by better and more directed information to possible investors in SWH, with easy to understand information on solar energy, especially continuous presentations of real case results of individual house owners having implemented SWHs.
3. COMMUNICATION: Lack of communication has to been reported and could be easily improved by improved communication as stakeholders for example received the NEEAP just the same day when the NEEAP was planned to be released to the public.
4. CONSTRUCTION COMPANIES AND ARCHITECTS: These experts should be more targeted same as the newly constructed “large scale” buildings.
5. DECREASING COST FOR INVESTMENTS BY INCREASING COMPETITION: Increased competition between installers and dealers would help to reduce costs. It was reported that the costs for SWH installations in Lebanon are about twice the price level in Jordan due to import tax (which is currently only 5%), but especially for customs clearance papers, but also VAT (which is currently also at moderate level of 10%) and due to currently limited competition between dealers and installers.
6. **Quality aspects**
7. QUALITY ASSURANCE: Quality of products should by all means be ensured. Product quality should be regulated by the government as there is negative experience with products from countries like China. Same applies for the installation companies, which should work with qualified staff. There were a number of installation problems with corrosion occurring, therefore it was recommended to introduce a system of certifications to Lebanon. For example Chinese SWHs are offered at a price of 900 USD, while conventional European systems cost 1,500 USD. The difference between the systems is due to different quality of material, for example the vacuum systems have 0.5 mm while others have 1.5 mm of steel in the pipes, therefore corrosion more often leads to leakages. And this damages the entire reputation of solar energy. On the other hand the subsidies and the 0% loans are very helpful for the market introduction. Also due to inappropriate quality two banks have stopped their co-operation with GSWH as they received heavy complaints from customers on quality of SWHs. Another urgent need is the qualification of installers, all Lebanese installers should pass a three-day-training course and pass through a test (“real test”). This could be done by accredited certifiers like IRI, the Ministry or a NGO.
8. QUALITY ASSURANCE: It was reported that quality controlled products, quality controlled suppliers and quality controlled maintenance for SWHs in Lebanon would help the entire industry for renewable energy. It is seen that due to unqualified dealers a number of consumers did not receive the foreseen subsidies and 0% loans. This should be tackled with priority.
9. TESTING FACILITIES: Currently the testing of vacuum pipes for SWH is technically not possible with this equipment at IRI and should be made available as soon as possible. Two proposals were given for future project extension; one is on an improved training in Europe, where well equipped test fields are in operation since long time and, a possible extension of the test field for the solar panels to a testing field for solar systems including the collectors, storage system, pumps and control system. For the evaluation it is clear that there should not be any extension before the current installed system is successfully running for a longer period. The start of the testing field should be handled with priority, especially as there is an opening ceremony planned for October 2011 with high political attendance.
10. **Sustainability**
11. KNOWLEDGE TRANSFER: Recommendation is given for ensuring knowledge transfer to future projects considering the goals given in the NEEAP.
12. IN-HOUSE TRAINING COURSES: Recommendations were given to arrange for all installments from CEDRO/GSWH and exchange of experience between users.
13. STANDARDIZATION OF PROCESSES: The proposal was given that with a standardization process we can proof that the installation and maintenance is properly done.
14. **Legal and regulatory aspects**
15. BETTER LABELLING: It is recommended to ensure better labelling of the solar panel system.
16. SMART METERING WITH NET-METERING: This topic was raised by a number of stakeholders as the finalization of “Net-Metering-Regulation” should be given priority within the GSWH project in order to stimulate the private sector for investments in solar energy.
17. REGULATIONS: It is recommended to continuously extent the projects from demonstration projects to a legal implementation project, therefore widening the horizon of the project from “pure” demonstration to more legal and regulatory implementation, for example a modification of the regulations on newly constructed houses should be reviewed on usability for renewable energies.
18. LEGAL MODIFICATIONS: Modifications of construction laws for up-to-4 floor buildings (allow 33 degree roofing instead of 22 degree roofing) was raised as an important topic from different stakeholders.
19. **Organizational aspects:**
20. PLANS READY FOR FUTURE PROJECTS: It was recommended to have ready proposals for a continuation of the current GSWH activities.
21. ADDITIONAL NEW FUNDS: Also various stakeholders recommended the need to add additional new funds to the GSWH project from other country sources in order to strengthen the GSWH initiative.
22. “OPEN FORUM”: Proposal was given for a public conclusion on the GSWH project evaluation. We document this opinion here and clearly understand the interest of the scientific and business community in Lebanon to follow the projects, but we do not recommend to accept this proposal. We understand that a presentation of the evaluation could be given at the “end-year seminar”, which is planned anyhow for December 2011.
23. ONE TEAM, ONE UNIT, ONE LOCATION: Given the size of Lebanon as small country and with reference to CEDRO and GSWH it was recommended to see one common approach or one unit continuing at one common place in the long term after completion of the two individual projects. This can be discussed and planned at a later stage of the projects.

Please note, that the following recommendations in Chapter F and Chapter G are not directly related to the current GSWH project, the main approach is here to document proposals given by stakeholders of the project on future activities related to the topic of the current GSWH project.

1. **Proposals for new projects**
2. GREEN MODEL VILLAGES: A proposal was given for five different municipalities in each of the five main regions of Lebanon to get a support on construction of PV and SWH and wind/biomass as a “green” model village as examples in other countries show. This could lead to project costs of about 5 Mio USD. This has been identified as priority compared to the other proposals and recommendations for new project given.
3. PV OFF-GRID-PV-APPLICATIONS: Priority to be given for the remote areas with PV systems was recommended.
4. WIND FARMS: The support for the development of projects for wind energy farms was given by some stakeholders to be understood as a next step for narrowing down the results from the wind atlas, for example the planning of a 80 MW windfarm in the North of Lebanon (West of Tripoli).
5. NEW BUILDINGS: New apartment buildings, new hotels and other new multi storey buildings with high hot water consumption should be attracted for the use of solar energy as hot water consumption is relatively high in these buildings (shower, pools, cleaning).
6. GREEN BUILDING: It was recommended for a full design of a Future Green Building of the MEW near Bourj Hammoud, which could use all types of renewable energy and have all energy efficiency measures included at a possible size of about 2,000 m2. Additional investment costs for the “green” part of the building including design are estimated at about 2 Mio USD.
7. SOLAR HEATING: Some proposals were made to start investigating in solar heating, as this could be useful for mountain areas, at least a kind of pre-heating in these areas in order to avoid use of wood for heating. This is of lower priority compared to the other proposals.
8. ENERGY BUS: A proposal on an “energy bus” or an extension of the current vehicle demonstrating the use of SWH was discussed where demonstration of prototypes of solar heating and PV could be demonstrated in remote areas at a larger extent in order to penetrate the market in remote areas.
9. **General aspects for future projects**
10. CO-FINANCING / FULL COST RECOVERY: It is recommended to start introducing partly co-financed projects by the beneficiaries of the projects in order to attract more truly committed project developers. This could lead, for example, to 90/10 financing between public finance and individual financing and this will attract more “really convinced people” and give a higher success rate for the projects.
11. NEW INSTALLATIONS / ADDITIONAL INSTALLATIONS: At those places where projects have been installed, maintained and used effectively, it is recommended to offer those who successfully implemented the projects a chance to apply for new additional supporting projects.
12. RURAL AND REMOTE AREAS / LARGE CONSUMERS IN URBAN AREAS: There are proposals to concentrate on urban areas with multi-owner houses to promote and install in urban areas SWH as a comprehensive solution, especially for multi-owner-houses and large scale users, for example apartment buildings, hotels or dormitories for students while other recommendations are to concentrate on rural and remote areas.
13. PUBLIC / PRIVATE SECTOR: There is a proposal to move from projects for the public sector to projects in the private sector. Other statements say that as this is public money, the need to support the public sector is a priority as there are very limited financial resources in the public sector for renewable energy. This could start covering “all” kinds of public buildings, for example in addition to currently served schools and hospitals, for example army, airport or security units.
14. REGIONAL COVERAGE PRIORITY REGIONS / ALL LEBANON: There is a strong recommendation to support projects also in the Northern and other parts of Lebanon and end exclusive support to the Southern parts of Lebanon. The project should cover the entire area of Lebanon. Concentration on remote areas would mean that comparatively poor people would benefit from savings of electricity bills. For example, this could be organized with the respective heads of the municipalities. And installation could be also concentrated in new resort villages, which are newly constructed and the additional costs compared to the overall cost can be neglected. Here we will have the advantage that the management of the resorts could ensure proper maintenance of the solar installations. Other proposals were on implementing PV systems in remote houses, and concentration on SWH on non-Beirut areas.
15. ENTIRE BUILDING versus COMPONENTS: From some stakeholders it was recommended that demonstration projects should cover an entire building and improve the performance of the entire building. Other stakeholders said that only main components of a building should be upgraded, which is in contradiction to other experts. A full upgrading of a building in terms of energy efficiency and renewables use would require a reduction of the number of sites for renewables energies. For the moment, “electricity” is the main topic in Lebanon, and therefore other energy carriers are at non-priority level, for example heating with oil. Probably full upgrading of buildings will be part for future projects, as this limits the number of demonstration sites, which should be spread all over the country.

These recommendations based on a large number of interviews will have to be seen in relation to the agreed work programme and the budget available. Therefore any recommendation within Chapter 4 should be linked to a recommendation on an equivalent in reduction of other working steps or reduction of original work plan, unless additional co-financing possibilities or other direct sources can be found.

**4 Recommendations**

Taking into consideration the achievements until today, the current project planning and given budget restrictions the following recommendation as an outcome of the evaluation are presented here. Those recommendations could be **integrated into the annual plan** for the next years.

On **the formal side we recommend to establish a more clear reporting system on project achievements**. For example the ToR for this project, the report on the meeting with the Board and some of the monthly information to UNDP are missing. In addition, there is no “Summarizing Report”, for example **Annual Reports** or **Quarterly Reports** on project achievements since two years, except for PIRs. Therefore a monthly reporting system with a separate filing system at L.C.E.C. including at least yearly Progress Reports comparing the project achievements with the given work programme in a **narrative form** will assist UNDP/GEF to follow the project in detail. Most internal information on progress of the project can be seen from **PIR**, but for the general public a conventional Progress Report with a narrative part would give for non-GSWH experts a better overview on the achievements since beginning within the project.

On **the content side there have been a large number of recommendations given by stakeholders**. From our point of view nearly all of them are worthwhile and constructive, some of the recommendations given are contradictory, but all recommendations were given in a positive way. Taking into account those arguments and the limitations by time (two years left) and the budget restrictions we recommend the following modifications in the work programme for the remaining period:

* Simple and **more directed information to the final consumers**, with easy to understand information and best practice, more direct information to potential users of SWH, especially in the rural and remote areas[[1]](#footnote-1).
* Ensuring the **quality of products and quality of maintenance** is one of the main concerns. A more rigid follow-up for the entire quality insurance should be established at L.C.E.C. with special attention on the progress of the field tests by IRI and continuous training and certification of dealers and installers[[2]](#footnote-2). For a certain period the L.C.E.C. team should **meet at IRI on a at least weekly base** in order to follow up any progress until full operation of the testing facility is achieved. And, priority should also be given to implement the certification procedures, which start with **definitions of certification criteria** and the support to GoL decision on the **authority organisation** handing out the certificates.
* The project team should prepare a **full list of possible new and advanced projects** to have ready for presentation in order to allow continuation of successfully completed work and loss of “common technical, organisational and regional know-how in SWH”, a priority for project for the Management of this GSWH project, namely L.C.E.C[[3]](#footnote-3). A clear strategy should be developed together with CEDRO team on future co-operation together with the MWE and UNDP/GEF.

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**6 Annexes**

**6.1 Brief summary of the key documents reviewed**

The main document for the evaluation is the **Inception Report**. This text is the basis for the conclusions drawn on the project. Besides this all publications of L.C.E.C. have been reviewed for example **newsletters, homepage, conference proceedings and project reports**. Finally all files in the **internal filing system** of L.C.E.C. in the office at the Ministry of Energy and Water have been reviewed.

**6.2 Brief summary of meetings with persons interviewed**

In this chapter the minutes of meetings held in Beirut and other Lebanese cities during period 12th September to 16th September 2011 are summarized, the minutes are presented in an alphabetical order. In total **24 meetings with in total 27 experts** had been held *(please note that yellow highlighted parts of the minutes indicate that proposals are given for the future of the GSWH project, but sometimes the interviewed persons mixed GSWH project with other projects in this field, for example the CEDRO project or other L.C.E.C. initiatives).*

(Abiak) 14th September 2011, Mr Jahad Abiak, Lebanese Norm Institute (LIBNOR)  
Mr Abiak was replacing Mrs Lena Degham, who was not available for personal reasons and illness within the family. Mr Abiak stated that he considers the project as very useful for the country, especially the new and innovative financing system. He said that the only comment from his side is, that he would have had the project implemented at a quite earlier time (about 10 years before). Mr Abiak promised to hand over the given questions to Mrs Degham and Mrs Degham will comment the position of LIBNOR in relation to CEDRO and GSWH in written form to the evaluator.

(Abusaid/Houri) 13th September 2011, Mr Ramzi Abusaid and Mr Ahmad F. Houri, the Lebanese Solar Energy Society  
Both members of LSES highlighted the important impact of the GSWH project on the Lebanese energy situation, the project is absolutely necessary for Lebanon in order to meet the challenge of 12% renewables energies in 2020. The members gave a number of recommendations for the second half of the GSWH project, for example to move the projects to a partly self-financing in order to attract the owners interest at a higher level, this could lead for example to 90/10 financing between public and private sector and attract more “really convinced people”; those should be included to the planning process from the beginning as the momentum on SWH is up in Lebanon. With reference to CEDRO the recommendations are to move from projects for the public sector to projects in the private sector. And there is a strong recommendation to support projects also in the Northern part of Lebanon and end the exclusive support to the Southern part of Lebanon. And, the combination of smart metering with net-metering as well the finalization of the “Feed-in-Law” or at least the “Net-Metering-Regulation” should be given priority within the GSWH project in order to stimulate the private sector for investments in solar energy. In detail, an addendum to the GSWH project was discussed and designed, where 5 different municipalities in each of the five main regions of Lebanon get a support on construction of PV for 20 different applications (per installment costs will occur at 4,000 USD, while the production of 1,600 kWh/a could be subsidized by 14 c/kWh, which will require subvention of about 100,000 USD and a similar sum of 200,000 USD for project implementation and project management).

(Alana) 16th September 2011, Mrs Alana, Director of the General Saida University Hospital  
Mrs Alana states that the hospital takes full benefit from the installed 68 solar water heating panels on the roof of the hospital (water temperature in summer 60 – 100 degree C, in winter 15 to 30 degree C). Since then diesel consumption has been reduced by 50% during the entire phase of the project. A recommendation given by the hospital is the organization of a 2/3 day in-house training course in the hospital on the use of the SWH system. And they would like to add an installation of a PV system as the hospital is facing continuous shortages of electricity of about 4 to 6 hours a day.

(Alaya) 12th September 2011, Mr Mohamad Alaya, EdL  
Mr Alaya welcomes the GSWH project as this project will reduce electricity consumption for water heating, while EdL is facing continuous shortages of electricity. All EdL prices are subsidized, therefor there is limited economic interest by Lebanese house owners on SWH installments. For the future he recommends to promote and install in urban areas SWH as a comprehensive solution, especially for multi-owner-houses. And he recommends to narrowing down the results from the wind atlas to develop projects for wind energy farms. Finally he recommends to supporting the Lebanese government with a specific law on feed-in-tariffs.

(Baroud) 13th September 2011, Mr Mahmoud I. Baroud, MEW  
Mr Baroud stated that current co-operation with the L.E.C.E. in the GSWH project team is excellent and mentioned the good experience of the team and stabile work. With reference to the GSWH project he would like to see a broader approach covering “all” public buildings, for example in addition to currently served schools and hospitals, for example army, airport or security units. And, he proposes to concentrate for SWH on non-Beirut areas. Mr Baroud recommends to extent the project from a demonstration project to a legal implementation project, therefore widening the horizon of the project from “pure” demonstration to more legal and regulatory implementation, for example a modification of the regulations on newly constructed houses should be reviewed on usability for renewable energies. With reference to CEDRO and GSWH he would like to see one team and one unit. Finally he highlighted the need to add additional new funds to the GSWH project from other country sources in order to strengthen the GSWH initiative.

(Chaaban) 12th September 2011, Mr Farid Chaaban, AUB  
The GSWH initiative is, according to Mr Chaaban, very important to the country as the strategy is 12% renewables energies in 2020 and to diversify energy sources. Mr Chaaban welcomes the new dimension of capacity building and awareness raising combined with the new financing schemes. For the future he recommends to more widespread the SWH installments also to other regions then the South, and more publicity in the media, especially interviews with TV, which is usually cost free. For the CEDRO project he recommends a testing stations and calibrations in order to better validate the results from the wind atlas, for example one station for one year as a field test. Finally he recommends a kind of “Open Forum” for the conclusions on CEDRO/GSWH project evaluation.

(Chbat) 12th September 2011, Mr Wissam Chbat, MEW  
Main topic for MEW is the electricity shortages and the construction of 700 MW new capacity as combined cycle process in the North at Delaware station. In order to reduce shortages, MEW understands the necessity to reduce water heating by electrical installments with SWH. Important is the public awareness and the innovative financing of the project. And, Energy Conservation Law is ready to be discussed by the Parliament. He is satisfied with the work output of the L.C.E.C. team and considers the team as well experienced. His intention is to make the L.C.E.C. team responsible for energy efficiency and for carbon trading. About 8,000 loans had been launched, which is a challenge for a region, where there is no specific culture on energy efficiency. The incentives for installment of SWH should continue, without continuation of the project there are risks for sustainability. For the future, Mr Chabat recommends to target more on construction companies and architects, and to target on “big” buildings. Mr Chabat also mentioned off-grid-PV-applications as a topic for L.C.E.C. in the future. The move of CEDRO project to MEW building was also discussed.

(De Clercq/Hakim/Choucair) 13th September 2011, Mr Christian De Clercq / Mrs Lea Hakim / Mrs Farah Choucair, Ministry of Finance (MoF)  
The participants of the meeting see both projects as main step forward for the implementation of the target of 12% renewable energy in 2020. They recommend a more directed P.R. work (“How attractive is SWH?”) in order to stimulate the market introduction of SWH. The GSWH should develop a market and sales drive for the next two years. The participants welcomed the National Energy Efficiency Action Programme, but also stated that the lack of communication has to be reduced as they received the NEEAP just the same day when the NEEAP was planned to bereleased to the public.

(El Khourri) 12th September 2011, Mr Pierre El Khourri, L.C.E.C  
The GSWH project is only a part of the current L.C.E.C. activities, some objectives, which were foreseen for completion in 2015 are already installed, for example the financing scheme with the National Bank of Lebanon. He values the co-operation with MEW and with UNDP as very successful. For the future L.C.E.C. plans an approach for PV, small hydro and small wind energy converters as with the scheme of GSWH project (including P.R., financing schemes). In parallel the Greek support project has been completed with 9,000 CFLs and 350 SWH installments.

(El Zein) 12th September 2011, Mr Ziad El Zein, L.C.E.C  
P.R. is important for the success of the GSWH project. Finally the goal is the installment of 1,000,000 m2 solar water heating installations in Lebanon in 2020. Advantage is the direct support of the MEW, especially the location of the L.C.E.C. within the Ministry building.

(Haijar) 14th September 2011, Mr Mohamad Hajjar, Industrial Research Institute (IRI)  
Mr Hajjar presented the testing site for solar water heating equipment at his institute. The development of the testing field is a joint co-operation between IRI and L.C.E.C., where samples are drawn from imported SWH equipment, which usually arrive at one of Lebanese harbors. Samples are drawn and the testing procedure is done according to the norm of EN 12975. Currently the site is used for “testing the testing equipment”. Inauguration is foreseen for mid October 2011. The testing circle includes performance tests and reliability tests for 5 days. All SWH is being imported as there is no production line for SWH equipment. It is clear for this visit, that the testing field has never been in operation, chairs are not unpacked, computer have not been installed, and there is definitely no solar collector installed in the testing field (photos of the empty testing field are available on request). Even testing of vacuum pipes for SWH is technically not possible with this equipment and should be made available. Two proposals were given for future project extension; one is on an improved training in Europe, where well equipped test fields are in operation since long time and, a possible extension of the test field for the solar panels to a testing field for solar systems including the collectors, storage system, pumps and control system. For the evaluation it is clear that there should not be any extension before the current installed system is successfully running for a longer period.

(Halawi) 13th September 2011, Mr Mazen A. Halawi, Banque du Liban (BdL)   
Mr Halawi recommends to target on a more active level the private consumers in order to attract them in the use of financing SWH. He sees one of the main obstacles for the use of SWH in a more clear structure, showing how much they could save with the installation of SWHs. And he recommends to offer quality controlled products, quality controlled suppliers and quality controlled maintenance for SWHs in Lebanon. He reports that due to unqualified dealers a number of consumers did not receive the foreseen subsidies and 0% loans. This should be tackled with priority.

(Harajli) 14th September 2011, Mr Hassan Harajli, Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon (CEDRO), Project Manager   
Mr Harajli gave an overview on the starting period of the CEDRO project, namely the CEDRO I project, which was launched in October 2007 and had been completed in March 2010. He referred to the Quarterly and Yearly Reports that had been published. Since then CEDRO II and CEDRO III have started, he expects the total cost at the end of the three CEDRO projects at 9.7 Mio USD. Cooperation with the funding agency AECID is excellent, they are informed on all activities and the Spanish Ambassador from time to time participates in the inauguration of the demonstration projects. Newsletters are published on a regular base, i. e. twice a year. Invoices of the project are controlled by UNDP. CEDRO I has completed 20 projects for PV and 4 projects for SWH. As to time delays in the beginning of the CEDRO I project, the spending of the budget for the demonstration projects was very weak, which means, that also the completion of the demonstration projects was not as foreseen in the original ToR. Considerable delays were handled through a time extension. For the next periods of CEDRO there are some discussions on a moderate change in the philosophy of the project, if the demonstration projects should cover an entire building and improve the performance of the entire building, or, if only main components of a building should be upgraded. A full upgrading of an building in terms of energy efficiency and renewables use would require a reduction of the number of sites for renewables energies, for example from 100 sites to 30 to 40 sites pending on the total investment costs. And there are concerns about the knowledge transfer to future projects considering the goals given in the NEEAP. Finally a project which could be considered as important would be the full design of a Future Green Building of the MEW near Bourj Hammoud, which could use all types of renewable energy and have all energy efficiency measures included at a possible size of about 2,000 m2.

(Maalouf) 12th September 2011, Mr Mitri Maalouf, L.C.E.C  
L.C.E.C. is in operation since 2005, as an organization “owned” by UNDP and MEW with own bookkeeping system, located at the MEW with the aim of increasing energy efficiency and renewables in Lebanon.

(Osseiran) 12th September 2011, Mr Karim M. Osseiran, MEW  
Mr Osseiran welcomes the work of the CEDRO team, especially as the Ministry itself has nearly no internal resources to work on operational level. Therefore he is thankful for the help by UNDP especially for the projects on “waste to energy”, “hydropower extension”, micro hydropower”, and “geothermal atlas”. Mr Osseiran is the correspondent in the Ministry for the CEDRO project. He meets with the Minister and reports about any progress of the projects. Without the CEDRO project by UNDP all internal resources would be allocated within the Ministry to the extension of conventional power stations. He recommends extension of the project and highlighted that with CEDRO there is the “luxury” of promoting and implementing renewables in Lebanon.

(Roda) 14th September 2011, Mrs Irene Cabrera Roda, Spanish Agency for International Development Cooperation (AECID)  
Mrs Roda stated at the beginning of the meeting that she is in Lebanon since one year and that she follows about 45 projects of the Spanish government in parallel. Spain has a number of 1,200 troops in Southern part of Lebanon and therefore gives priority to projects in this region. Mrs Roda finds the project important for Lebanon and proposes two topics as the financing of the projects will end in October 2014. Within the remaining period the contractor should emphasis on a “Study of possibilities for continuation of the demonstration projects completed by the CEDRO project”. This means that during the remaining period considerable efforts should be allocated to ensure continuation of the started projects and started project approach. And, it was recommended that the team should have ready proposals for a continuation of the current CEDRO activities, just in case a CEDRO IV project could be launched.

(Sarkis) 15th September 2011, Mr Richard Sarkis, Order of Engineers and Architects Beirut (OoE)  
Mr Sarkis is positive for the results achieved in the two projects, GSWH and CEDRO, even as there is very slow implementation. He proposes to reduce the gap of guidance by better and more directed information, with easy to understand information on solar energy. In his opinion the incentives given in the projects help a lot for the promotion of solar energy. But he states, that quality of products should by all means ensured. Product quality should be regulated by the government as there is negative experience with products from China. Same applies for the installation companies, which should work with qualified staff. He proposes to concentrate on remote areas as there are comparatively poor people live, which would benefit from savings of electricity bills. This could be organized with the respective chiefs of the municipalities. And, installment could be concentrated for new resort villages, which are newly constructed as the additional costs compared to the overall cost can be neglected. Here we will have the advantage that the management of the resorts could ensure proper maintenance of the solar installations. Also new hotels and other new buildings with high hot water consumption should be attracted for the use of solar energy as hot water consumption is relatively high in these buildings (shower, pools, cleaning).

(Sfeir) 15th September 2011, Mr Jean Paul Sfeir, Solarnet  
Mr Sfeir highlights the efforts by the two projects to introduce renewable energy into Lebanon. He has seen that for a number of installations problems with corrosion occurring, therefore he recommends to introduce a system of certifications to Lebanon. For example Chinese SWHs are offered at a price of 900 USD, while conventional European systems cost 1,500 USD. The difference between the systems is due to different quality of material, for example the vacuum systems have 0.5 mm while others have 1.5 mm of steel in the pipes, therefore corrosion more often leads to leakages. And this damages the entire reputation of solar energy. On the other hand the subsidies and the 0% loans are very helpful for the market introduction. Also due to inappropriate quality two banks have stopped their co-operation with GSWH as they received heavy complaints from customers on quality of SWHs. Another urgent need is the qualification of installers, all Lebanese installers should pass a three-day-training course and pass through a test (“real test”). This could be done by accredited certifiers like IRI, the Ministry or a NGO. And, in order to allow a long-term effect from solar energy with reference to the CEDRO project he recommends allocating funds for long-term proper maintenance of the demonstration projects of the public sector. At least the batteries will have to be changed after 5 to 6 years operation, therefore training of technicians and training of operators of hospitals and schools should increase the long-term effect. Finally he recommends to put efforts on the net-metering initiative, which will allow a considerable increase in the installation of PV systems.

(Shehadeh) 12th September 2011, Mr Nader Haji Shehadeh, L.C.E.C  
Most of the installations of SWHs are usually in the suburbs of Beirut. Private banks finance SHW installations with 0% interest rate, the private banks are re-financed by the National Bank of Lebanon by releasing 1.5 time the loan as reduced minimum reserve of private bank at National Bank. National Bank gets a kind of loan for “lost” repayments by the European Commission. Currently 400,000 m2 of solar collectors are installed.

(Sroud) 16th September 2011, Mr Sroud, Director Middle School Sfeir  
Mr Sroud is very thankful for the donation given by the UNDP programme in installing a 2,05 kW photovoltaic system on roof of the school. The school is not linked to the national grid of EdL, a link to the network would cost about 14,000 USD, therefore the PV system is the only source for energy. Inspection of the equipment was made and data logger was connected to the computer in order to allow a transfer of the data from last 6 months. The school, which could serve about 300 pupil serves only 45 pupil as most of the pupil go to the four religious schools in the neighborhood. With the PV system the school runs a computer, a printer, lighting and a refrigerator. Unfortunately the school is closed in summer for holidays while the PV production is the highest during year. Currently the headmaster takes care on batteries and on the panel. A view to the panels show heave dust on the panel, after cleaning the radiation increased from 654 W/m2 to 750 W/m2, which is an increase of 18%. The Director promised to ensure continuous cleaning of the panels in the future. Two recommendations were given by him, first he would like to participate in a kind of maintenance training in order to get a better understanding of the installed system and second, he would recommend for future projects to implement PV systems to remote houses, which are located in this region.

(Tabbara) 12th September 2011, Mrs Rola Tabbara, L.C.E.C  
All filing is centralized at Mrs Tabbara desk, especially correspondence with UNDP, MEW, Chinese Fund, and other correspondence. The project files for all SWH installments are directly with the engineers. No direct payments from and to L.C.E.C., only via UNDP and to be agreed with the Ministry MEW.

(Tassi) 15th September 2011, Mr Mohammad Tassi, American University of Beirut (AUB)  
Both programmes, GSWH and CEDRO have had a considerable positive effect on the market for renewables. Still improved awareness raising and more continuous information on the benefits for individuals on installing SWH is needed. Especially the 0% loans make the investment attractive and this message should be continuously disseminated. The selected partners should deliver high quality equipment and installation. Improper dealers should be kept out of the business. And, the project should cover the entire area of Lebanon. With a standardization process we can proof that the installation and maintenance is properly done. Mr Tassi discusses the question, whether the goal of the project is to reach a high number of customers or to reach a high number of installed m2 of solar panels; in this case he proposes to add to the project installments in the large cities and there at large scale consumers, for example hotels or dormitories for students. We also proposes to start investigating in solar heating, as this could be useful for mountain areas, at least a kind of pre-heating in these areas in order to avoid use of wood for heating. Finally the possibility of an “energy bus” was discussed, where demonstration of prototypes of solar heating and PV could be demonstrated in remote areas.

(Traboulsi) 13th September 2011, Mr Samir Traboulsi, LGBC  
Mr Traboulsi highlights the efforts taken by UNDP and the L.C.E.C. expert team on implementing solar water heating in Lebanon. He confirms the strict need for solar water heating, especially for rural regions, where continuous shortages of electricity happen. With reference to the GSWH project he recommends to decrease the lack of information and data on water consumption in Lebanon, to ensure better labeling of the solar panel system, more public awareness raising (continuous presentations of real case results of individual house owners having implemented SWH) and modifications of construction laws for up-to-4 floor buildings (allow 33 degree roofing instead of 22 degree roofing). And, Mr Traboulsi stated that the costs for SWH installations in Lebanon are about twice the price level in Jordan due to import tax (which is currently only 5%), but especially for customs clearance papers, but also VAT (which is currently also at moderate level of 10%), increased competition between installers and dealers would help to reduce costs.

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1. This could be internally made available by reducing the information to scientific and professional audience. [↑](#footnote-ref-1)
2. A reduction in follow-up of new additional installations should ensure availability of internal resources [↑](#footnote-ref-2)
3. In this case the direct work for the government will have to be reduced, as we see large social losses for Lebanese society if the team is split into different groups. [↑](#footnote-ref-3)