

WP 4: THE REGIONAL STATE OF THE ART IN JORDAN REGION



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Index

Introduction.....	3
1. A regional Solar Policies overview in Jordan: preliminary state of the art and needs identification for the SHAAMS POLICY ACCELERATOR	4
1.2 Institutional organisation of the solar sector	6
1.3 The energy/solar strategy in Jordan.....	9
1.4 Jordan 2020 and the MED Solar Plan	9
1.5 Questionnaire Results.....	10
1.6 SWOT analysis and results	14
1.7 Global conclusions for the policy accelerator in Jordan region	15
2. The SHAAMS ENTERPRISE RESEARCH ACCELERATOR in Jordan	17
2.1 The R&D for energy and the solar market in Jordan	17
2.2 Economic, market and financial barriers and facilitators to the strategy implementation.....	17
2.4 SWOT Analysis	21
2.5 Regional Conclusions	21
3. The SHAAMS SOCIAL ACCELERATOR in Jordan	24
3.1 Public awareness on the solar sector in Jordan	24
3.2 Barriers and Facilitators for the social apprehension of solar sector solutions	24
3.3 Questionnaire Results.....	24
4.1 SWOT Analysis	27
4. SHAAMS common indicators for the sectors analysis	28

Introduction

SHAAMS project is funded in the frame of ENPIC CBC MED. Al Urdonia Lil Ebda is part of this project representing Jordan.

This document provides state of the art about the solar energy statistics and stakeholders' point of view of the challenges facing solar energy in Jordan in the perspective of policy accelerators (more than 100 questionnaires had been distributed), Enterprises (more than 100 questionnaires had been distributed) and social bodies that promote the uses of renewable energy (more than 250 questionnaires had been distributed).

Questionnaire surveys were disseminated to the three mentioned categories above. Were the respondents of each category analysed and the findings were capitalised.

1. A regional Solar Policies overview in Jordan: preliminary state of the art and needs identification for the SHAAMS POLICY ACCELERATOR

Jordan has great resources and potential of renewable energy, especially solar and wind energy. Jordan is located within the Sunbelt, as the solar radiation intensity is 5-7 Kwh/m², and wind speed in specific regions is between 7-9 m/s.

These figures are promising data for exploiting renewable energy for electricity generation in Jordan. Therefore; Governments of Jordan recognise the need to invest in renewable energy, specifically in solar energy, as a result Jordan published The 2007 – 2020 energy strategy of the Jordanian government includes ambitious targets to increase the contribution of renewable energy sources to the national energy supply. The share of renewable energy in the total energy mix shall reach 7% by 2015 and 10% by 2020, including 600 MW of wind energy projects and 300-600 MW of solar thermal projects.

Furthermore, the strategy recognizes the country's great potential to reduce energy consumption via energy efficiency measures. For example, studies came to the result that the industrial and commercial sector may reduce energy consumption by 20%. In order to meet the target of renewable energy and to improve energy efficiency, legal provisions were established for a fund supporting renewable energy and energy efficiency projects.

In line with investment requirements and in order to open the door for the private sector to effectively participate in the implementation of renewable energy projects, Renewable Energy and Energy Efficiency Law was enacted as a permanent law under no. 13 for 2012. This law provides the legal, regulatory and legislative framework of investments in renewable energy, allows the Ministry to deal with direct proposals submitted to it to invest in renewable energy projects without entering into long tender process, and grants tax and custom exemptions to renewable energy systems and equipment in addition to many privileges regarding investment in renewable energy.

Renewable Energy and Energy Efficiency Fund was established as one of the directorates of the Ministry of Energy and Mineral Resources aiming at the provision of support necessary for renewable energy projects and energy efficiency programs.

In line with Renewable Energy Law, which permits companies to submit direct proposals for investment in renewable energy projects in BOO method, 64 request of interest were received and 30 memoranda of understanding were signed with international companies to develop about 1000 MW of wind and solar energy projects

In the field of energy conservation, Regulation for "Organization of Energy Efficiency Procedures and Means and improving its Efficiency No. 73 for 2012" was issued. The regulation required not to grant permission only after the installation of solar heaters as of 1/4/2012. A tender for a project of distributing 1.5 million energy-saving lamps on houses with less consumption of 600 kwh.

A number of projects have been launched to develop solar energy in Jordan, such as the project for measuring solar radiation and developing solar cells laboratory.

In 2006, 14% of households were served by solar collectors for water heating purposes, while this figure has been decreased to around 12% in 2009 according to the last survey done by Department of Statistics (DOS). The total energy output was estimated at 380 GWh yearly. Assuming 17% of solar collectors were used instead of electrical heaters and 83% instead of using fossil fuels, and then the total savings in the primary energy was 61,218 toe, due to the increasing penetration of solar collectors, it is expected that the contribution of solar collectors will rise in 2020 to be 50% of households. The resulting energy savings are projected to be 2,712GWh, or primary energy savings of 436,871 toe.

Regarding use of photovoltaic, the total installed capacity was 0.5 MW in the year 2006. Most of these units have been installed in the remote areas of Jordan, and have the capability of producing 0.9 GWh per year. Therefore; the savings in the primary energy is equivalent to 226 toe. This is expected to rise to 200 MW in the year 2020, equivalent to 18 GWh per year, or 905 toe in primary energy.

Decentralized photovoltaic units in rural and remote villages are currently used for lighting, water pumping and other social services (1000KW of peak capacity). In addition, about 15% of all households are equipped with solar water heating systems. In May 2012, a 280 kilo watt solar electricity system was inaugurated to be used at El Hassan Science City.

Kawar Energy in partnership with Ma'an Development Area (MDA) has announced the launch of its \$400 million Shams Ma'an Project, a 100MW photovoltaic (PV) power plant project to come up at the MDA industrial park in Jordan. The project on completion, expected to be ready in 2012, will be the largest PV plant in the world, and will position Jordan on the global renewable energy map. It aims to utilize approximately 360,000 to 2 million PV/CPV panels and produce around 168 GWh per year.

California-based company Ausra has been chosen to supply solar steam boilers to the 100MW JOAN1 concentrated solar thermal power (CSP) project in development in Ma'an. The JOAN1 project is expected to enter operation in 2013 and will be the largest CSP project in the world using direct solar steam generation. JOAN1 will use dry cooling to conserve water.

Jordan inaugurated its first solar-powered charging station for electric cars in February 2012. Located at El Hassan Science City (EHSC), the station is considered the first step towards promoting solar-powered vehicles and building more solar-charging facilities on the streets of Jordan.

The Sahara Forest Project, a Norwegian endeavour to create oases in hot, arid and uninhabited lands, is currently being implemented in the southern city of Aqaba, with the cooperation of the Aqaba Special Economic Zone Authority, to address its food, water and energy challenges. The objective of the project is to enable restorative growth, revegetation, and creation of green jobs through the profitable production of food, freshwater, bio fuels and electricity. The three core components of the Sahara Forest Project are saltwater-cooled greenhouses, concentrated solar power (CSP) for electricity and heat generation, and technologies for desert revegetation.

1.2 Institutional organisation of the solar sector

Unfortunately; No clear institutional organization of the solar energy sector in Jordan, the organizational hierarchy is not yet clearly defined and systematic, but in view of the important role which total energy sector plays in terms of the socioeconomic aspects, and as this sector's activities are directly related to the political and economic aspects, the Government has been interested in re-organizing this sector in order to enhance its efficiency and increase its effectiveness. In light of the new institutional amendments, the current institutional framework of the energy sector consists of the following:

- Ministry of Energy and Mineral Resources (MEMR), which was established in 1984. The role of the MEMR is to define policies, to fix tariffs and to regulate all activities with an impact on energy, MEMR's responsibilities also include strategies and projects to promote renewable energy technologies, such as solar water heaters or wind energy. In the electricity sector, MEMR aims to increase the share of efficient natural gas-fired power plants and foster the utilization of nuclear power as Jordan possesses significant proven recoverable reserves of uranium. Almost 95% of Jordan's electricity is supplied by the Central Electricity Generating Company (CEGCO), while the National Electric Power Company (NEPCO) is responsible for the transmission and distribution of electricity.
- Research and Development Centres that is in charge of conducting searches in the field solar energy as well renewable energy such as National Energy Research Centre and other academics and solar energy practitioners.
- Civil associations: the main association that plays a crucial role in solar energy map in Jordan are EDAMA and ESTIDAMA.

- Private Companies working in solar energy field
- Electricity sectors' institutions which consist of the following:
 - Electricity Sector Regulatory Commission (ESRC)
It is an independent commission established in 2001 whose most important tasks involve determining electricity prices, subscription fees and costs of the necessary services, issuing licenses to the companies generating, transmitting, and distributing electricity, and monitoring their compliance with the conditions stipulated in these licenses. This Commission is also responsible for providing amicable solutions to the disputes arising between the electricity sector's companies and the consumers, and also between the companies themselves, in as much as the public interest will be secured, as well as for extending consultancies and advice concerning any matters related to the electricity sector. The Commission is also responsible to control and manage the relationship between electricity companies and household solar energy production that was approved by the Energy Law. It is issuing procedures and regulations that define clearly the relationship between electricity companies, household electricity production using solar energy, tariffs and how to connect on the electricity network, as well as other related issues.
 - National Electric Power Company (NEPCO)
 - Samra Electric Power Generation Company (SEPGCO)
 - AES- Jordan. Psc
 - Al Qatraneh Electric Power Company
 - Electricity Distribution Companies: there are three companies@
 - a. Jordan Electric Power Company (JEPCO)
 - b. Irbid District Electricity Company (IDECO)
 - c. Electricity Distribution Company (EDCO)
- Petroleum, Gas, and Mineral Ores Institutions
These institutions carry out operations related to prospecting for petroleum and mineral ores inside the Kingdom along with refining crude oil. These include:
 - Natural Resources Authority (NRA)
NRA is a government institution formed under the Organization of Natural Resources Affairs Law for 1968. It is involved in implementing works related to prospecting for mineral resources, conducting geological, geophysical, and geochemical surveys along with issuing licenses and rights for mining, stone quarries, and exploration, and monitoring the operations thereof.
 - National Petroleum Company (NPCO)
It is a government-owned public shareholding company which carries out works pertaining to research, exploration and production of oil and gas in the concession area to the northeast of the Kingdom on the Iraqi borders. The concession area covers 7000 square kilometers including the Risha Gas Field area of around 1500 square kilometers. The concession period is 50 years effective since 1996.
 - Jordan Petroleum Refinery Company (JPRCO)

It is a public shareholding company which is responsible for refining crude oil, producing and distributing oil products inside the Kingdom by service agreements signed with MEMR and have been extended many times.

- The Jordanian Egyptian Fajer Company
It is a limited liability company working according to license agreement which was signed on 25/01/2004 between the Jordanian Government represented by the Ministry of Energy and Mineral Resources, and the Jordanian Egyptian Fajer Company. Its duty is to build, own and operate the natural gas pipeline from Aqaba to north of the Kingdom, and collect the Egyptian natural gas in Aqaba and then transport it by the pipeline and sell it to the power plants and to the heavy industry.
- Gas Stations
They are stations owned by natural or legal persons, which concerns in the sale of oil products to citizens. These stations reached 450 in the year ended of 2012.
- Gas Agencies
They are agencies owned by natural or legal persons, which concerns in the distribution of gas cylinders to citizens. These agencies reached 837 in 2012.
- Central Gas Distribution Companies
They are private sector-owned companies, which concerns in the distribution of gas by tanks. These companies reached 6 in 2012.
- Oil Products Marketing Companies
They are private sector-owned companies, which concerns in the distribution of oil products (all types of gasoline, diesel, kerosene and jet fuel). These companies reached 3, two of which had been licensed in 2012.
- The Commission for Regulating Radiation and Nuclear Activity
This Commission was established in 2007 as replacement of the Jordanian Nuclear Energy Commission which was established in 2001. The commission has a legal entity independent financially and administratively and directly responsible in front of the Prime Minister. The Commission aims to protect the health and property of the human being and the surrounding environment from the radiation and nuclear dangers through regulating and monitoring the use of the nuclear power, and making sure of the existence of the requirements and conditions of health and safety and the protection from the radiation and the nuclear security
- The Jordanian Atomic Energy Commission:
It was established in 2008 in order to transfer the use of the peaceful nuclear power and the technology of the radiation to the Kingdom, and enhance its usage in order to generate the electricity, for the desalination of water and for agricultural, medical and industrial usage
- Bio-Gas Company
It is a shareholding company jointly owned by the CEGCO and Greater Amman Municipality. The Company has been founded in the year 2000 for

utilizing methane gas extracted out of the organic waste towards generating electricity. The installed capacity for the Company is 3.5 MW

1.3 The energy/solar strategy in Jordan

The 2007 – 2020 energy strategy of the Jordanian government includes ambitious targets to increase the contribution of renewable energy sources to the national energy supply. The share of renewable energy in the total energy mix shall reach 7% by 2015 and 10% by 2020, including 600 MW of wind energy projects and 300-600 MW of solar thermal projects. In reflection to this strategy a new Renewable Energy and Energy Efficiency Law was approved by the cabinet in 2010

The characteristics of this law include the following:

- Provide legal, regulatory and legislative framework for investment in renewable energy field.
- Allow the Ministry of Energy to deal with direct offers submitted to it regarding investment in renewable energy projects without entering long-term tender processes.
- Grant tax and custom exemption for renewable energy systems and equipment.
- Give investment incentives to infrastructure works of renewable energy projects, such as the exemption of the investor from incurring cost of linking renewable energy projects with electrical grid.
- The law obliged electricity companies to buy all electricity generated from these projects regardless of priorities of generation from electrical stations and economics.
- The law gave additional incentives to renewable energy systems and equipment of local origin

1.4 Jordan 2020 and the MED Solar Plan

The Mediterranean Solar Plan (MSP), launched in July 2008 as one of the major initiatives under the Union for the Mediterranean, is designed to ensure that increased electricity demand in the region can be met in a sustainable and renewable way.

The Plan has two complementary targets: developing 20 GW of new renewable energy production capacities, and achieving significant energy savings around the Mediterranean by 2020, thus addressing both supply and demand.

Energy sector strategy in Jordan is somehow in line with the MED solar plan, where the Jordan's plan has provided for reaching a contribution percentage for renewable energy in total energy mix of about 7% by the year 2015 and 10% by the year 2020 where the volume of required investment was estimated at about (1415 – 2115) million US\$.

The plan/strategy main aspects:

1. Create a clear binding mechanism to apply programs and procedures of energy use rationalization.
2. Prepare broad awareness campaigns on the energy consumption rationalization targeting all sectors as of outset.

3. Establish audience service offices on purpose to reach all citizens classes and introduce them to the energy consumption rationalization and improve its efficiency.
4. Exempt equipment – energy savers from the sales tax and customs duties and set suitable mechanisms to facilitate access to them like solar energy heaters, energy saving lumps on purpose to encourage citizens to rationalize and conserve energy consumption.
5. Carry put procedures related to the energy consumption rationalization.
6. Set operative mechanism to apply the National Building Codes related to the thermal insulation.
7. Create a national award in the energy consumption rationalization domain and improve efficiency to encourage and simulate rationalization of energy consumption in Jordan.

1.5 Questionnaire Results

1.To which of these geographical areas does your Administration belong?	%
MED AREA	50%
ENPI CBC MED	50%

2.What is your role within the Administration?	%
Political and institutional area	100%
Professional areas (officers, directors, technicians, etc)	0%

3.Do you think that the information on renewable energy is adequately conveyed in your country?	%
Yes	69%
No	31%

4.To what stakeholders is your Administration's strategy for sustainable energy development addressed?	%
Non-profit organizations	33%
Local enterprises	33%
Associations and professional bodies	33%
Citizens	0%

5.Is your Administration already engaged in the development of specific actions for the support and promotion of sustainable energy?	%
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No	0%
Yes; it has recently started working on this field	38%
Yes; however the results are still not sufficient	31%
Yes, it has reached a satisfactory level and it progresses appropriately	0%
Yes, our administration is largely involved in the development of such actions	31%

6. Your Administration's strategy on sustainable energy is mainly linked/coordinated by: (max. two answers)	%
State/provincial government	31%
National government/federal government	69%
Supranational institution	0%
Other	0%

7. In your country, are there economic incentives for the installation of solar energy systems?	%
No	0%
Yes, only for photovoltaic systems	31%
Yes, only for solar thermal systems	0%
Yes, both for photovoltaic and solar thermal systems	69%
If yes, please provide a list of the those incentives	0%

8. In your country, are there rules or general requirements in the building regulations concerned with renewable energy?	%
No, there are no rules or general requirements	0%
Yes, there are rules addressing energy efficiency	0%
Yes, there are rules on the use and dissemination of renewable energy sources (particularly solar energy)	100%
Other please explicit	0%

9. Building regulations and territorial planning include obligations aimed at accelerating energy saving and/or the development of renewable sources?	%
No	0%
Yes	100%

10. Have solar cooling systems been installed by your Administration? (each air-conditioning system – cooling – that uses solar energy)	%
Yes	94%
No	6%

11. Has your Administration ever (or sub-contracted the installation) installed photovoltaic systems on public buildings?	%
No	0%
Yes	100%

12. Has your Administration ever (or sub-contracted the installation) installed solar thermal systems on public buildings?	%
No	0%
Yes	100%

13. There exist in your Administration the figure of Energy Manager? (professional agent whose job is to analyze and optimize the energy consumptions of the companies, both public and private)	%
Yes	0%
No	100%

14. On which kind of energy sources will your country mainly focus in the next five years? (max two answers)	%
Hydroelectric	0%
Geothermal	0%
Wind energy	50%
Solar energy	50%
Nuclear energy	0%
Fossil fuels	0%

15. What is your opinion regarding the feasibility of in the territory covered by your Administration to switch to solar energy in: (max two answers)	%
Bureaucratically difficult	9%
Technically complex	9%
Economically wasteful	23%

Environmentally convenient	0%
Economically convenient	59%

16. Which are the main barriers to promote solar energy in the territory covered by your Administration: (max two answers)	%
Lack of the technical staff	3%
Funding to implement actions	41%
Decision-making power	34%
Establish a dialogue with the national government	3%
Administrative procedures	19%

1.6 SWOT analysis and results

	HELPFUL (To achieving the objective)	HARMFUL (To achieving the objective)
INTERNAL ORIGIN	<ol style="list-style-type: none"> 1. Energy law 2. Technical staff 3. Jordan Energy problems 4. 	<ol style="list-style-type: none"> 1. Funding 2. Energy monopoly 3. Decision-making power against the energy monopoly 4. Administrative procedures 5. Technical infrastructure
EXTERNAL ORIGIN	<ol style="list-style-type: none"> 1. Potential funding 2. Feasibility 3. The availability of natural resources 4. Good political attention toward green energy 5. Good social power and pressure toward green energy 	<ol style="list-style-type: none"> 1. High pressure power from ordinary energy providers 2. Lack of funding 3. Lack of coordination 4. Delay in implementing renewable energy law and publishing its procedures and regulations 5. High investment cost 6. Renewable energy projects need wide areas of land which are often difficult to secure 7. Lack of special regulations concerning renewable energy projects covering facilities, customs exemptions and necessary tax 8. Decline of financial allocation for renewable projects

Results and analysis of the SWOT

Jordan needs to maximise its strengths in fields related to solar energy potential investments such as the location and other factors, also, it needs to efficiently use the potential opportunities to invest in the solar energy as well as renewable energy due to its high energy invoice.

Relevant initiatives such as participative workshops and local meetings between policy makers and private or public stakeholders could be a constructive opportunity to enhance the political commitment and awareness about solar energies.

According to the regional energy plan and its objectives, Jordan would be able to supply 7% its own energy needs from renewable sources by 2015.

Nevertheless political discussions appear not to be sufficiently oriented towards influencing and involving the main stakeholders throughout the policies and strategies definition.

Another of the objectives toward which more efforts are needed is the consolidation of a green jobs professional qualification. The fact that Jordan has been an active region in building a renewable energy economy and in

implementing several research and development efforts makes it necessary to create the necessary "green jobs" professional profiles to ensure the sustainability of the model and to guarantee the international position of the sector in international markets

Examples of initiatives that should be promoted at public level could:

1. Set operative mechanism to apply the National Building Code to more green and environmentally friendly through the following:
 - a. Prepare special codes for energy-saving buildings for installations in the buildings, update thermal installation codes and general technical specifications
 - b. Issue instructions to make quality assurance certificates in term of green buildings
 - c. Create a national award in the renewable energy best projects and energy consumption rationalization domain and improve efficiency to encourage and stimulate renewable energy and rationalization of energy consumption in Jordan

1.7 Global conclusions for the policy accelerator in Jordan region.

Policy accelerator in Jordan believes that the government make serious steps toward more reliability on renewable energy efficiency and uses in Jordan through approving solar energy law and related articles and operational steps.

Energy Sector strategy has provided for reaching a contribution percentage for renewable energy in total energy mix of about 7% by the year 2015 and 10% by the 2020 where the volume of required investments was estimated at about (1415 – 2115) Million US dollar.

The important recommendations in this regard were as follows:

1. Proceed with the issuance of renewable energy law to stimulate the private sector to increase its investments in this regard.
2. Proceed with the implementation of the solar energy and wind energy projects for electricity generation.
3. Complete the studies necessary for the thermal solar energy projects (300 – 600) MW.
4. Expand in the use of solar cells systems to lighting remote areas and domestic, industrial and commercial uses and electricity generation.
5. Carry out electricity generation projects from the municipal wastes.
6. Focus search and study on the solar energy to be used in covering industrial needs and transport sector
7. Create a fund to aid renewable energy projects and energy rationalization so that resources of the fund are through:
 - a. Treasury allocation

- b. Environment fund
- c. External funds from external and internal donors
- d. Funds through World Bank
- e. Any other sources that can be proposed.

In energy consumption rationalization and efficiency domain, by reviewing the strategy focus was made on implementing a number of programs and projects that will save energy consumption in all sectors (domestic, industrial, commercial, governmental, transportation and water pumping) at percentage of about 20% where the volume of investments (expenditures) required in this domain was estimated at about (76 – 155) million US dollar.

The strategy recommended the following:

1. Create a clear binding mechanism to apply programs and procedures of energy use rationalization.
2. Prepare a broad awareness campaigns on energy consumption rationalization targeting all sectors .
3. Exempt equipments – renewable energy equipments – from sales tax and customs duties and set suitable mechanisms to facilitate access to them on purpose to encourage citizens to rationalize and conserve energy consumption.
4. Any other initiatives that can be proposed.

2. The SHAAMS ENTERPRISE RESEARCH ACCELERATOR in Jordan

2.1 The R&D for energy and the solar market in Jordan

Most of the R&D organizations in Jordan summarize in universities and research centres and well as private companies.

The research in Jordan still did not meet the high potential of renewable energy in terms of funding and results

2.2 Economic, market and financial barriers and facilitators to the strategy implementation

Research enterprises in Jordan believed that the financial side is the most critical factor in upgrading the investment in solar energy (renewable energy)

2.3 Questionnaire Results

Research method

- Personal contact by telephone to recruit to web, follow up by online interviews
- In the field questionnaires

Results

More than 100 surveys had been distributed, the respondents were 55 completed questionnaires, 20 questionnaires were eliminated due to sufficient answers, more than 25 questionnaires were missed due to non-response

It is important to note the difficulties that we had experienced difficulties in gathering extensive data for the analysis of the solar sector situation in Jordan; we had expected excellent respondents from Jordanian enterprises working in the field of renewable energy (solar energy) due to the following reasons:

1. Long response time given to enterprises
2. Continuous follow up.
3. Clear explanations and clarification of the purposes on the survey.

It must be noted that the surveyed enterprises did not disclose any financial information, covered areas by their services and products, and What kind of equipments and practices are available for this lab. We believed that the information they provided about the number of their employees may be insufficient.

Here below we can summarize the main results on the questionnaires had been distributed

1. Please select you organization type ?	%
Chamber of commerce	0%
University	0%
Science Park	0%
SME	100%
Research center	0%
Business Incubator	0%
Office of Technology Transfer (OTT)	0%

4. Are you aware of your country's policy/legislation on solar energy systems?	%
Yes	100%
No	0%

5. What type of solar energy systems you know about?	%
Photovoltaic	29%
Passive heat	0%
Solar Thermal	43%
Other	29%

6. What type of solar energy subjects you are interested in?	%
a. R&D in solar energy	40%
b. Promotion of solar energy	100%
c. Trading solar energy systems	20%
d. other	0%

7. Do you have links to solar energy Labs?	%
Yes	20%
No	80%

9. Have you adopted or used solar energy systems in your organization?	%
Yes	31%
No	69%

10. Have you implemented or been part of a solar energy subsidized/grant program? (international donors or government)	%
Yes	50%
No	50%

11. In your country, are there rules or general requirements? Do you have the intention to invest in a solar energy project/program/system or upgrade an already existing one?	%
Yes	20%
No	80%

12. Please define the two main difficulties in implementing solar energy system in your organization?	%
Legislation	0%
Lack of Capital	67%
Cost Efficiency	17%
Lack staff expertise	0%
Availability of Labs equipment	0%
Lack of Technology	17%
Lack of knowledge	0%
Other	0%

13. Do you work with experts or specialists outside your organization on Solar system?	%
Yes	100%
No	0%

15. What is your initial amount you invested to implement solar energy system in your organization?	%
No	80%
Yes	20%

17. What is the source of funding of your organization's solar energy system?	%
Capital	44%
Loan	0%
Grant	44%
National Support Scheme	11%
Others	0%

18. Does your organization have any link or cooperation with public institutions or governmental agencies on the subject of solar energy?	%
Yes	20%
No	80%

19. Is there any national or EU based support institutions on solar energy subject?	%
Yes	100%
No	0%

20. Do you have any future plans on implementing solar energy solutions?	%
Yes	100%
No	0%

21. What kind of private/public initiative do you think can be relevant to cover your organisation's needs?	%
1) Technology transfer event	63%
2) Scouting of technology	0%
3) Be to be event	0%
4) Training initiatives	13%
5) Market place	25%

21. How does the organisation organize the commercialization process with respect to	%
a) Licensing	0%
Start-up or spin-off	20%
c) There is not a commercialisation process identified	80%

22. Is there in your organisation a office/person actively involved in facilitating technical, entrepreneurial and financial support?	%
Yes	40%
No	60%

2.4 SWOT Analysis

	HELPFUL (To achieving the objective)	HARMFUL (To achieving the objective)
INTERNAL ORIGIN	STRENGTHS <ol style="list-style-type: none"> 1. Know-how 2. Good Educational background 3. Willingness to invest more in Solar energy 4. Willingness to apply new solar system technology 	WEAKNESSES <ol style="list-style-type: none"> 1. Financial resources 2. Lack of experts 3. Unwillingness to take loans from banks due to high risk industry in the meantime 4. Limited export capabilities
EXTERNAL ORIGIN	OPPORTUNITIES <ol style="list-style-type: none"> 1. Funding . 2. Increasing citizens awareness of solar energy systems' efficiency 3. Governmental support (not to the required expectations) 	THREATS <ol style="list-style-type: none"> 1. Technical infrastructure 2. High initial capital 3. Limited number of clients 4. Small market in Jordan 5. Slow implementation of solar energy law and required regulations and procedures

2.5 Regional Conclusions

Jordan recently shows an important potential for the development of the solar energy industry, both in geographical, technological and entrepreneurial ways. Jordan already counts with a significant number of projects such as

- Utilization of solar energy for electrical power generation
- Projects for building units for electrical power generation using solar and wind energy.

Jordan had taken the advantage of great resources and potential of renewable energy, especially solar and wind energy. Jordan is located within the Sunbelt, as the solar radiation intensity is 5-7 Kwh/m², and wind speed in specific regions is

between 7-9 m/s. Therefore; Jordan has contributed to the development of important technological solutions for the solar sector supported by the Energy Law and its regulations.

In accordance with the provisions of the Renewable Energy Law that permits the companies to submit direct offers, the Ministry had announced in May 2011 of starting to receive interest applications from companies interested in investment in renewable energy projects via BOO method.

A large number of interest applications 64 were received, and 30 memoranda of understanding were signed with international companies to develop about 1000 MW of wind and solar energy projects. It is expected to receive direct offers for solar energy projects during the first quarter of 2013 so as these projects will be operational by the end of 2013 if the negotiations with the companies were successful and reached financial closure of their projects.

Together with this, legislative activity has been kept at all political levels (international, national and regional) supporting the implementation of solar energy solutions, resulting in new building regulations, energy saving recommendations and sector support measures. It could be argued, however, that such an intensive legislation has resulted in a rather complex and sometimes too-complicated legislative framework as well as in an expensive and complex administrative process. In this sense, the sector would benefit from a simplification and clarification of the regulatory corpus.

Despite the fact that the Energy Law was approved the private sector and civil association still making efforts to enhance the regulations that stimulate the relationship between the companies, households, factories, and Electricity commission (government) in terms of technology, tariffs and volume of electricity generated by solar energy since the regulation still do not allow huge production of energy produced by renewable energy (solar energy). This drawback limits the commercial return of Jordanian companies as well this reflects on their international commercialization aspects.

Another of the trammels faced by the Jordanian solar sector is the persistence of technological inadequacies, such as an insufficient technological development or certain lack of training activities for the sector professionals and lack of experts in the field of solar energy where as shown in the questionnaires results the

Jordanian companies still in mass need for international experts.

Last but not least, and related to the previous point, is the insufficient cooperation between market agents and the academic environment.

All these issues, taken together, explain why, despite its potentialities, the development of the solar sector has not taken full advantage of its potentialities, nor has resulted in a privileged competitive position in the region in terms of solar power development

3. The SHAAMS SOCIAL ACCELERATOR in Jordan

3.1 Public awareness on the solar sector in Jordan

The government of Jordan, NGOs and private companies launched many awareness and educational campaigns in the field of renewable energy efficiency and uses.

Awareness campaigns were there during the annual year specially in the summer and winter seasons

3.2 Barriers and Facilitators for the social apprehension of solar sector solutions

- o Lack of information of civil society
- o Lack of pressure from civil society to further develop renewable energies
- o Lack of political will of decision makers
- o Lack of willingness of business sector
- o Lack of foreign investment

3.3 Questionnaire Results

4

1. To which of the following categories do you belong?	%
Non-governmental organization (NGO)	46%
Academic/Research Institution	14%
Artist	0%
Students and scholars	7%
Other (please specify if possible)	32%

2. Regarding the country you are living in : what do you think is the actual percentage of renewable energy of the total energy production	%
Less than 10 %	57%
Between 10 and 40 %	21%
Between 40 and 70 %	11%
Between 70 and 100 %	11%

3. Regarding the country you are living in: what do you think is the actual percentage of solar energy of the total renewable energy production?	%
Less than 10 %	57%
Between 10 and 40 %	21%
Between 40 and 70 %	11%
Between 70 and 100 %	11%

4. When talking about solar energy we have to distinguish between three main types described below. Which of these types you think should be given priority. Please rate from 1 (not important) to 3 (very important)?	%
Photovoltaic energy (PV): Uses energy from the sun to create electricity to run appliances and lighting. A photovoltaic system requires only daylight – not direct sunlight – to generate electricity.	34%
Passive heat: This is heat which we receive from the sun naturally. This can be taken into account in the design of buildings so that less additional heating is required.	34%
Solar thermal: Uses the sun's heat to provide hot water for homes or swimming pools (also heating systems).	32%

5. Regarding the country you are living in: what kind of energy mix would you like to see in twenty years?	%
100% renewable energy	14%
75% renewable energy	39%
50% renewable energy	39%
25% renewable energy	7%
Less than 25% renewable energy	0%

6. Regarding the situation in your country: what would you say are the main barriers which hamper a further development of renewable energy solutions? Please rate from 1 (not important) to 5 (very important)	%
Lack of information of civil society	14%
Lack of pressure from civil society to further develop renewable energies	17%
Lack of political will of decision makers	16%
Lack of willingness of business sector	16%
Lack of foreign investment	17%
Lack of sufficient renewable energy sources	21%

7. Do you think that the production of renewable energy is in general more expensive than the production of energy based on fossil or nuclear sources?	%
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Yes	36%
No	50%
Don't Know	14%

8. Do you think that you have enough knowledge and information about how to save energy at home or at your working place?	%
Yes	75%
No	25%

9. Climate Change is considered one of the greatest environmental and economic challenges of the 21th century. Regarding your country, do you think that this threat is taken seriously into consideration when decision makers decide about the best energy solutions for the country?	%
Yes	34%
No	55%
Don't Know	10%

10. What do you think you could do to influence the discussion and decision making process regarding the future energy policy in your country? You may choose more than one option)	%
Participate in public hearings and roundtables on energy issues	10%
Participate in campaigns or education activities	23%
Collaborate with a political party	28%
Collaborate with a NGO	28%
Others	13%

11. Did you ever heard of Earth Hour or any other campaign dealing with Climate Change and/or renewable energies?	%
Yes, I have heard about the Earth Hour Campaign	52%
No, but I have heard about other campaigns (please specify if possible): _____	41%
No	7%

4.1 SWOT Analysis

	HELPFUL (To achieving the objective)	HARMFUL (To achieving the objective)
INTERNAL ORIGIN	STRENGTHS <ol style="list-style-type: none"> 1. High awareness of the efficiency of renewable energy 2. There existent of many organizations and personnel bodies working on promoting solar energy 	WEAKNESSES <ol style="list-style-type: none"> 1. High initial costs 2. Lack of political decisions toward renewable energy 3. Lack of companies working in renewable energy
EXTERNAL ORIGIN	OPPORTUNITIES <ol style="list-style-type: none"> 1. Funds availability in the near future 2. Foreign investments willingness 	THREATS <ol style="list-style-type: none"> 1. Political issues and procedures

4. SHAAMS common indicators for the sectors analysis.

Indicator	Category		Exists by end of 2011	Exists by end of 2012	Exists by end of 2013	Exists by end of 2014	Exists by end of the project	Notes
Region of reference: Jordan								
1-N° of solar systems in the region	Solar thermal power			5162				
	Solar thermal application in hot water, space heating, drying, solar cooling			1 project \$5 million				
	Solar PV systems							
	Installed power per capita		1193 kgoe	1247 kgoe				
2-Total investments in solar energy in your region	Grant schemes to support private investments							
	No of solar systems in public buildings			\$177.5 M				
	Money invested on raising awareness (training, communication)							
	Which technology does the state support?							
3 – Total solar energy production in your region	Total energy generated from the solar energy			1000 MW				