



**International Copper  
Association**  
Copper Alliance

## **REPORT**

# **REGIONAL WORKSHOP FOR THE TRANSFORMATION AND STRENGTHENING OF THE SOLAR WATER HEATING IN THE MEDITERRANEAN**

**18-19 April 2012**

**Beirut, Lebanon**

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## INTRODUCTION

This event is part of the "**Global Solar Water Heating Market Transformation and Strengthening Initiative**," financed by the Global Environment Facility (GEF) and co-executed by UNEP and UNDP. The main goal of the Initiative is to create the conditions for a solar water heating market uptake at global level, by building on the most successful examples in developed and developing countries, and taking into account the potential and the necessary prerequisite for deployment.

Within this initiative, a first regional meeting was conducted in Latin America (Chile) in 2011. The Mediterranean region is the second world area to host such an important gathering, with the aim to establish a regional network and platform for knowledge sharing and collaboration in order to scale up the solar thermal heating market. Lebanon is one of the implementing countries of the global initiative in the region. As an expected outcome of this workshop, additional countries in the Mediterranean region will join the network, to implement follow-up activities.

The event, coordinated by the Renewable Energy Division of OME in cooperation with the Lebanese Center for Energy Conservation, the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP), took place on 18-19 April 2012 at Crowne Plaza Hotel in Beirut and was organised under the auspices of the Ministry for Energy and Water of Lebanon.

## WORKSHOP OBJECTIVES AND ACHIEVEMENTS

More than fifty experts from ten different countries around the Mediterranean participated in the workshop. The workshop gathered both public and private sector stakeholders; ministries, public agencies and private companies.

The goal of the workshop is to create a platform for knowledge sharing and collaboration to transfer and scale up the solar thermal heating market for, both, public and private sectors, and by envisioning a regional network focused on the following objectives and activities:

- **Inform about the Global Solar Water Heating (GSWH) project's goals and objectives:** Introduce the (GSWH) project's goals and objectives to the participating regional countries and present the global knowledge management component of the project, as well as present some technical thematic areas of interest.
- **Inform about the status of the GSWH project countries in the region:** Update on the current status and progress of the Solar Water Heating market in each of the regional project countries.
- **Best practices, knowledge sharing and networking:** Disseminate information on the lessons learnt and "best practices" and facilitate cross-country information exchange and networking among policy makers and businesses, as well as identify potential areas for collaboration on the national, regional and global levels.

## AGENDA

Attached in Annex A

## THEMES DISCUSSED

The workshop was organized in two main sessions; the opening session and the thematic sessions. The opening session included opening remarks; overview of the “Global Solar Water Heating Transformation and Strengthening Initiative”- Global, Regional and National components of the project; and prospects and vision for the development and deployment of solar thermal technologies at global and regional level.

The four thematic sessions discussed are: 1) policy and regulatory measures for boosting the solar thermal use; 2) role and benefits of industry associations; 3) the importance of standards and testing; and 4) solar heat for industrial processes.

## OPENING SESSION

The session was opened by Zakaria Rammal (advisor to the Minister) from the Ministry of Energy and Water on behalf of His Excellency Minister Bassil.

Zakaria Rammal talked about how energy sources has been used and how new technologies have been evolving to exploit renewable energy sources, potential of renewable energy in the energy mix in Lebanon and the regulatory framework governing the deployment of such technologies, including financing schemes and the allocation of \$9 million by the government to encourage the installation of SWH system in each house.

He also highlighted the importance of the workshop as a platform for knowledge sharing and extended his thanks to the organizers and the partners who contributed to such event.

### **Emanuela Menichetti**

*Head, Renewable Energy Division, OME (France)*



Emanuela Menichetti took the opportunity to introduce OME and its role in the project as the regional partner of the Global Solar Water Heating Initiative, the executing parties of the project as well as the LCEC. She also thanked all participants while highlighting the presence of international, regional and national experts to the workshop.

### **Amr Abdel Hai**

*Programme Officer, Energy Branch  
United Nations Environment Program (UNEP), France*



Amr Abdel Hai presented an overview of the global component of the project. He emphasized the main objectives as to accelerate global commercialization and sustainable market transformation of solar water heating, thereby reducing the current use of electricity and fossil fuels for hot water preparation in residential, private service sector and public buildings and, when applicable, industrial applications.

He also highlighted the expected global impact such as installation of an additional 3 million square meters of SWH panels (compared to the expected baseline development) by the end of the country programs; GHG reduction 14.9 million tons of CO<sub>2</sub>eq over 15 years; and Sustainable growth of these markets at the minimum annual rate of 20% (in total installed capacity).

The project consists of 2 main components: the Global Knowledge Management and Networking Component and the Country Programs Component. He emphasized the role of the Knowledge Management component as the discipline that will enable project partners and stakeholders more collectively and systematically; and will capture, store, share and apply their knowledge, to achieve the project objectives.

Knowledge Management Strategy is composed of four main elements: knowledge management system, knowledge products and services, knowledge dissemination and knowledge enhancement.

Global Knowledge Component Main Outputs: (1) KM Web-based Tool - Knowledge management system through a web-based tool: [www.solarthermalworld.org](http://www.solarthermalworld.org); (2) Establishment of a Network of Organizations: i) the International Copper Association (ICA) as a global partner; ii) the Observatoire Méditerranéen de l'Energie (OME) covering South and East of the Mediterranean region; iii) the Latin American Energy Organization (OLADE) covering Latin America & the Caribbean; iv) the International Institute for Energy Conservation (IIEC) covering South and Southeast Asia; and v) the European Solar Thermal Industry Federation covering Europe.

The project is overseen by a Project Management Committee (PMC) including the International Copper Association (as co-financing partner), UNDP and UNEP.

**Marcel Alers,**

*Principal Technical Advisor, Climate Change Mitigation Manager  
United National Development Programme (UNDP), USA*

Marcel Alers gave updates about the status of the countries implementing the project and the possibility to extend it to other countries interested in implementing the program. He highlighted the global project framework by emphasizing the project objective as to accelerate the global commercialization and market development of solar water heating in residential, private service sector and public buildings and, when applicable, industrial applications. The project components are 1) knowledge management, 2) country programs (Albania, Algeria, Chile, India, Lebanon, Mexico), objectives of which is to accelerate and sustain the SWH market in those countries, and 3) project management (including both KM and country programs).

### **Nicolas Cottret**

*Energy Analyst, OME (France)*



Nicolas Cottret went over what has been carried out under the first phase of the project, by highlighting the role of OME and the technical studies that have been carried out in this regard.

OME coordinates the Knowledge Management and networking component of the project in the Mediterranean region: 1) technical studies; 2) identification of barriers, needs and priorities; and 3) dissemination of information and best practices.

In terms of technical studies, Mr. Cottret gave some examples of the analysis that was done, including solar thermal capacity in the Mediterranean, solar thermal capacity per capita, existing policies and supporting schemes in the South Mediterranean, solar heat for industrial processes (SHIP), SHIP potential in the South Med, and barriers and recommendations in this regard.

### **Abdelghani El Gharras**

*Energy Analyst, OME (France)*



Abdelghani El Gharras gave an overview of the second phase of the project, deliverables and next steps by highlighting the objective as to complement and extend the previous phase of the project by expanding the number of countries participating in the initiative; providing additional statistics and reports for the Mediterranean region; developing a Solar Action Plan for the region; and creating a knowledge network involving both private and public stakeholders.

He also emphasized the objectives of the workshop as to create a platform for knowledge sharing and cooperation; inform about the status of the GSWH project countries in the region; bring together public and private actors; best practices, knowledge sharing and networking.

Market assessment update entails updating of the market assessment and enlarging the scope to more countries. For this purpose, country factsheets (7 country factsheets collected, market volume, turnover, policies, incentives, etc.) were sent to participants for their feedback.

Action Plan and its components: status of solar thermal technologies today, potential benefits, identification and assessment of critical factors, actions for policy makers and stakeholders, main conclusions and recommendations for next steps.

### **Pierre El Khoury**

*Manager of the "Lebanese Center for Energy Conservation" (LCEC); Project Manager of the SWH National Programme, Lebanon*



The main theme of the presentation was about a general description of the national SWH programme in Lebanon: Achievements and barriers. Mr. El Khoury went over a short historical review, including the signature in 2009 of a new project with UNDP and Lebanon entitled "The Country Programme of Lebanon under the Global Solar Water Heating Market Transformation and Strengthening Initiative." The 5-year initiative in Lebanon is managed by UNDP Lebanon and the Ministry of Energy and Water through the work of the Lebanese Center for Energy

Conservation (LCEC).

This initiative aims at accelerating the market development of solar water heating in Lebanon with an objective to facilitate: 1) the installation of 190,000 m<sup>2</sup> of new installed collector area over the period 2009-2014; 2) an annual sale of 50,000 m<sup>2</sup> reached by the year 2014; and 3) with expected continuing growth to reach the set target of 1,050,000 m<sup>2</sup> of total installed SWH capacity by 2020.

Work on 4 axes: 1) policy and financing- enabling environment to promote the SWH market, 2) information and communication- marketing and awareness raising on SWH strengthened, 3) technical and pilot projects- implementation, certification and quality control schemes established, 4) management and institutionalization- support and lessons learnt.

In terms of challenges and concern, the SWH testing facility does not include testing for vacuum tube systems (with high penetration into the market); consumers are still



reluctant about which product to purchase (need for a label); If a label is adopted in Lebanon, how to make sure that the label has a cross-border ability to other countries in the region; If SWH becomes mandatory, whether the private sector would be able to supply all the needs and whether skilled labor is available; Lebanon would definitely need an overall quality control scheme, including the setup of a vocational technical training.

## **Paolo Frankl**

*Head, Renewable Energy Division, IEA (France)*



Paolo Frankl talked about the IEA solar technology roadmaps; recent trends in deployment of renewable energy, a global perspective from IEA long-term scenarios, solar energy perspectives and technology roadmaps (solar PV, solar CSP, solar heating and cooling), and input from IEA SHC implementing agreement.

He highlighted the strong growth in electricity, heat, and transport (3% share of road transport, grew at 26%, growth focused in Brazil, US and EU). There has been also a rapid growth in solar water heating, mainly in China.

He also presented the status of solar heating and cooling today, while emphasizing that solar heat will remain the solar leader in the near future. Highest growth rates in 2010 were observed in Asia, especially India, important player in a fast growing market. MENA region comes 2<sup>nd</sup>.

In terms of the global energy-related CO<sub>2</sub> emissions in the Baseline and BLUE Map scenarios, global CO<sub>2</sub> emissions double in the Baseline, but in the BLUE Map scenario abatement across all sectors reduces emissions to half 2005 levels by 2050. The primary role of renewables in the BLUE scenarios: Renewables provide from almost half to three quarters of the global electricity generation in 2050.

Solar PV Roadmap Vision: PV can provide 5% of global electricity generation in 2030, 11% in 2050.

Solar thermal electricity - key value of STE/CSP is in thermal storage to better match demand: 1) effective and cheaper than electrical storage; 2) concentration requires good direct irradiance; and 3) any different designs and options.

Solar heating: 18 EJ annual solar heat production by 2050, some 10% of final energy for heat by that time; 1.5 EJ annual solar heat for cooling by 2050; solar heat can contribute to 8.9 EJ/y domestic hot water and space heating in buildings by 2050; large potential of solar-supported district heating.

Solar cooling offers a promise considering rapidly increasing cooling demand worldwide and allows for avoiding peak load electricity demand and need for additional power production and transmission capacities. Technology is still in RD&D phase as substantially higher RD&D resources are needed to realize standardized solutions.

Policy priorities for SHC: create stable policy framework - in relation to local conditions and SHC applications; address non-economic barriers: information failures, split incentive, training & education ; stimulate development of new “business models” to overcome up-front investment barriers; Include “avoided” costs into discussion, e.g. avoided peak loads, avoided additional transmission capacity ; and develop standards – including for industry.

### **Salvatore Moretta**

*Expert, Mediterranean Renewable Energy Centre (MEDREC), Tunisia*



Salvatore Moretta talked about the main barriers and enabling factors for the development of a sustainable solar thermal market in the Mediterranean region and the MEDREC experience especially with the financial instrument, Mediterranean Investment Facility (MIF) as an initiative promoted by IMELS in partnership with the United Nations Environment Programme (UNEP) aiming at developing a sustainable renewable energy market system in Mediterranean and Balkan regions, removing project, policy and trade barriers and strengthening the market system, thus contributing to climate change mitigation.

The IMELS has already provided a financial contribution amounting to 10 million USD to test different options to increase available financing for renewable energy and energy efficiency systems in Morocco, Egypt, Tunisia, Macedonia and Montenegro.

The objectives of the actions performed under MIF are: to lower the charged interest rates to end users; to ensure financial institutions participation by reducing the risk in entering a new market segment; to support the development of partnerships between commercial banks and suppliers of technology; to lower the up-front cost for Energy Efficiency and distributed RE appliances.

Mr. Moretta also covered the ongoing projects under the Mediterranean Investment Facility. In Egypt, EGY SOL targets the hotel sector to install SWH systems through a combination of subsidies, awareness raising and training workshops, and by establishing quality standards for SWH suppliers. In Montenegro, MONTESOL is allowing local banks to finance SWH end-users through preferential terms such as low-interest loans. In Morocco, MIF is helping to transform the market for energy efficient lighting, paving the way for phasing out incandescent lighting. In Tunisia there is the

“PROSOL family”: PROSOL (SWH in residential sector - 2004->2008), PROSOL Tertiary (SWH in hotel sector - 2009-> ...), PROSOL Industry (SPH – 2009 -> ...), PROSOL Elec (PV in residential sector – 2010 -> 2012).

Salvatore Moretta also draws some conclusions about the key factors to success: i) financing Mechanisms tailored taking into account specific local conditions with regard to the institutional, legal and market framework (Investment costs and interest rates subsidies, financial support for design and maintenance...); ii) capacity building to both private and public operators; iii) awareness rising through communication campaigns, iii) involvement of the banking sector; iv) involvement of the energy utility; v) technical support for feasibility studies and design; vi) development of Emission Reduction related activities; and vii) quality standards and certification procedures.

He also emphasized the role of political commitment as a key factor for the successful deployment of SWH technologies at competitive cost-benefit ratios is to systematically turn this technology into a major element of energy system. Governments need to adopt, in agreements with relevant stakeholders, strategies, policy targets, and support schemes that are visible, feasible, and effective, that create both sufficiently expansive markets to drive down costs by scaling up deployment, and sufficiently attractive business perspectives for industrialists.

MEDREC is working to assist Tunisian Government to address perverse subsidy on fossil fuels to SWH (and REEE in general), to improve energy security and reduce CO<sub>2</sub> through simplified and effective support schemes tailored on local conditions.

## **Q&A Session**

The questions raised concerned the targets of the GSWH in these program countries, especially the ones in the Mediterranean region and how these would be achievable. In response, in Lebanon, for example two main elements were behind achieving the targets, namely a long term financing mechanism and a policy framework mandating solar water heating.

The issue of lack of documented return on experience was raised regardless of the long experience countries might have. In Jordan, for instance, experience for SHIP is not well documented. Thus, the goal of the workshop is to get more documented and accurate data and a platform for knowledge sharing.

The lack of synergies among agencies promoting SHW in the region was also raised and how this might have a negative impact on the market growth. Therefore, a need for coordination of these efforts was emphasized.

Another issue was how important standards are in harmonizing the quality of products in each market. The question was whether the testing facilities could be certified or not, but the answer was that they are accredited not certified. A certification scheme called “ArSol” to be established in the Arab region was also mentioned as a scheme similar to the European “solar keymark.”

Another question was raised concerning competition between PV and solar thermal technologies and how PV has benefited much from policy incentives, thereby driving the cost of energy from PV down compared to solar thermal.

Other themes discussed included the criteria for countries to get involved in the program; the issue of evaluating the incremental impact of such programs; prerequisites for a successful deployment of SWH systems; the financing sector’s involvement.

## Thematic Session I: Policy and Regulatory Measures for Boosting the Solar Thermal Use

This session was moderated by Paolo Frankl, and the introductory speech was given by Ricardo Battisti.

### Ricardo Battisti

*Senior Researcher, Ambiente Italia, Italy*



Ricardo Battisti presentation talked mainly about policy and regulatory measures for solar thermal. He talked about where the solar thermal is going, the 2020 targets and the markets; support policies in place- best (and worst...) practices; and what should be done as the best recipe.

In addition to underlining some of the trends of solar thermal and the 2020 targets and the need for strong support policies for reaching the targets in some countries, he shed light on support policies in place: best (and worst...) practices. He highlighted the strong confidence in the solar obligation in buildings given the available support scheme and the high energy prices (also heating by electricity). He, nevertheless, acknowledged that despite the situation the support scheme (tax reduction) is not appealing enough; there exists competition (purchase power, roof, media attention) with PV; bureaucracy costs: from +24% to +100%; and the appeal of individual ST systems is decreasing.

He also gave an example of support policies in place in non Mediterranean context. He pointed out that market is almost 100% for large systems and with no incentive, as he wondered that maybe the right way for assuring sustainability.

He gave some suggestions about what should be done as the “best recipe” for a comprehensive support and development plan with no spot actions. In terms of incentives (low/high (crisis), tax reduction/feed in tariff/rebate), it does not matter as long as it i) has a time frame of at least 3 years (Upper Austria: since 1981) and ii) lowers the system payback time to 5 or 6 years. Regarding solar obligation in buildings, it rests on three main elements: not only in new buildings but also in renovations (crisis); do not allow “easy exemptions”, i.e. special areas, technical problems, etc; and foresee checks and fines. Communication also matters through holding annual national campaigns (e.g. European Solar Days) as this gives more transparent data on costs and savings (for banks!) Quality is also important through certification standards and training of planners and installers.

Ricardo Battisti suggests how to develop a stable market as the solar thermal providers should: i) have good marketing strategies, such as more targeted promotion of special applications; ii) invest enough money in R&D; iii) invest enough time and money in

highlighting the benefits of solar to the final user; and iv) be able at lowering product costs.

That the public sector, in turn, should: i) set up appropriate and long-lasting funding schemes; ii) assure adequate R&D resources to industries, thus allowing industries to reduce product costs; iii) organize campaigns for highlighting the benefits of solar to the final user, since this is an issue of general interest; iv) monitor the installations and provide reliable market statistics; and v) design and manage the whole support and development plan.

He also raised questions about whether there are excessive bureaucratic burdens in one's country; whether the development plans currently in place in one's country assure a self-sustainability of the sector in 10 or 15 years. The initial market big bang is easy, but preserving life in the universe is much harder; and that "S" stand for "solar" but also for "security" (of supply, price and environment protection)...in times of crisis and uncertainty, whether this is enough for assuring the success of a technology, especially in sunny countries.

### **Sonia Mezzour**

*General Secretary, ADEREE, Morocco*

Sonia Mezzour presented the National Programme for Solar Water Heating Development (Shemsi) and the objective to reach a 1.7 million m<sup>2</sup> by 2020 while promoting a local industry through offering financial aid and by development of quality through development of norms of products and services to be eligible for such aid. She talked about the current situation of SWH in Morocco as the country enjoys a high, yet untapped potential of SWH.

She stated the difficulty of evaluating the PROMASOL Programme, but underlined the low status due to five obstacles limiting development of SWH in Morocco. These are mainly: i) butane subsidy makes the rate of return on investment of SWH at around 16 years; ii) little or no regulatory and legislative incentives; iii) low promotion of SWH; iv) lack of an effective support program for SWH; and v) limited roof surface due clothes drying and satellite dishes.

The programme rests on 4 main pillars: 1) financing, 2) labeling, 3) communication and 4) regulatory and legislative framework. The main conclusion is that the model of subsidization is the most visible for the client, but contributes a little to the growth of surface installed.

The programme would allow for subsidizing ~550 000 m<sup>2</sup> (with a budget of 100 M DH from FDE and 30 M DH from UNDP); ~1 360 000 m<sup>2</sup> (with a budget of 300 M DH); ~2 350 000 m<sup>2</sup> (with a budget of 500 M DH). SWH in new social housing would allow

achieving around 80% of the objectives without expenses to ADEREE and for a gain of butane subsidies of around 1 100 M DH (1 DH invested by the state in the program brings 4.3 DH for the state due to a saving of unsubsidized butane).

The challenges for Morocco, however, are facilitating the mobilization of financing by fund donors; assuring a good transition from subsidizing fossil fuels to subsidizing of renewable technologies; successful involvement of electricity distributors to reduce the final cost of SWH for the consumer; and undertaking the successful application of the law (being implemented) to make SWH obligatory for the new constructions for the CSP, social housing and public buildings.

### **Muhieddin Tawalbeh**

*Head, RUE and Solar Thermal Division, NERC, Jordan*



Muhieddin Tawalbeh talked about the general situation in Jordan and the required policy framework to promote solar thermal applications. Solar water heating systems are commonly used in Jordan; have three solar water heaters manufacturers; while highlighting the existence of a small workshop with bad quality of solar water heaters which affects negatively the market in Jordan. In mid 1990's Jordan had a penetration rate of 25% of households use solar water heaters, but has been decreasing to 12% (2010 figures) of households due to low prices of fuels. Jordan has 1 million m<sup>2</sup> installed, with a 10 000 m<sup>2</sup> increase on average annually.

The Jordanian strategy is to promote more solar water heating use than the normal growth of 25% target increase annually by 2020. Jordan is preparing a Solar Law mandating new buildings to install solar water heating systems. He also highlighted the roof space challenge, including satellite dishes, and water tanks.

He underscored that security of energy is the responsibility of the government. Quantifying the cost of energy security would allow us to convince government about promoting more solar water heating systems.

### **Khairy Agha**

*Chairman, Centre for Solar Energy Studies, Libya*

Khairy Agha gave this presentation on behalf of Mohamed Ali Ekhlal who could not attend the workshop due to last-minute commitments related to his policy functions.

Khairy Agha commented on several points that were discussed previously. He highlighted that everybody agreed that there is a need for a law that mandates obligatory installation of solar water heaters, which will have an effect on industry itself.

He highlighted the notion of breaking the law. His conclusion is to give incentives but not to make it compulsory as some cannot install SWH systems for some technical reasons; living in the ground floor, so necessitating exemptions; and not enough sunny areas on the roof.

For Libya, it does not have any energy law, no energy regulatory body, and electricity is a complete monopoly of the government. Penetration rate of SWH is extremely low. This is because electricity is so cheap (1 Euro cent/kWh). He suggested that it might be cheaper for the government to distribute SWH systems to households than to subsidize electricity from an economic point view. He emphasized that Libya is rethinking of its energy strategy and is looking for new energy resources, however.

### **Dilan Kavruk**

*General Directorate of Renewable Energy of the Ministry of Energy and Natural Resources, Turkey*



Dilan Kavruk opened her presentation with the main policy concerns in Turkey such as energy security and sustainable energy supply, thereby attributing significant importance to encouraging the energy production from renewables in a secure, economic and cost effective manner.

The regulatory and legislative framework has been enforced by the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity (No: 5346). The targets of renewables are defined as follows: 1) providing resource diversification with priority of domestic resources; and 2) increasing renewable energy share in energy supply and making renewable share available at least 30 % in electricity generation in 2023 through completing all hydro power plants (HPPs) under construction (total 5.000 MW capacity ) by the end of 2013, increasing wind power installed capacity up to 10.000 MW by the end of 2015, increasing geothermal power installed capacity up to 300 MW by the end of 2015, and reaching an installed capacity of at least 3000 MW in solar power by the end of 2023.

She also presented some market figures of solar energy in Turkey. 18 million m<sup>2</sup> flat-plate solar collectors are in use. Annual flat-plate solar collector manufacturing capacity is about 0.5 - 1 million m<sup>2</sup>. As for PV, the estimated total installed capacity is 3 MW. This technology is used only in forest fire watching towers, highways, communication towers and meteorological stations.

Besides, she went over the incentives for SWH systems. The number of “forest villages” (Turkish coined for remote villages) in Turkey that benefit from solar thermal technology



is growing rapidly. The credit, covering 100 % of the investment costs for a solar water heater, has to be repaid in three equal installments, starting one year after installation. Since the start of the program in 2004, a total of around 100.000 families have received an interest-free credit to buy a solar water heater until the end of 2010.

## **Q&A Session**

Several questions have been raised during this session: i) how policy could drive market growth: ii) how to integrate energy policy in overall country planning; iii) setting targets or obligations: iv) the issue of stop and go problem especially after the end of a given program due to funding; and v) the question of policy to regulate the market.

The theme of mandatory obligation has attracted so much attention as there was some skepticism about the idea to enforce people to install SWH systems. The emphasis was made, however, on obligations imposed on developers, not really on individual households. In the same regard, communication and awareness raising, financing, education and training were some of the measures that were discussed.

The conclusion that was made concerned that any policy should be done in a simple, predictable and transparent way; a policy strategy to identify a technology roadmap, and communication and awareness raising to give a positive view on solar by showing its benefits while highlighting the real cost of subsidized systems.

## Thematic Session II: Role and Benefits of Industry Association

This session was moderated by Emanuela Menichetti, and the introductory speech was given by Amin Bennouna.

### Amin Bennouna

*Vice President, AMISOLE, Morocco*



Amin Bennouna talked about solar thermal market in Morocco, its impacts and the role of AMISOLE. He first gave an overview on energy in Morocco in terms of consumption of energy and energy per sector; the role of AMISOLE as an industry association whose contributions are to establish a dialogue between decision makers and firms; by bridging the differences between public and private actors, and to improve the policy making process.

He stressed how industry associations should also be enablers for innovation and gave the example of the European Solar Thermal Industry Federation (ESTIF) and its role in contributing to increasing the share of solar energy in heating and cooling sectors, and liaising with the EU institutions and providing policy advice and other tasks as facilitating trade, strengthening research and development, and lobbying to ensure a favorable legislative framework.

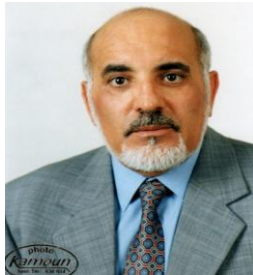
Similarly, in 1987 renewable energy actors in Morocco established AMISOLE (Association Marocaine des Industries Solaires et Eoliennes - Moroccan Association of Solar and Wind Industries) to advocate their interests and develop the renewable energy industry. He outlined some guidelines for AMISOLE's actions in the future by 1) accelerating the market through creating legal constraints to equip new buildings with SWH or, at least, impose the roofs pre-equipment with pipes in individual houses (60% of total); creating the needed tools to follow up; remove subsidies on butane gas (price = 0.30 €/kg !!!) or, at least, subsidize SWH to compensate the energy market distortion created by the cheap butane; and providing financial support to implement local manufacturing factories of SWH from sustainable financial resource and making the access to the funds as flexible as possible; and 2) protecting the consumer through access to tests and labeling must be more attractive to make more products be certified and certifying installation companies and not only the technicians.

He also talked about the role of AMISOLE, lessons learned and its effectiveness in promoting the SWH market. AMISOLE tries to have a continuous lobbying action with public players. AMISOLE has a roadmap based on two items per activity (thermal, PV and wind. AMISOLE official statistics are updated each five years. He highlighted the inexistence of any joint programme for research, development and innovation among members and public private sector research by IRESEN initiative. He

emphasized the difficulty of AMISOLE to have an impact on the establishment of a structured solar thermal industry, and in promoting the solar thermal industry interests as none of the companies has a single activity. Members are never happy with AMISOLE but cannot imagine acting without it.

### **Tahar Achour**

*President, Chambre Syndicale Nationale des Energies Renouvelables, Tunisia*



Tahar Achour gave an overview of the CSNER and its role in promoting renewable energy (training, communication and dissemination) and how it came into existence in 2003 thanks to the evolving market of solar thermal and other actors such as STEG. The market slowed down, however, when STEG's intervention is not any more in the program. By the help of GEF's fund of \$7 million, the market started increasing again. Starting from 2004, the PROSOL program was put in place, that was divided into PROSOL I (2004-06), which was supported mainly by government subsidies and II (2007) supported by subsidies and more advantageous loans (money was collected by STEG in electricity bills) by banks contrary to PROSOL I.

This increase in market has allowed the CSNER to do several things; professional association gathering industries involved in renewable energy (installers, manufacturers, distributor, etc) with 487 members. The Chamber plays the role of labeling to ensure quality. Starting from 2010 it established qualitySol label (that is revised constantly every three years) that installers must have. In terms of testing, two testing facilities exist.

### **Khairy Agha**

*Chairman, Centre for Solar Energy Studies, Libya*

Khairy Agha emphasized the need for a solar industry association, while highlighting his experience within a solar industry association in Tampa, Florida (USA) and its role in promoting solar thermal applications. He stressed the need to replicate that experience in the Arab world to raise public awareness, conduct training programs, and do the certification work, etc.

## **Walid El Baba**

*Former President and Board Member, Lebanese Solar Energy Society, Lebanon*



Walid El Baba presented an overview of the Lebanese Solar Energy Society and its work as a gathering platform of professionals that assures the quality of the whole solar water heating system and stakeholder partners, including manufacturers, installers, engineers, etc. Help in elaborating laws is also a task that LSES does. He underscored that role of NGO's as to help implement a national policy for the benefit of people.

In Lebanon, there was an issue of uncertified and with different quality levels of SWHs. As such, LSES established also some norms when noticed the uncertified products that were coming to Lebanon. It did first some benchmark with regional standards and then developed Lebanese norms. He also highlighted the obligations for some households depending on their house surface.

## **Samir Ayad**

*Chairman, Egyptian Solar Energy Systems, Egypt*



Samir Ayad presented a proposal for Solar Hot water Systems Manufacturer Association that Solar Energy Development Association (SEDA)-started in 2011- could promote. He gave some suggestions for the Solar Association to companies for installation and maintenance; establish training for installers and maintenance personnel; invite members from universities and research institutes and consider them as active members of the association; create feed in industries like storage tank manufacturing, absorber manufacturing, controllers etc. (in Egypt companies are not specialized in a certain component of the system); create an appropriate financing and collecting schemes for local conditions; and increase public awareness of solar hot water systems by updating educational programs at schools and universities.

## **Q&A Session**

The main theme discussed was the role of industry associations and how important to have such kind of associations to fill up the missing action link between the public and the private sector. Level of dialogue and cooperation between such regional associations, and the possibility of having a regional network that could bring all these associations together was also raised. The role of the Mediterranean institute of

renewable energies was highlighted, while underlining the problem language as a barrier for more cooperation.

In addition to such themes of awareness raising and its importance in the market growth, the issues of subsidies, labeling and certification and how these are crucial in such market penetration. The public sector's role in terms of obligations on real estate developers was also discussed.

## **Thematic Session III: The Importance of Standards and Testing**

This thematic session was moderated by Ricardo Battisti, and the introductory speech was given by Ashraf Kraidy

### **Ashraf Kraidy**

*Senior Expert, RCREEE, Egypt*



Ashraf Kraidy talked about the SWHs Certification Program (ARSOL), the current status of SWHs market evolution analysis 2009, need for certification measures in the region 2010, and study for the analysis of the C&S potentials in the MS 2011.

He highlighted the key elements required for the development of a sustainable solar thermal market, including standards (for components and systems containing requirements & test methods), industry (for manufacturing and installing products), test labs (for testing products and further development of technology), certification (for products and installers), and promotion (by campaigns and political measures).

He also underlined some of the prerequisites for ARSOL program such as a bigger market, better products, enhanced user confidence, increased sales, more rational production and lower prices.

ArSol is regional certification model (such as solar keymark, SRCC, etc) supported by a national certification model (such as DIN, CSTBat...etc) and for SWHs in the Arab region. This certification model should enable the states to establish their national certification model and empower RCREEE to be a regional certification body such as Solar Keymark.

He also talked about the content of certification programme, including scope, standards, requirement and assessment procedures for bodies engaged in certification, testing and inspection, selection and submission of test samples, factory and installer inspection control and initial inspection of the production and construction site, surveillance, bodies for the implementation of the scheme, fees, requirements for obtaining the license and the logo (including the design of the logo), the rules of the certification scheme, references, annexes related to specific topics and procedures such as e.g. data sheets, website etc., maintenance of the certification scheme - internal regulations for the Arab Solar Network, requirements for Installer examination, and the way towards the ARSOL label (Flowchart).

## **Hussein Salloum**

*CDR, Lebanon*

Hussein Salloum talked about the codification of the minimum energy performance standards and efficiency ranks for the solar water heater.

He underlined that the standards should depict the level of the technique and the degree of consent of the Lebanese manufacturers and consumers; correlate between the technical complexity of the European testing standards and the local financial capabilities and technical capacities to build and operate testing infrastructure; define the level of requirements that is appropriate for the local market; help to implement a simple certification and labeling program that is easy to understand and implement by all stakeholders; help in the identification by national designers, installers and end-users for the most adequate solar systems; propose a checklist to avoid design, installation and operation errors that are frequently encountered; provide a basis for financial incentives that might be implemented to promote solar thermal systems; and provide a certain level of confidence to the end users, to avoid bad quality of solar thermal products and unprofessional designs and installations.

He talked also about harmonization with the European standards, as these cover the older ISO standards, without deviating too much from technical aspects and express the consent of all actors that activate in the solar thermal market. The harmonization of other Mediterranean and Arab countries with the European approach will facilitate significantly the marketing of the solar thermal products from and to these countries, eliminating thereby considerable technical obstacles. The users on the other hand, will have the chance to choose from a wide range of products on the base of product quality.

He outlined some barriers that hinder the manufacturers or installers to increase their market share in Lebanon: the availability of cheap products that do not meet local quality and standards (Such as the import of cheap Vacuum-Tube SWHs); the quality and the standards of the products manufactured locally; lack of standardization is considered to be the greatest barrier; the need for certification of manufactured products; lack of qualified salesmanship; lack of qualified installers; the inexistence of building codes governing the use of SWH's in general and their installation on roof of Buildings in specific; unawareness of customers about RE in general and SWH in specific; lack of TV programs educating the public on the use of SWHs; public awareness on benefits and energy saving impacts on the use of SWHs; lack of financing and the availability of comfortable loans with low or no interest; the existence and increase of custom taxes on SWH products and raw material such as copper hinders the competition with imported products; the existence of TVA taxes; the inexistence of sound policies to encourage the installation of SWHs; the absence of

government subsidy programs; lack of government incentives; the absence of local incentives by government programs; the existence of reduced electricity tariff (Subsidies by the government); the inexistence of considerable share of support from the ministry of Energy and Water and from EDL on the purchasing of the SWH units.

He highlighted what should be changed in the current system (legislation, tax incentives/disincentives) by policy makers to help companies expand their market share: enforcing a mandatory measure to install a SWH on all new buildings; reducing taxes and exempt users from taxes; exempting TVA on SWH products; making available a solar funding mechanism similar to the one in Tunisia; reducing Custom taxes on all related imported goods and products including water tanks; exempting TVA from all imported SWHs; enforcing mandatory regulations on the use of SWHs on a large scale throughout the country, including the industrial sector and the public sectors such as hospitals, hotels, government facilities; facilitating the existence of comfortable financial mechanism for the public; reducing first cost installation fees on new electric meters in building; adopting policies and generate proper legislations in favor of the use of SWHs; creating tax disincentives that would protect national manufacturing through the exertion of more taxes on imported SWH products; encouraging investments and subsidizing related factories; encouraging home owners to use SWHs; eliminating municipal taxes for those who employ SWHs in their homes; generating coherent standards and enforce a certification process for the SWHs; enforcing legal measures on the improper use of SWHs.

**Nader Haj Chehadeh**  
*LBCEC, Lebanon*

Nader Chehadeh highlighted the existence of testing facility, adoption of NL 12975 standards, and launching of a financing mechanism that subsidized the solar water heating systems.

He also talked about the analysis made regarding market share in terms of qualified vs unqualified solar water heaters; and the increase of SWH companies to more than 100 companies, not necessarily all of them are manufacturers, but they include different categories even distributors and retailers.

In terms of country of origin regarding the products that are sold in the market, the highest share is from China and then minor share of Turkish, Lebanese and Dutch products. The share of china is decreasing, however.



**Kutay Ulke,**  
*Export Executive, Ezinc, Turkey*



Kutay Ulke started his presentation by underlining the existing standards scheme in Turkey, that is following the EN standard as a member candidate of EU. Before, Turkey was using the extension of international (ISO) standards which was named as TS-3680 for solar thermal collectors. Today, TS (Turkish Standards) are existing norms and these are extensions/duplicates of EN norms for solar water heating systems, which are; TS-EN-12975, TS-EN-12976 and TS-EN-12977.

He also talked about potential barriers about standards and certification in Turkey, including the inexistence of an EU accredited test laboratory and lack of incentive schemes for solar water heaters. The only support for SWH's is ORKÖY programme limited with Forestry Villages.

Other items such as impact on trade, on quality of products and customer awareness were also discussed. He emphasized that it takes a long time and high expenses to certify products outside of Turkey. Quality of products is directly related with standards and certifications because of basic production facilities without quality concern. Customers who are dealers, installers and wholesalers will prefer certified products. Government tenders is asking for the availability of Solar Keymark certificate for solar collectors since last 3-4 years which is encouraging manufacturers to certify their products.

Some of the self testing facilities in Ezinc are aging tests on solar collectors and solar water heater tanks; water penetration tests on solar collectors; pressure tests on solar collectors and solar water heater tanks; performance tests and heat loss tests on solar water heaters; overheating tests on solar water heaters.

**Imad Hage Chehade**  
*Technology and Development Director, IRI, Lebanon*



Imad Hage Chehade talked about the implementation of the obligatory Lebanese standards related to SWH. He went over the applicable standards and the procedures for certification, by highlighting the Decree 5305 of 28 October 2010 that mandated standards for SWH. 7 Lebanese standards established by LIBNOR conforming with European standards.

Two cases for SWH certification: imported and locally manufactured products. There is control before entry at the borders through inspection and test of conformity for imported products and control and inspection even before the shipping from the country of origin. For the locally manufactured products, certification of the manufactured product and procedures for certification of such products are in place.

### **Q&A Session**

The main themes discussed were labeling, standards and certification. A question was raised about the rationale for having standards for the Arab region if there are already European standards. As a response, the initiative of ArSol by RCREEE as a certification scheme for the Arab region was brought about, while highlighting the differences of the technology systems used in Europe and the MENA region, especially in terms of technology complexity. The issue of cost was also discussed as this is very important for manufacturing industries in the region to certify their products under ArSol instead of Keymark in Europe. In the same line, the question of harmonization between ArSol and Keymark was discussed and whether products certified by each would be mutually recognized.

Another point that was discussed was the difference of solar irradiance between the north and south of the Mediterranean, which explains the need for having different standards from those in Europe given that North Africa enjoys more solar irradiance than Europe.

## Thematic Session IV: Solar Heat for Industrial Processes

This session as moderated by Ashraf Kraidy, and the introductory speech was given by Souheil Ksouri

### Souheil Ksouri

*National Agency for Energy Conservation (ANME), Tunisia*



Souheil Ksouri started his presentation by outlining the potential of energy efficiency and renewable energy in Tunisia, as about 102 million tons of oil equivalent in 2030 (20 % renewable energy, 80 % Energy Efficiency).

The aim of the PROSOL program is to create a long-term market for solar thermal. The program rests on several elements; different components, financial mechanism, VAT exemption, reduced custom duties for SWH, capacity building, awareness raising, carbon finance.

Key success factors of the PROSOL in the residential sector: involvement of STEG offers security; guarantee of the loan payments by the STEG through the electricity bills; collaboration synergy between different actors (Public Partnership – Private).

The bases of the scale change are real support of the banking sector and a strong membership with the STEG; commitment of "Attijari Bank" for the granting of consumer loans with a financing of 64 M€ over the period 2007 – 2011 (This period was prolonged to the end of 2012); interest rates down to 7%; and a comprehensive communication and awareness raising campaign.

The PROSOL Program in the industrial sector rests on the these elements: incentives financed by the FNME; 30 % of the investment with a ceiling of 75 € / m<sup>2</sup>; and 70% of the cost of the study and control. PROSOL Industry was launched with the support of the Italian Cooperation (IMELS, MEDREC) and UNEP in 2010.

In terms of the approach adopted, the determination of the potential of using solar systems in 80 industrial institutions belonging to the branches of agro-food, textile, chemistry and various industries (papers, tobacco...); the completion of a survey to identify the degree of commitment for the SHIP; identification of 40 industrials the most interested to the project; the achievement of 40 prefeasibility studies for these industrials interested and motivated to invest in the solar thermal technology; information and awareness to identify the industrials interested to invest; the finalization of 10 detailed feasibility studies; organization of a workshop to disseminate the results of the studies and identification of the industrials to realize pilot project; the implementation of a pilot project of SHIP; the establishment of a

financial mechanism for the industrial PROSOL program; selection and survey of industrial: 84 industrial (35 food, 33 textiles, 5 paper, and 11 chemical).

Current and future actions entail carrying out a study for the setting up of a sustainable long-term regulatory framework for the promotion of the integration of solar thermal energy in the Industrial sector in Tunisia; the achievement of a demonstrative solar plant in a low temperature industrial process; ensuring the exchange of experience between national and international experts; and the analysis of the feedback from this pilot plant.

### **Georges Abboud**

*Earth Technologies, Lebanon*

Georges Abboud's presentation focused on the solar thermal heating applications in industrial processes while highlighting some of the elements of solar thermal heating for industrial processes such as 30% of the total energy consumption, decreasing costs for industry, integration of solar thermal into industrial processes, higher heat efficiency and R&D.

He also gave some recommendations to split solar thermal usage in industries into two sections; A) usage in Low-Temperature Processes (Example: Rinsing in food and textile industry) and B) usage in High-Temperature Processes where there is a need for steam as the future of thermal energy in industry.

### **Reda Abdel Azim Younes Elnavrawy**

*NREA, Egypt*



Reda Elnavrawy talked about solar thermal in industrial process heating in Egypt. He started with an overview of the current status of SWH in Egypt. More than 650,000 m<sup>2</sup> of domestic solar water heating systems have been installed since the 1980s, when the technology was first introduced to the local market by the Ministry of Electricity & Energy. Currently, there are 14 local companies for solar water heaters competing in the Egyptian market. Three solar industrial process heat (SIPH) Pilot projects have been implemented in food, textile and pharmaceutical sectors. A project for dissemination of solar water heaters in hotels and resorts in Red Sea & South of Sinai governorates is currently executed, in cooperation with the UNEP and Italian Ministry for Environment, Land & Sea.

The Industrial Sector is the highest consumption in the sectorial energy consumption in Egypt. About 50% of the total national primary energy consumption is used in industrial sector. About 60% of the industrial energy consumption is used in industrial process heat. About 20% - 30% of the industrial energy consumption is wasted (low maintenance and inefficient processes). Two demonstrate and field test Solar Industrial process Heat and Waste Heat Recovery projects have been established by NREA with co-operation and financed by USAID. A pilot project for Solar Industrial process heat using concentrating collectors (parabolic Trough) has been implemented by NREA with co-operation and financed by ADF.

Elnavrawy gave some examples of solar heat for industrial application in food industry (poultry), textile (MISR-HELWAN Textile), chemical industry (El Nasr Pharmaceutical project), and a solar thermal power plant (140 MW). He also talked about the on-going 100 MW CSP project.

### **Waleed Darwish**

*Nur Solar Systems, Jordan*



Waleed Darwish talked about Nur Solar Systems and an aluminum factory case study. He first gave an overview of the situation before the solar installation in the aluminum factory. To produce hot water, four basins each of which is 7 m<sup>2</sup> and contains 16 m<sup>3</sup>, and the basins are heated using coils and steam boilers. The heating process is done through steam provided to heat the basins via 11 meters length of coils inside each basin. Current boiler works 4 hours to generate the required heating temperature inside the basins. Required temperatures are between 40-60 ° C. Each basin requires 30 Liters of diesel a day to be heated. Diesel prices are 0.53 JD/Liter.

The main purpose of the system is to cut heating costs. The solar system will support the main steam boiler by heating the basins from their cold temperature to as high as 50 degrees °C. The heating liquid circulates by a pump inside the collectors, collectors' network and the coil. The Circulation process is fully controlled via a differential controller. The steam boiler heats the water in basins through designated (existing) coils by passing steam through those coils for each basin.

## **Q&A Session**

The main theme discussed was about tools private sector companies use to make their decisions and some of the accompanying measures after sale services companies usually provide for their customers to encourage industrials adopt solar thermal technologies. The main tool used is energy audits, IRR and payback period.

An energy saving agreement mechanism that has been used in Lebanon was also discussed regarding to encourage customers to adopt such systems while highlighting the energy savings from such mechanism. If the energy saving target promised is not met, then the difference is paid by LCEC.

Other themes discussed included a monitoring system for compliance, payback period, and promising technologies either low or high temperature technologies as well as the storage issue.

## **PARTICIPANTS**

More than 50 experts attended the workshop from both public and private sectors. Representatives came from the following countries: Morocco, Tunisia, Libya, Egypt, Jordan and Lebanon. International experts came from the United Nations Development Programme (UNDP/USA), the United Nations Environment Programme (UNEP/France) and the International Energy Agency (IEA/France). Regional experts include the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE/Egypt) and the Mediterranean Renewable Energy Center (MEDREC/Tunisia).

A full list of participants is in Annex B.

## **WORKSHOP EVALUATION**

An evaluation questionnaire was prepared and distributed to participants in order to receive some general feedbacks about the overall quality of the workshop, as well as suggestions and recommendations for future activities. The rate of return was 30%.

In the following, a concise description of the main inputs provided is reported. A more comprehensive analysis of the questionnaires is given in Annex C.

Overall, respondents were satisfied with the workshop organisation, the level of the discussions conducted and the profile of selected speakers and panelists, which allowed for intense knowledge sharing. Other reported added values are related to the opportunity for networking, the analysis of best practices and benchmarking, and the fact that the workshop gathered together experts from both the public and private

sector, thus giving the opportunity to exchange views, perspective and enhance public-private partnerships. Summarizing, the workshop succeeded in meeting attendants' expectations and provided a very comprehensive overview of the state of the art of the solar water heating market and policy in the region, as well as analysis of prospects and main challenges,

In terms of recommendations for future action, questionnaire respondents signaled the need to further explore the technology innovation chain, particularly in the industrial sector, to more deeply discuss the integration between solar thermal technologies and energy efficiency, and the need to involve the finance sector in the discussion. A specific request was to organise business-to-business meetings in order to create synergies and explore opportunities for market creation and expansion.

Respondents very much appreciated the country factsheets which were prepared by OME for the workshop; they would like to see them regularly updated, and possibly expand the number of reviewed countries. To facilitate this process, some respondents suggested the idea to establish national focal points who would be in charge of the data collection.

A reported shortcoming is that the programme was too dense and therefore did not allow for more in-depth discussions during the thematic sessions, Also, respondents would have liked a more focused final session to debate about next steps, priorities and follow-up.

Furthermore, respondents invited the workshop organisers to keep momentum by following up on this interesting initiative, maintaining a regular exchange and communication with experts through emails and newsletters, and creating a real database of experiences for the benefit of all concerned stakeholders. A specific suggestion received was regarding the opportunity to organise a regional awareness raising campaign on solar, following the example of the European Solar Days.

All these inputs have been duly taken into account, and will serve as a basis for future activities currently being discussed between OME and UNEP.

Some of the recommendations are already being translated into practical action. For example both UNEP and OME have joined the network of ArSol, an initiative launched by the League of Arab States, the Arab Industrial Development and Mining Organization (AIDMO) and the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) whose aim is establishing a regional certification scheme for solar water heaters in order to harmonise standard and testing systems throughout the region and facilitate trade and market development of solar thermal products.

This idea was presented by RCREEE and discussed during the workshop. All attendants were very favourable, as ArSol should increase quality and performance of

solar water heaters in the region, and facilitate trading within the region and with the EU. The involvement of both UNEP and OME will guarantee that the recommendations expressed by the regional and international experts during the workshop will be accurately reported and reflected into the programme of the ArSol network.

Finally, a specific question was addressed only to the representatives of the private sector, and was related to their interest in participating to possible business-to-business meetings in the future. Respondents (3 representatives) confirmed their interest and suggested the following main priorities:

- i) subcontracting or co-sourcing agreement (2);
- ii) exportation/importation (2);
- iii) technological partnerships (transfer of know-how, exchange of staff) (1);
- iv) establishment of new business activities (through, e.g.: subsidiary company, representative office, etc) (2); and
- v) strategic partnerships (through, e.g.: joint venture, representative agreements, etc.) (3);



## NEXT ACTIVITIES

One of the main expected outcomes of the workshop is that additional countries throughout the Mediterranean region will join the Global Solar Water Heating Initiative to implement follow-up activities. In that respect, some of the country representatives attending the event in Beirut expressed their interest in joining the Initiative. To succeed, potential candidates need to undergo a series of procedural steps, which include:

- making sure that a GEF focal point is established and operational in the country, and that there is a budget allocated to project activities in the solar thermal sector
- 
- if this condition is met, then the country representative with the support of OME and the supervision of UNEP will prepare and submit a Project Identification Form (PIF)

OME will contact country representatives to confirm their actual willingness to join and to accompany them in the administrative and technical steps to prepare their candidature and request financing.

In addition to the being a tremendous opportunity for knowledge sharing, the workshop produced very relevant information which is currently being used by OME to produce two additional studies:

- A market assessment report, focusing on more than 10 countries around the Mediterranean region and providing information on the institutional and regulatory framework, solar thermal market size, main actors involved along the technology value chain, system costs, potential and targets;
- An “Action Plan for Investment Promotion” in the solar water heating sector in the selected countries, with a benchmark analysis for investment opportunities in the Mediterranean/North African countries. The action plan will include several elements, including the status of solar thermal market and technology, socio-economic impact, priority needs and future actions for both public and private stakeholders, in order to create an enabling environment for a wide scale deployment of solar thermal technologies in the region.

## ANNEX A AGENDA

### AGENDA

Day I - Wednesday, 18 April 2012

<b>8:30 - 9:00</b>	<b>Registration</b>
<b>9:00 - 9:20</b>	<b>Opening session</b>
9:00 - 9:10	<ul style="list-style-type: none"><li>Opening remarks by His Excellency Gebran Bassil, Minister of Energy and Water, Lebanon</li></ul>
9:10 - 9:20	<ul style="list-style-type: none"><li>Opening remarks by: Emanuela Menichetti, Director of the Renewable Energy Division, Observatoire Méditerranéen de l'Energie (OME), France Marcel Alers, Principal Technical Advisor, Climate Change Mitigation Manager, United Nations Development Programme (UNDP), USA Amr Abdelhai, Programme Officer, Energy Branch, United Nations Environment Programme (UNEP), France</li></ul>
<b>9:20 - 10:40</b>	<b>Overview of the "Global Solar Water Heating Transformation and Strengthening Initiative" - Global, Regional and National Components of the project</b>
9:20 - 9:40	<ul style="list-style-type: none"><li>Overview of the global component of the project - Amr Abdelhai, Programme Officer, Energy Branch, UNEP, France</li></ul>
9:40 - 10:00	<ul style="list-style-type: none"><li>Summary of each of the project's programme in five countries, Marcel Alers, Principal Technical Advisor, Climate Change Mitigation Manager, UNDP, USA</li></ul>
10:00 - 10:20	<ul style="list-style-type: none"><li>Knowledge Products and Services, role of OME, deliverables and next steps, Nicolas Cottret and Abdelghani El Gharras, Energy analysts, OME, France</li></ul>
10:20 - 10:40	<ul style="list-style-type: none"><li>General description of the SWH national programme in Lebanon, Pierre El Khoury, Project Manager of the SWH national project in Lebanon</li></ul>
<b>10:40 - 11:00</b>	<b>Coffee break</b>
<b>11:00 - 12:10</b>	<b>Prospects and vision for the development and deployment of solar thermal technologies at global and regional level</b>
11:00 - 11:30	<ul style="list-style-type: none"><li>Solar Thermal Technology Roadmaps, Paolo Frankl, Head, Renewable Energy Division, International Energy Agency (IEA)</li></ul>
11:30 - 12:00	<ul style="list-style-type: none"><li>Main financial aspects for the development of a sustainable solar thermal market in the Mediterranean region: analysis of experience, Salvatore Moretta, Expert, MEDREC, Tunis</li></ul>
12:00 - 12:30	<i>Questions and Answers</i>
<b>12:30 - 14:00</b>	<b>Lunch</b>

<b>14:00 - 15:00</b>	<b><i>Thematic session I: Policy and regulatory measures for boosting the solar thermal use</i></b>
14:00 - 14:20	Introductory speech/Case study - Riccardo Battisti, Senior Researcher, Responsible for Renewable Energies at Ambiente Italia and Policy Advisor to ASSOLTERM, Italy
14:20 - 14:40	Panel discussion: <ul style="list-style-type: none"> <li>• Sonia Mezzour, General Secretary, ADEREE, Morocco</li> <li>• Muhieddin Tawalbeh, Head of the RUE &amp; Solar Thermal Division, NERC, Jordan</li> <li>• Khairy Agha, Chairman, Centre for Solar Energy Studies, Libya</li> <li>• Dilan Kavruk, General Directorate of Renewable Energy of the Ministry of Energy and Natural Resources</li> </ul>
14:40 - 15:00	<i>Questions and Answers</i>
<b>15:00 - 16:00</b>	<b><i>Thematic session II: Role and benefits of industry associations</i></b>
15:00 - 15:20	Introductory speech/Case study – Amin Bennouna, Vice President, AMISOLE, Morocco
15:20 - 15:40	Panel discussion: <ul style="list-style-type: none"> <li>• Tahar Achour, President, Chambre Syndicale Nationale des Energies Renouvelables, Tunisia</li> <li>• Khairy Agha, Chairman, Centre for Solar Energy Studies, Libya</li> <li>• Walid El Baba, Former President &amp; Board Member, Lebanese Solar Energy Society, Lebanon</li> <li>• Samir Ayad, Chairman, Egyptian Solar Energy Systems, Egypt</li> </ul>
15:40 - 16:00	<i>Questions and Answers</i>
<b>16:00 - 16:20</b>	<b><i>Coffee break</i></b>
<b>16:20 - 17:20</b>	<b><i>Thematic session III: The importance of standard and testing facilities</i></b>
16:20 - 16:40	Introductory speech/Case study - Ashraf Kraidy, Senior Expert, RCREEE, Egypt
16:40 - 17:00	Panel discussion: <ul style="list-style-type: none"> <li>• Hussein Salloum, CDR, Lebanon</li> <li>• Nader Hajj Chehadeh, Lebanese Center for Energy Conservation, Lebanon</li> <li>• Kutay Ulke, Export Executive, Eziñç, Turkey</li> <li>• Imad Hage Chéhadé, Technology and Development Director, Industrial Research Institute, Lebanon</li> </ul>
17:00 - 17:20	<i>Questions and Answers</i>
<b>17:20 - 18:20</b>	<b><i>Thematic session IV: Solar heat for industrial processes</i></b>
17:20 - 17:40	Introductory speech/Case study – Souheil Ksouri, ANME, PROSOL Industrial programme, Tunisia
17:40 - 18:00	Panel discussion: <ul style="list-style-type: none"> <li>• Georges Abboud, Earth Technologies, Lebanon</li> <li>• Reda Abdel Azim Younes Elnavrawy, Chief Engineer of Solar Thermal Energy &amp; Energy Efficiency Department, NREA, Egypt</li> <li>• Waleed Darwish, Marketing Manager, Nur Solar Systems, Jordan</li> <li>• Nader Hajj Chehadeh, Lebanese Center for Energy Conservation, Lebanon</li> </ul>
18:00 - 18:20	<i>Questions and Answers</i>
18:20 - 18:30	<i>Summary of day one and end of the meeting</i>

## Day II - Thursday, 19 April 2012

9:00 - 10:45	<i>Workgroup/ roundtable discussion on the main topics discussed during day one:</i> <ul style="list-style-type: none"><li>• <i>What are the main lessons learnt?</i></li><li>• <i>What are the main priorities?</i></li><li>• <i>What are the main barriers and needs?</i></li><li>• <i>Identification of next steps</i></li></ul>
<b>10:45 - 11:00</b>	<b>Coffee break</b>
11:00 - 11:30	Transfer to the Industrial Research Institute (IRI), Lebanese University Campus, Hadath (Baabda)
11:30 - 12:30	Visit to the solar thermal testing facility
12:30 - 15:00	Return to the hotel, lunch and end of day two

## ANNEX B LIST OF PARTICIPANTS

Country	Name	Organisation	Email
Egypt	Samir Ayad	Egyptian Solar Energy Systems	<a href="mailto:samir_ayad@mail.com">samir_ayad@mail.com</a>
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Egypt	Nabila Philip Atalla Seif	Cairo University	
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International	Paolo Frankl	IEA	<a href="mailto:paolo.frankl@iea.org">paolo.frankl@iea.org</a>
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International	Amr Abdelhai	UNEP	<a href="mailto:amr.abdelhai@ome.org">amr.abdelhai@ome.org</a>
International	Marcel Alers	UNDP	<a href="mailto:marcel.alers@undp.org">marcel.alers@undp.org</a>
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## ANNEX C WORKSHOP EVALUATION

Participants were given an evaluation questionnaire for their feedback, suggestions and recommendations. Evaluations are given based on the following: 1 (Poor), 2 (Fair), 3 (Good) and 4 (Excellent). The questionnaire is structured in five parts; workshop sessions, organization and logistics, networking, overall evaluation and comments and feedback from private sector regarding a business to business meetings. The workshop sessions are evaluated based on two criteria; content and relevance. 15 questionnaires were collected.

### SUMMARY TABLE OF THE EVALUATION

	Excellent	Good	Fair	Poor	No Response
<b>1. Workshop Sessions</b>					
<b>Opening Session</b>					
content and quality of discussion	33%	53%	7%	0%	7%
relevance	40%	53%	0%	0%	7%
<b>Thematic Session I</b>					
content and quality of discussion	33%	53%	7%	0%	7%
relevance	40%	53%	0%	0%	7%
<b>Thematic Session II</b>					
content and quality of discussion	20%	53%	13%	7%	7%
relevance	13%	73%	7%	0%	7%
<b>Thematic Session III</b>					
content and quality of discussion	47%	33%	13%	0%	7%
relevance	47%	47%	0%	0%	7%
<b>Thematic Session IV</b>					
content and quality of discussion	40%	53%	7%	0%	0%
relevance	33%	60%	7%	0%	0%
<b>2. Organization and Logistics</b>					
<b>Promotion of the workshop</b>					
scientific coordination	53%	40%	7%	0%	0%
communication	47%	47%	7%	0%	0%
<b>Venue</b>					
hotel booking	40%	40%	7%	0%	13%
meeting room	27%	53%	13%	7%	0%
technical equipment	33%	67%	0%	0%	0%
<b>Transport</b>					
airport pick-up	40%	27%	13%	0%	20%
transfer to restaurants and IRI	27%	60%	0%	0%	13%
<b>Catering</b>					
breakfast, coffee breaks, etc	67%	33%	0%	0%	0%
dinners	67%	20%	0%	0%	13%
<b>Networking</b>					



opportunity for networking	60%	40%	0%	0%	0%
cross-country information exchange	60%	27%	13%	0%	0%
contacts made	33%	47%	7%	7%	7%
concrete results	7%	47%	33%	7%	7%

In general, most of the respondents evaluated the workshop sessions and the organization and logistics part by either “Excellent” or “Good,” thereby reflecting an overall positive feedback.

Regarding the workshop sessions, it is worthwhile noting that the third (standards and testing facilities) and fourth (solar heat for industrial processes) thematic sessions were the most appreciated by participants. The second thematic session (role of industry associations), however, received the least appreciation.

In terms of the organization and the logistics section, both the scientific coordination and the catering were evaluated the most by respondents.

### **Overall Workshop Evaluation and Comments**

Feedback from respondents for this part is listed under each question, respectively.

*What aspects did you appreciate most? Which topics would you like to see further explored in possible follow-up workshops?*

Respondents express their appreciation to interest in enhancing solar thermal market, the subjects treated and the competence of participants who are knowledgeable about the subjects.

Others appreciated the possibility of networking, more learning from others and focus on core studies, concrete insights on trends and technologies, commercial and industry applications, policy benchmarking experiences and share of different categories, as well as the importance of joining efforts and collaboration opportunities, especially bringing both public and private stakeholders together. However, as one participants highlights, the authority possessed by the public sector representatives highly affect the outcomes, (in Jordan Case) NERC is a research body and they do not have the jurisdiction to impose or change regulations, thus their effect on that matter matches the private sector one.

For topics for further workshops, some experts suggest to allocate time to market new technologies in industrial sector, more energy efficiency integration, and financing actors (banks, etc), exploring more aspects related to market industry, and R&D along the technology value chain as well as B2B workshops.

*Which were your initial expectations and to what extent has been the workshop capable to meet them?*

Some of the initial expectations include: knowledge sharing and dissemination of best practices as well as getting a global overview on state of the art of SWH market and policy in the region, more participants or at least more active participants, and *extending our reach and networking with regional parties involved in our field.*

In terms of whether the workshop has met such expectations, all the participants show a positive feedback and expressed that their expectations have been met. Some even highlighted the calibre of the participants and their knowledge levels. The issue of finance has been raised, however.

*Has the workshop been effective in achieving its objectives of introducing the GSWH project's goals and objectives, informing about the SWH market in the region and disseminating knowledge about best practices and lessons learned?*

Almost all of the respondents asserted that the workshop has been effective and successful in achieving its objectives. Missing of worst cases was raised, however.

*What would you suggest to improve for future workshops/meetings?*

Suggestion for future improvements include: less dense program, more round tables and inter-regional debates, more strict on time management, more presence of the countries from the world, shorter presentations and fewer for more time for discussion, no presentations by the panellists, session with a moderated discussions, a final session to share decision about practical follow-ups, working groups for drawing real action plans, involving more participants from Europe, push into having R&D on ground breaking technologies, showcase new solar thermal technologies, more time for participants to rest before the event, a follow-up workshop with a concentration on having delegates from Ministries of energy, environment or public works.

*What would you recommend for follow-up and future actions?*

As for follow-up and future actions, some of the recommendations respondents underlined include: official establishment of the solar industry association network, common communication campaign (Arabic Solar Sys), newsletter on developments in the region, regular workshops, involvement of research centers and banking sectors, following up with the countries interested in implementing the program, push for new technologies, some information over everything that relates to SWH policy / regulatory / achievements with coordinators OME on a bi yearly basis, moving more towards this direction and doing more think tanks and focus groups mainly in coordination with RCREEE, setting national focal points in each country for OME who shall supply data and information required for OME publications, and coordinate for future events and

activities, continue building the countries fact sheets and to work more on documentation.

Follow up on the discussions related to solar thermal process heat and update the current technical study report developed by OME based on the recent discussions in the workshop.

## **Business Representatives**

*Would you consider participating in a business to business (B2B) meetings in the near future that would offer your company the opportunity to meet potential business partners in individually planned meetings, and what exactly the types of partnership that you would like to initiate or discuss during these meetings?*

Feedback from business representatives is shown below as the following:

- i) subcontracting or co-sourcing agreement (2);
- ii) exportation/importation (2);
- iii) exchange of commercial networks (0);
- iv) technological partnerships (transfer of know-how, exchange of staff) (1);
- v) establishment of new business activities (through, e.g.: subsidiary company, representative office, etc) (2); and
- vi) strategic partnerships (through, e.g.: joint venture, representative agreements, etc.) (3);