Economic Sector

Energy Department

The Secretariat of The Arab

Ministerial Council for Electricity (AMCE)

Pan Arab Strategy for the Development of Renewable Energy Applications (2010-2030)

Pan Arab Strategy for the Development of Renewable Energy Applications (2010-2030)

The Pan Arab Strategy for the Development of Renewable Energy Applications (2010 -2030) was adopted as a framework for the joint Arab action in renewable energy field, in accordance with the recommendations of the 3rd Arab Economic and Social Development Summit (Arab ESD Summit) (held in Riyadh, Jan 21st – 22nd 2013).

(The Summit recommendations No. 31 are attached hereto at no.31 D. E. (3) – P. 3 – 22nd Jan, 2013)

Pan Arab Strategy for the Development of Renewable Energy Applications(2010-2030)

During the Arab ESD summit, the Council of League of Arab States has reviewed:

- The memo of the General Secretariat;
- The resolution of the Economic and Social Council (ESC) (R 1923 – D.E. 90 – 13th Sep, 2012) on the agenda of the 3rdArab ESD Summit (in Riyadh – Jan 21st – 22nd 2013);
- The Resolution of the ESC (R 1942 – D A – 6th Dec, 2012) on submitting the Pan Arab Strategy for the Development of Renewable Energy Applications in its final form (2010-2030) to the summit;
- The resolution of the Arab Ministerial Council for Electricity (AMCE) (153 – D. 9. M. K. – 12th Dec, 2011) on selecting the subject of the Pan Arab Strategy for the Development of Renewable Energy Applications (2010-2030) to be put on the summit agenda;
- The Pan Arab Strategy for the Development of Renewable Energy Applications (2010-2030);
- The draft resolutions submitted by the joint meeting of the Arab Foreign Ministers, and the concerned ministers in the Economic and Social Preparatory Council for the 3rdArab Economic and Social Development summit.

In light of these discussions, the Council of League of Arab States decided:

1. Adopting the attached form of the Pan Arab Strategy for the Development of Renewable Energy Applications (2010 -2030) as a framework for the joint Arab action in the renewable energy field, and requesting the member states to take the outcomes of the Arab Strategy into consideration when setting or developing the irrespective national strategies for promoting renewable energy applications, including creating a suitable environment for investment in related projects.
2. Assigning the (AMCE) to prepare an executive action program for the strategy application, as well as submitting a periodic report to the summit on the progress made in this regard.
3. Requesting the international, regional, Arab and national financing funds and corporations to provide the financial support required for the implementation of renewable energy projects that serve the development plans in the Arab region.
4. Inviting the private sector to contribute in promoting of renewable energy applications and technologies in the Arab states, as well as investing, as main partner, in renewable energy projects in accordance with the adopted national plans in the Arab states.

(R.R: 31 D.E. (3) P.3 – 22nd Jan, 2013)

Contents

Introduction

The world always looks for ways to use all available alternatives of energy sources, to meet the growing demand for energy at the present time and in the future. This is what makes the renewable energy research, development and application a priority, being the first resource man found on earth as well as the most promising alternative suitable for meeting the increasing need for electricity.

In this context, the diversification of energy resources appears as paramount necessity in the Arab Region. Studies have shown that this region possesses abundant resources of renewable energies especially solar and wind energies, as most of the states are located in the Sun Belt. Moreover, most of these states enjoy good potentials to generate electricity from wind energy, water energy, as well as biomass energy in some states. Hence, the solution of exploiting the available resources of renewable energy and transferring the manufacturing techniques of their equipment appears as strategic option for the Arab Region. This option will secure and diversify the region's energy resources, and establish an Arab industry foundation complying with the international standards. Products will be marketed regionally at the beginning, and globally later. This will also help keep the fossil resources as a strategic stock for future generations.

In this regard, it is a pleasure for me to present this document titled "The Pan Arab Strategy for the Development of Renewable Energy Applications (2010 - 2030)"1which was adopted by the Executive Office of the AMCE in its 26th meeting held on 11th Nov, 2010 by resolution no. 192 which recommended to update the strategy periodically upon the declared future targets of the Arab states. The Office assigned the Committee of Experts on Renewable Energy and Energy Efficiency and the sub-committee of the Council to search for more effective mechanisms of private sector partnerships in investments of renewable energy projects, and to suggest suitable finance sources to take part in building an Arab Market of renewable energy. The Office also assigned the Committee to put an executive action plan for the strategy including activities and programs that fulfill the Arab States priorities.

---

[1]This is the updated version of the strategy (January 2013) that was submitted to the 3rd Arab ESD Summit Riyadh, Jan 21st – 22nd2013.

The development of this strategy comes as the outcome of all efforts exerted by the AMCE and its executive office, committees and specialized staff in cooperation with experts from agencies and organizations working in the renewable energy and energy efficiency field, which participated in the preparation of such strategy. It is the first Arab joint action directed to increase the share of renewable energy in the energy mix; therefore this strategy needs a lot of efforts and support to come to effect and achieve its purpose.

I would like to take this opportunity to thank all the experts who participated in preparing the Pan Arab Strategy for the Development of Renewable Energy Applications: 2010-2030 whether the Arab experts working under the umbrella of AMCE or specialists from organizations and institutions like the Arabian Industrial Development and Mining Organization AIDMO, Economic and Social Commission for Western Asia ESCWA, Regional Center for Renewable Energy and Energy Efficiency (RCREEE), United Nations Educational, Scientific and Cultural Organization (UNESCO), and the Arab Union of Electricity (AUE). I would also like to thank Prof. Mohamed Mustafa Al Khaiat for his kind efforts deployed in preparing the first draft of the Arab Strategy, Prof. Mohamed Al Sobki for the final draft of the Arab Strategy, the secretariat of the AMCE for its great efforts in updating the strategy, preparing relevant documents and submitting them to relevant meetings.

Best Regards,

Prof. Mohamed Bin Ibrahim Al Twaijiri

Deputy Secretary General for Economic Affairs

Acknowledgment

Recognition for all who participated 2in preparing the Pan Arab Strategy for the Development of Renewable Energy Applications (2010-2030)

Country	Name	Job Title
Hashemite Kingdom of Jordan	Eng. Wegdan Al Rabdi	Director of Cost and Pricing Directorate at the Ministry of Energy and Mineral Resources
Kingdom of Bahrain	Eng. Naser Al Roaily	Specialist at Electricity and Water Authority- Office of Deputy Chief Executive Officer for planning and projects
Tunisia	Mr. Omar Al Onli	Director of Renewable Energies at the National Agency for Energy Conservation
The People's Democratic Republic of Algeria	Mr. Mohamed Ras Al Kaf	Director of studies at Ministry of Mines and Energy
	Mrs. Shahrzad Bozaid	Deputy Director of New and Renewable Energies
	Mrs. Nora Zawawi	Deputy Director for Energy Conservation
	Mr.Aisha Ezamo	Chairman Advisor- General Manager of the Algerian Company for Renewable Energies

[2] Job title is stated as it was at the time of Strategy preparation

Kingdom of Saudi Arabia	Dr. Naif Al Abadi	General Director of Saudi Energy Efficiency Centre- Chief of Arab strategy team- (the current renewable energy team)
Republic of Sudan	Eng. Mohamed Abdullah Al Elwi	Director of Renewable Energies
Arab Republic of Syria	Eng. Abdel Halem Qasem	Assistant of the Minister of Electricity
The Republic of Iraq	Mr. Qasi Abd Al Sattar Magbor	Officer of Renewable Energies Activities – Ministry of Electricity
The State of Kuwait	Dr. Meshan Al Otaibi	Assistant Deputy of Planning and Training- Ministry of Electricity and Water
	Eng. Nabil Abdel Aziz Abdal	Senior Mechanic Engineer- Ministry of Electricity and Water
The Lebanese Republic	Mr. Ziad Al Zain	Deputy Head of the Lebanon Center for Energy Conservation
	Eng. Basam Abdullah Mo'awad	Engineer in Lebanon Electricity Authority
State of Libya	Eng. Youssef Khalifa Bokar	Director of Projects Department
	Eng. Fayhi Mohamed AbouQarad	Secretary of Executive Agency Administration Committee for Renewable Energy

	Ramadan Ali Abdewi	Director of Solar Energy Planning and studies Office at the executive agency for renewable energies
Arab Republic of Egypt	Dr. Mohamed Al Khaiyat	Head of Technical Affairs Division – New and Renewable Energy Authority
	Eng. Bothaina Amen Rashid	Economic Affairs Officer at New and Renewable Energy Authority
Arabian Industrial Development and Mining Organization	Eng. Saleh Al Gaghdaf	Director of Cairo Regional Office
Arab Educational, Scientific and Cultural Organization	Dr. Amen Al Qalq	Coordinator of Scientific programs- Department of Science and Scientific Research
Arab Union of Electricity	Eng. Lamia Youssef Abdel Hakem	General Director of connecting private sector plants for new and renewable energies
The Regional Center for Renewable Energy and Energy Efficiency (RCREEE)	Eng. Samer Hassan	Executive Director of the Center
	Eng. Ashraf Kraidy	Projects Director at the Center
Economic and Social Commission for Western Asia (ESCWA)	Dr. Salah Kandil	Energy Expert

United Nations Educational, Scientific and Cultural Organization (UNESCO)	Dr. Nizar Hassan	Head of Science and Technology Unit
Secretariat of Arab Ministerial Council for Electricity (AMCE)- Arab League	Eng. Jamila Matar	Director of Energy Department
	Mrs. Salha Abou Sab'a	Head of Renewable Energy Section
	Eng. Khalid Hassan	Energy Expert
	Mr. Walid Goda	Local officer at Energy Department
	Mr. Yehia Abo Al Azaim	Local officer at Energy Department

THE PAN ARAB STRATEGY FOR THE DEVELOPMENT OF RENEWABLE ENERGY APPLICATIONS (2010-2030)

Executive Summary

The AMCE mission was clear, to develop cooperation and coordinate efforts in the fields of generation, transmission and distribution of electricity in the Arab countries. It assigned the secretariat to organize a workshop about policies and actions that enhance renewable energy applications to enable its outputs to form the first brick in building the Pan Arab Strategy for the Development of Renewable Energy Applications acting as the foundation of the Arab vision in this regard. AMCE also called all stakeholders involved in the energy planning to prepare for an integrated planning of power supply systems and to build national capacities in the field of renewable energy technologies in order to bridge the digital and knowledge gap. This shall contribute in increasing the share of these resources in the energy mix in the Arab countries. (For more details, see Appendix 1).

Based on the above, and in order to achieve the above goals, the strategy comprises four chapters. The first chapter includes the status quo of the electricity in the Arab world in terms of: generation with 6% average growth in demand, in addition to the various installed capacities technologies in which the renewable resources share is about 6.5% of the total installed capacities. International and regional initiatives were developed as a result of the availability of high solar luminosity rates and promising averages of wind speeds. Therefore, Mediterranean Solar Plan (MSP) and Desert Technology Initiative were announced. Both initiatives were issued by European entities seeking to meet a part of their future needs of electricity from renewable resources transmitted via transport networks that link the generation sources in the south Mediterranean to the points of consumption in the north. However, the third initiative "Clean Technology Fund (CTF)"was launched by an international entity aspiring to bring a boom in solar energy applications globally based on the abundance of solar radiation distinct rates in the Arab region.

In addition to that, the first chapter explains the reasons of the low contribution of renewable technologies in the Arab energy mix, stressing the need of organizational structures to have separate entities managing renewable

resources. Such separate entities must be vested with powers to be able to develop future plans considering the homeland data. Plans must also fit within the country's energy system. Such entities shall also initiate financing mechanisms that promote the participation of national and regional institutions. They shall also consider the opportunities of international and regional cooperation in this regard starting from the phase of studies to the phase of innovation and development within scientific research programs that provide innovative solutions and products that are in line with the nature of the Arab consumer and the requirements of his environment.

Policies adopted by the countries for the development of renewable energy applications remain dependent on their ability to achieve projected targets.

The second chapter shows the contributions scope of renewable energy in the energy mix in the Arab countries during the period from 2010 to 2020, and from 2020 to 2030 reaching the desired goal of the preparation of this strategy which is about increasing the contribution of renewable resources in the energy mix in Arab countries. The calculation of future targets during the above two periods depends on a group of bases at the top of which are:

- Targets officially announced by the Arab countries.
- Targets referred by the Arab countries represent a proportion of the electricity expected to be generated in the year determined to achieve the future goal in such country.
- Translate the targets that have been established as ratios of "primary energy" to ratios of "electricity".
- The targets stated for the participation of renewable resources in the future include all forms of renewable energy (water, wind, solar and biomass).
- Guided by the historical actual indicators, the estimated annual average of growth rate in electricity demand is6% in the period from 2010 to 2020 and about 4.5% for the period from 2020 to 2030.

The strategy shows that the share of renewable energy resources in generating electricity; according to the Arab countries' announced targets will reach 5.1%, by

2020. Since only few countries identified their targets until 2030, the strategy provided three scenarios of renewable energy resources involvement in generating electricity in the following form:

Low scenario: According to the announced targets of the Arab countries, the renewable resources involvement in generating electricity is expected to be about 2.3%.

Medium scenario: This perception depends on the hypothesis of the growing Arab countries interest in renewable energy resources, either in order to diversify the resources of energy or to reduce their dependence on fossil fuels. Therefore, the growth rate of the reliance on renewable energy during the period from 2010 to 2020 will come into effect during the next ten years so that the share of renewable energy resources will reach 4.7 % of the total generated electricity by 2030.

High scenario: This scenario is based on doubling the percentage announced by the Arab countries as their set targets until 2020, which leads to increasing the share of renewable energy in generating electricity to 9.4% by 2030.

However, achieving these targets depends on three integrated factors. The first one is the legal and legislative frameworks that ensure the organization of investment in renewable energy projects under a regional climate that highlights the role of the Arab League as a coordinator between all parties. Moreover, the existence of frameworks which ensure transparency and equality of opportunities and present stimulating finance alternatives with the aim of increasing the renewable energy application.

The second factor depends on stimulating the Arab industrial capabilities to integrate with each other in a single system comprising both the public and the private sectors in the areas of renewable energy. This is in addition to building Arab knowledge capabilities and localizing technology through scientific research and knowledge transfer in cooperation with regional and international institutions.

Finally, the third factor represents identification of the criteria for the optimal use of renewable resources, taking into account the Arab environment in light of the generosity of nature. This is in addition to the activation of environment and

natural resources preservation policies and rationalizing their application in generating electricity.

Activating the strategy procedures depend on helping Arab countries to reach their announced future targets of renewable resources involvement within their respective national systems. From this standpoint, the third chapter presents the following procedures:

First: Adopt national and regional policies that can create the appropriate atmosphere for the development of renewable energy technologies and spread their field applications. This is in addition to increasing the involvement of renewable energy resources in the energy mix taking part in the sustainable development.

Second: Exchange experience, promote mechanisms of regional and international cooperation, and generalize the awareness of technical and applicable capabilities of renewable energy systems. This is in addition to creating an Arab atmosphere that accommodates renewable energy technologies and adapts them according to its requirements.

Third: Encourage the private sector to participate in the development of renewable energy systems and applications and support scientific and applied research in this field, resulting in the availability of renewable energy equipment at affordable prices.

To achieve that, the strategy provides an executive work plan to follow up the stages of its implementation by a committee of renewable energy and energy efficiency experts, working under the umbrella of the AMCE. The committee shall verify the positive impact of the collective performance, as well as its development depending on the voluntary compliance of all parties. The Electricity Regulators Forum will also be activated and cooperation mechanisms will be promoted to spread renewable energy applications. The League of Arab States (LAS) is keen to maximize stakeholders' involvement in the development of renewable energy technologies and spread its applications to further activate the strategy.

The mechanisms enhancing the cooperation for renewable energy applications is extended from its Arab-Arab scope to its counterpart the Arab- European scope,

Arab-Japanese scope, Arab-Chinese scope reaching finally its Arab- International scope.

In recent years, some Arab distinguished experiences were formed in the field of renewable energy technologies either in terms of application or training. Accordingly, there is an urge to participate in the technical progress process to be able to produce equipment and tools with techniques consistent with the Arab culture and atmosphere. This requires mechanisms and tools that aim at establishing renewable energy technologies, working on them regionally, and marketing for them internationally.

Chapter 4 tackles the assessment indicators of the national targets announced by countries forming altogether the Arab Target set by the strategy. A unified mechanism is set to assess the development of these targets and to evaluate their compliance with the strategy targets. It is also important to verify that the strategy basis and content are consistent with what is already being achieved; and then work on updating them on logic bases. A specific approach shall also be adopted to measure and analyze the annual progress so as to benefit from the successful practices and avoid any future difficulties. All these will be achieved by providing the team in charge with the required information in accordance with the deadlines set by the Arab expert team.

It is necessary that we define indicators and provide the needed equations to make their calculations as well as the tables necessary to assemble the different data. From this standpoint, indicators are divided into: follow-up indicators which are designed to collect and monitor all activities and events carried out by the member states during their endeavor to achieve their strategic objectives, whether at the level of the announced plans or the size of the projects carried out in each country separately. The second type of indicators is the assessment indicators, that are designed to measure the effects and consequences of the activities and events carried out at the regional level to achieve the strategy targets. This chapter also tackles the results expected out of the strategy implementation which include:

- Economic results such as increasing the investments and boosting the industrial and commercial competition, which in turn contributes in increasing the regional capital and the foreign

exchange reserves as a result of encouraging national, Arab and foreign investments in this field.

- Environmental outcomes that include the improvement of the Arab environment, and enhancement of the use of clean fuel technologies in electric or thermal power plants.
- Finally, social outcomes such as reducing unemployment rates by availing new job opportunities in the field of renewable energy at the technical, administrative and legislative levels, in addition to improving the individual's life standard.

In conclusion, the document shows that the Arab Strategy to develop renewable energy applications is only the beginning of a long way that started to be paved. There is no doubt that investing hard work to apply this strategy through setting plans and executive programs, which are continuously followed up under the supervision of the AMCE, may be the best method to pave this way.

The pressing need for the existence of this Arab Strategy requires joint efforts to implement it as this will lead to diversifying the energy resources investments in the Arab region. This will also help in finding paths where we can work collectively in this area in addition to our good management of the conventional energy projects, whether the newly ones or those planned to be implemented. This is susceptible to ensure a positive impact on the economic level, and thus to achieve many benefits due to the common geographical nature and the common spoken Arabic language capable of guaranteeing the unity of work and objective under a regional cooperation based on mutual gains that extend far beyond the clean energy target.

1 Chapter I: Electricity in the Arab World and the Status Quo of Renewable Energy Contribution in the Energy Balance

Introduction

Electricity generation systems in the Arab World depend on an equal mix of conventional units for electricity generation. These units work according to the needs to meet loads throughout the day, taking into account the nature of the peak hours and the required suitable reserve. This is supported by the fact that most of the Arab countries enjoy plenty of fossil fuel types. Thermal power stations represent nearly 93.5 % of the power generation capacity while the remaining percentage 6.5 % comes from renewable energy resources (water, wind and solar)[3] translated to 4.1 % (3.8% water and 0.3 % wind and solar) of electricity generated in 2010. Conventional thermal power plants in the Arab World consist of a mix of steam, gas and combined cycle plants and diesel units that depend mainly on oil and natural gas as a fuel to generate electricity. The total amount of fuel used in the Arab electricity sectors reaches 155 million tons of oil equivalent in 2010 of which natural gas represents 51.4 %.

In light of the instability witnessed in the oil markets from time to time, searching for other non-conventional energy resources accelerated. The world is looking for renewable resources that can be used in meeting the growing demand.

Diversifying the energy resources, rendering its generation and use more efficient as well as reducing its demand rates became a stringent necessity for the Arab Region. Statistical estimations indicate a growing demand of the primary energy with an average annual growth of about 6%.

3Arab Union of Electricity- Statistical Bulletin 2010

1.1 Electricity Indicators and Demand Forecasts until 2030

1.1.1 Electricity Generation Indicators

In 2010, the total installed capacities in the Arab World reached 1884 gigawatts. With the increasing consumption rates of electricity in response to the steady growth of population and expansion in the fields of infrastructure and industry, the electricity produced by the Arab World is now above 815 terawatt/hour with a relative increase of about 12.6% compared to 2008 which was estimated to be 722.6 terawatt/hour. The need for electricity in the Arab countries increases annually as most of those countries are still in the stage of growth in various economic fields, which requires meeting the growing demand for energy.

1.1.2 Electricity Consumption Indicators

The growth rates of electricity consumption differ in the Arab countries according to the usage nature and availability level of energy resources in each country. Statistics indicate an increase in the individual's average consumption of electricity with about 2.5% compared to 2009. The average of the Arab citizen's share thus reaches 3486 kilowatt/year.

1.1.3 Electricity Demand Indicators

Demand for electricity in the Arab World increased by 6.2% on average during the past ten years reaching 655.8 terawatt/hour in 2010. It is expected to reach 1139 terawatt/hour by 2015 and 1535 terawatt/hour until 2020[5].

The maximum load average of the Arab countries reached 150 gigawatts in 2010, and is expected to reach about 200 gigawatts in 2015. This requires establishing energy generation capacities not less than 50 gigawatts by 2015 to meet the expected increase in demand for electricity with an average of 8,000 megawatt/year.

4Arab Union of Electricity- Statistical Bulletin 2010

5Arab Union of Electricity- Statistical Bulletin 2010

1.2 Renewable Energy Status Quo

Up to the present time, the governmental entities play the main role in the development of renewable energy applications[6].

1.2.1 Existing Projects

1.2.1.1 Hydroelectricity

Hydroelectricity participates with total installed capacities up to 10,500 megawatts, representing nearly 6% of the total installed capacities in 2010. The share of hydroelectricity in the energy mix in the Arab World is expected to decline by time due to consuming most of the water resources in the Arab World in completing the Merowe Dam Project in Sudan (1,250 megawatts).

1.2.1.2 Wind Energy

Wind energy is one of the technologies that are able to compete with traditional sources that rely on oil and gas when compared to its worldwide prices. Wind turbines have evolved in a manner that allowed them to spread worldwide earning investors trust with total installed capacities of about 240 gigawatts by 2012, trespassing solar cells and solar energy concentrators[7].

In the same context, the projects of generating power from wind energy spread in the Arab World in North African countries. The share of wind farms amounted to about 0.43% of the total power generated in the Arab World in 2011, which is considered a small and limited share when compared to the available capabilities. The future projects of wind energy in the Arab countries reflect the adoption of positive programs to increase reliance on such type of energy based on strategic plans and targets. (Appendix 2) provides an overview of the national plans for generating power from renewable resources in the Arab countries.

1.2.1.3 Solar Energy

The Arab countries enjoy high rates of total solar radiation, ranging from 4 to 8 kilowatt-hour/square meter/day. The intensity of direct solar radiation ranging

6Arab Union of Electricity- Statistical Bulletin 2010

7www.ren21.net

between 1700 to 2800 kilowatt-hour/square meter/year, with a low clouds cover that ranges from 10% to 20% over the year, are excellent rates that can be used effectively given the current available solar technologies.

The application of solar energy spreads in some of Arab countries in areas like domestic water heating, and some pilot desalination plants. There are also many factories producing systems of solar water heating in many Arab countries. In addition, the application of solar energy in generating power using solar energy concentrators began to be used in Algeria, Egypt and Morocco, by establishing three solar thermal stations in integration with combined cycle, with a power of 150, 140 and 470 megawatts, respectively. In Egypt and Morocco, the solar field share of power was 20 megawatts and Algeria solar field share of power was 25 megawatts, (see Appendix 2). This is in addition to the remarkable progress in the field of direct use of solar energy in the Arab countries, which is about 32 megawatts in 2011.

1.2.1.4 Biomass Energy

The application of biomass energy in the Arab world is concentrated in the Kingdom of Morocco, where the biomass provides about one-third of the primary energy demand and is increasingly being used heavily in the rural areas. It is well known that Morocco produces about 8,000 tons of garbage and about 1.1 million cubic meters of sewage daily, most of which are subject to treatments and reuse or recycling processes in remote rural areas, as well as being used in heating the water used in public toilets by burning wood. Several programs were implemented to rationalize energy consumed in heating water in these toilets, as the annual needs of wood for this purpose are estimated to about 1.25 million tons that feed about 5,000 toilets. This program led to reduce the amount of wood used by these boilers by about 38% and the development expenses of the boilers were recovered only in ten months.

There are also projects in Sudan to produce ethanol from agricultural residues and waste in collaboration with Brazilian companies.

1.2.2 Renewable Energy Resources Utilization Initiatives

International and regional initiatives were originated depending on the availability of high rates of solar luminosity and promising wind average speeds. The Mediterranean Solar Plan and DESERTEC initiative were announced, although

both are originated by European entities that aspire to satisfy their future needs of power from renewable resources transmitted through networks linking the sources of power generation in the south of the Mediterranean to the consumption points in the north. The third initiative "Clean Technology Fund" was originated by an international entity aspiring to bring a boom in solar energy applications worldwide depending on the richness of the Arab region with high rates of solar radiation.

- **Mediterranean Solar Plan (MSP)**

It is considered one of the six goals for the announcement of the Union for the Mediterranean. It is summarized in the implementation of projects related to renewable energy and relies mainly on solar energy as well as wind energy for generating electricity with installed capacities up to 20 gigawatts by 2020 in the Mediterranean region. The aim of these projects is to contribute to the fulfillment of local needs and export part of the generated power to Europe through connection lines across the Mediterranean.

- **DESERTEC Initiative**

Is an initiative that allows taking advantage of solar energy available in abundance in the desert areas by using thermal concentration of solar radiation, which can economically generate half of the power demand in the Middle East, North Africa and Europe.

- **Desert Industrial Initiative (DII):**

It consists of companies contributing to the DESERTEC project to establish a joint stock company, distributed between Southern and Eastern Mediterranean countries. It aims at promoting electricity trading through creating a coherent and effective market to supply the electricity generated from renewable resources.

- **Clean Technology Fund Project (CTF)**

It was established in the World Bank to provide facilitated financing to encourage the spread of clean technologies to generate electricity from solar concentrators with its various techniques. Such project achieves multiple benefits for the Arab and Developing countries such as; environment protection, transfer of clean technology and the contribution to implement sustainable development plans.

- **Arab Ministerial Declaration on the "Arab Vision to make use of the Solar Energy"**

It is worth mentioning that the AMCE had issued the Arab Ministerial Declaration on "the Arab vision to make use of the solar energy" on 22/12/2011. This declaration is derived from the keenness of LAS and its specialized ministerial councils (AMCE) that Arab countries have a clear vision and unified Arab position toward the Mediterranean Solar Plan (MSP) and similar initiatives that aim to make use of the solar energy in generating electricity. Interests of all concerned parties are to be considered equally; taking into account the unforeseen revenues for the use of solar energy that the Arab region is very rich with, being located within the Sunbelt.

1.2.3 Renewable Energy Status quo Assessment

1.2.3.1 Organizational Structures

The governmental involvement is varied according to the different organizational structures for the energy sectors. We find independent government bodies concerned with renewable energy affairs in several Arab countries such as Saudi Arabia, the United Arab Emirates and the countries located around the Mediterranean. At the same time, we also find that the activities of renewable energy are confined in sub-departments within larger bodies and institutions in some other countries, as in Iraq and Yemen. Libya established a ministry for renewable energies, named the Ministry of Electricity and Renewable Energy. The last few years have witnessed a clear boom regarding the establishment of institutions and enactment of legislations regulating the work in the field of renewable energy.

1.2.3.2 Renewable Energy and the Practical Application

It is noted that renewable energy does not receive the required importance in most of Arab countries yet, and its contribution to the energy balance in those countries does not reflect the reality of its available capabilities. Such capabilities can be used in the Arab region, especially the wind energy available in different promising locations in many Arab countries. This also reflects the delay in using the solar energy although most of the Arab countries are located in the global Sunbelt and have high solar radiance and long periods of solar luminosity annually.

1.2.3.3 Motives

Some motives are available for the use of renewable energy in a number of Arab countries; while they may be absent in a number of other Arab countries. (Appendix 2) shows some of these motives in a number of Arab countries.

1.2.3.4 Studies, Scientific Research and Development

In regard to studies, scientific research and development, there are several centers for research and development in the field of renewable energy and energy efficiency. However, the participation rate of these centers in making the plans and future strategies is still limited. This means that there is a necessity to initiate scientific research based on standard basis considering the development of the means of monitoring, analysis and measurement. Scientific Research topics are to be related to the industry and development requirements, to eventually turn into a commercial product that contributes in improving the performance of renewable energy systems and raising their role.

1.2.3.5 Arab and Regional Cooperation

There are studies in some Arab countries for a specific view about the joint Arab cooperation in the field of renewable energy, and there is a consensus among Arab countries regarding the necessity to strengthen this cooperation at the technical, manufacturing and financing level. Perhaps the most significant action done in this field is the United Arab Emirates hosting of the International Renewable Energy Agency (IRENA) in Abu Dhabi. In addition, Abu Dhabi Future Energy Company (Masdar) started to enter into a partnership with a number of world research centers. Cairo on the other hand hosted the RCREEE.

1.3 Renewable Energy Application Determinants

1.3.1 Strategic and Institutional Determinants

The most important strategic and institutional determinants in Arab countries are represented in:

- Limited policies attracting private investments and lack of government resources allocated to them
- Poor policies that aim at forming partnerships in the field of renewable energy application

- Limited institutional capabilities directed to the development of renewable energy systems and the difficulty of coordination between them
- Lack of public awareness of the available capabilities and renewable energy systems that can be used technically and economically
- Difficulty in applying governmental funding system for renewable energy
- Limited regional cooperation and coordination in the field of renewable energy projects funding and depending on foreign funding programs

In addition to all the above mentioned, the most important thing from the perspective of securing the energies resources, is that the role of renewable energy in the diversification of these resources is large, especially the generation of electricity and thermal heating as one of the means that promote Energy Security and preserve oil resources to the future generations. For all these reasons, many European countries enacted laws to motivate investors getting into this sector. In Arab countries, the electricity sector is depending on governments mostly to own, operate, and manage power plants, so the priority is to provide services for people not to use other techniques or to involve the private sector. The high cost of building solar power plants compared to fossil fuel stations; lack of laws and regulations for investors, especially the ones related to tariff and clean electricity rates; and other factors such as the availability of oil and natural gas in the region, used as fuel generating electricity at prices much less than the renewable energy stations, all of this led to maximizing the role of fossil resources compared to renewable ones.

1.3.2 Technology Gap

In the field of windmill equipment and components manufacturing, we find that local manufacturing is limited to electric cables, transformers, and mill towers. This is in spite of the fact that the initial application of such systems in the Arab countries, especially Egypt, witnessed larger contributions of local manufacturers where mill's blades were locally manufactured (with a Danish contribution) along with some other components. As for the components of solar water heating

systems, many Arab countries were able to start this industry due to the simplicity of their technologies compared to other complex systems such as the solar cells and wind energy. This helped in the growth of using these systems in some Arab countries such as Jordan, Tunisia and Lebanon. However, these industries suffered later from after-sales services. Appendix no. 3 shows some suggestions and activities required to bridge the technological gap in the field of manufacturing the renewable energy equipment.

1.3.3 Marketing

The marketing obstacles are represented in the absence of long-term marketing plans linked with deploying the renewable energy systems selling outlet for domestic, commercial, or industrial applications. In addition to this, the high prices of renewable energy systems lead to the absence of competitiveness between these systems and their counterparts using traditional energy sources. Lack of national marketing plans as well as the absence of funds facilitating building or installing these systems is delaying renewable energy applications in the Arab markets. Such facilitating fund can be provided through national or regional banks offering low-interest loans reimbursed over long repayment periods.

1.3.4 Awareness

Arab countries have applied awareness programs through national campaigns targeting users in domestic, industrial and governmental sectors as they are the most common users of electricity. These campaigns aim to explain the importance of using alternative resources for electricity, and to show the efforts of Non-Governmental Organizations (NGOs) and civil society organizations who organize workshops in coordination with the entities responsible for educating people and rising mass awareness in cities, towns, and villages. These efforts include for instance: establishing awareness campaigns in schools, rural and remote communities, including creating pilot plants such as solar water heaters in service areas (youth gathering centers, health centers, etc.); producing methane from agricultural and animal remnants using anaerobic fermentation in rural areas, as well as training women to use these systems. In spite of all the efforts deployed by Arab countries in the field of awareness, more efforts can be deployed to change the culture of citizens towards the importance of enrolling the renewable energy resources in the daily use associated with normal human activities.

1.3.5 Tariff

One of the most important shortcomings in the Arab countries is the absence of an electric tariff associated with the time of use. This limits the idea of using other resources for generating electricity for small residential and commercial units. This factor along with the lack of users' awareness with the economic and environmental importance of renewable energy systems lead to the lack of demand for their use. This requires mandatory laws related to electricity tariff, and motives for using equipment based on renewable energy, with investment in electricity in a way that generates profits for companies working in these fields.

2 Chapter 2: Goal of the Pan Arab Strategy for the Development of Renewable Energy Applications and Application Aspects

The general framework of the second chapter focuses on defining the scope of the renewable energy share in the energy mix in the Arab countries in future, especially the period from 2010 to 2020, and from 2020 to 2030. This shall be in light of the forecasts of the Arab Union of Electricity (AUE) that the average annual rate of growth of electricity demand will be up to 6% within the first period, to decline to about 4.5% for the period from 2020 to 2030.

2.1 Assessment Basis of the Targets of Renewable Energy Contribution

Some Arab countries stated their future targets for the involvement of the renewable energy in the electricity system, as shown in Table (1). These targets range from 1% to 42% either as a percentage of the electricity generated in these countries or as a percentage of primary energy. Some targets were also characterized by determining the installed capacities, which should be accessed. Moreover, these capacities were identified according to the type of technology which facilitates the evaluation of what those countries will reach in the future.

Table (1)

The targets stated for involving renewable energy in the Arab countries according to the scope of targets

Country	Targets	Scope of targets
Sudan	1% of electricity generation	2011
Palestine	10% of electricity generation	2013
Tunisia	4% of primary energy	2014

Jordan	10% of primary energy	2020
Kuwait	5% of electricity	2020
Lebanon	12% of the needs of electrical and thermal energy	2020
Libya	10% of electricity generation	2020
Egypt	20% of electricity generation	2020
Morocco	42% of electricity generation	2020
Yemen	15% of electricity generation	2020
UAE	7% of electricity generation[8]	2030
Algeria	10% of electricity generation	2030
Syria	4.3% of primary energy	2030

Therefore, the calculation of the future targets for involving renewable energy in the Arab countries for the two assessment periods of the Strategy "from 2010 to 2020 and from 2020 to 2030" was made on the following basis:

[8]Emirate of Abu Dhabi announced this percentage.

- Targets officially stated by the Arab countries as shown in Table (1)
- The stated targets represent a proportion of electricity or the primary energy expected to be generated in the year that was determined to achieve those targets as stated by each country
- Transfer the set targets as a proportion of "the primary energy" to a proportion of "electricity generation"[9]
- The targets stated for involving the renewable energy in the future include all types of renewable energy (hydroelectricity, wind, solar, biomass).
- Calculation of the average rate of growth of electricity demand depends on the following:

Table (2)

Calculation of the average rate of the growth of electricity demand

Period	Average Rate of Electricity Demand Growth	Source
2010 to 2020	6%	AUE
2020 to 2030	4.5%	Calculated based on the rate of growth of demand within the previous period

- Expecting the targets until 2030 ensures three scenarios which are " low, medium and high", as shown in table (3) as follows:-

[9]This is based on what was stated by Kingdom of Morocco.

- Average and high scenarios depend on the perception that the countries which set their targets until 2020 (8 countries out of 11 countries) will set other targets until 2030.
- As for the countries which didn't set future targets, they will apply the current status of involving the renewable energy without any change in the future.

Table (3)

Future targets scenarios of the renewable energy

Low scenario	represents total of the targets stated by the Arab countries
Average scenario	Assuming that the growth rate of renewable energy share within the period from 2020 to 2030 will be the same for the period from 2010 until 2020.
High scenario	Assuming doubling the growth rate of renewable energy share within the period from 2020 to 2030 to what it was in the period from 2010 to 2020.

2.2 Scenarios of Renewable Energy Contribution in Energy Mix in Arab Countries until 2030

2.2.1 First Phase: Renewable Energy System (From 2010 to 2020)

The percentage of involving renewable energy resources in electricity generation is expected to reach 5.1% within this period. The wind energy has the largest percentage followed by hydroelectricity. Solar energy and biomass follow with small percentages. Moreover, there are other applications of renewable energy, such as using solar energy for water heating in some industrial and domestic sectors.

2.2.2 Second Phase: Renewable Energy System (From 2020 to 2030)

The share of renewable energy resources in electricity generation is expected to be 2.3 % during the second phase of the strategy implementation. The decline in the share is attributed to the bigger share of energy resources of fossil fuels, and that it does not include the strategic targets of the Arab countries until 2030, except for only three countries: the United Arab Emirates (Abu Dhabi), Syria and Libya. It is to be noted that solar energy will come at the top of the other resources, enhanced by the ambitious plan announced recently by the Kingdom of Saudi Arabia.

2.2.2.1 Low scenario

According to what the Arab countries announced, the share of the electricity generated from renewable sources is expected to be 2.3%.

2.2.2.2 Medium Scenario

This scenario depends on the hypothesis of the growing need of Arab countries to renewable energy resources, either to diversify energy resources or rationalize and raise the efficiency of fossil fuel consumption and therefore reduce the environmental impact. Thus, the growth rate of depending on renewable energy during the period from 2010 until 2020, can be applied during the next ten years (i.e., until 2030), which may lead to increasing the percentage of renewable resources share to 4.7% of the total generated energy by 2030.

2.2.2.3 High Scenario

This scenario is based on doubling the percentage stated by the Arab countries as their targets until 2020, which leads to increasing the share of renewable energy in generating power to 9.4% of power generation in 2030. Table (4) shows the percentages of renewable energy involvement in generating power of the three scenarios in 2030.

Table (4)

Future forecasts of renewable energy resources share in electricity system in the Arab countries by 2030

Scenario	Renewable Energy Resources Involvement in Generating Power
Low	2.3%
Medium	4.6%
High	9.4%

2.3 Strategy Application Aspects

2.3.1 First Aspect: Develop Policies and Regulations Encouraging the use of Renewable Energy Resources

2.3.1.1 National and Regional Planning of Energy Affairs in Arab Countries

The regional planning is a vital aspect of the energy field since all Arabs have a common interest. We find this in many international entities. Hence, there was a need to call for collaboration, working according to one approach and adopting budgets to ensure the provision of financial cover to meet the requirements of renewable energy projects as well as to conduct high level of accuracy and quality research. This is what the Arab Strategy can provide in the field of energy in addition to the environmental dimension associated with the generation processes and use of renewable energy.

The availability of regional power connection networks helps in meeting the shortage of renewable energy supply in the countries connected to these networks. This means that in case of any shortage of renewable energy in a country, as a result of low wind speed, for example, the Arab union network shall cover this shortage and maintain the stability of local networks which form the regional network. Thus, these networks should be associated with systems which predict wind rates and solar luminosity to allow power connection networks to

operate more effectively and be ready to encounter any shortage in renewable systems generation.

Among the frameworks that support regional networks is the presence of a regional facility (and a national control center) to organize the work in electricity sector. At the national level, establishment of a national power facility aims at organizing, following-up and controlling all aspects of electricity; as of generation, transmission, distribution and application. This aims at ensuring its availability and continuity in fulfilling the requirements of different application aspects at best price while preserving the environment, taking into account the interests of energy users, as well as the interests of generators, transporters and distributors of energy. It is suggested in this regard, to establish national facilities in the countries that have no equivalent entity of energy facility. The Arab Forum of Power Sector Regulators can, as a first stage, organize, follow-up and review all aspects of electricity at the regional level.

2.3.1.2 Legal and Regulative Frameworks

These frameworks regulate energy supply procedures and ensure transparency, equality of opportunity and the provision of services at a reasonable price. The importance of the legal framework of energy sector is to ensure the achievement of the following aspects:

- Establishing open markets and competition that allow the diversity of participation, to ensure sustainability
- Performing market functions efficiently to ensure the diversity of resources
- The need for the energy markets to reflect the real prices of power generation
- Transparency in exchanging energy information between different entities inside and outside the country
- Providing the financial resources necessary for local investment in energy projects
- Issuing strategies, national and regional policies that ensure companies' commitment to the power transmission and

distribution by purchasing power generated from renewable energy resources, as well as introducing regulations that are able to accommodate an agreed upon percentage of renewable energy

- Urban planning plans and programs shall include the allocation of lands needed to establish power generation projects out of renewable energy resources
- Adopting and approving regulations, incentives and exemptions supporting applied policies
- Encouraging the private sector investment by introducing special regulations to incite investment in this area, such as the law of Feed-in Tariff and Net Metering of energy produced from different renewable resources
- Conducting national studies or update the available ones to know the availability and diversity of renewable energy resources in each Arab country
- Establishing national and regional mechanisms of cooperation in the area of manufacturing renewable energy systems and equipment to achieve Arab integration
- Securing a stable market for generating power from renewable energy, especially by providing consistent and fair prices for purchasing the generated power
- Concluding relatively Long-term contracts with specific tariff for purchasing all types of renewable energy
- Announcing attractive pricing for energy that varies according to technology, size and generation source
- Encouraging investment incentives and economic guarantees inciting investment in renewable energy, including most of the previous items

2.3.1.3 Arab Organizational Procedures

A) Renewable Energy Organizational Structures in the Arab Countries

The flourish of renewable energy affairs requires activating the cooperation at the Arab and international levels whether nationally or regionally. At the level of the Arab / Arab cooperation, Arab countries can exchange experiences in terms of building capacities depending on national experiences that have been developed in the areas of feasibility studies for project implementation, data analysis and other relevant topics. Whereas Arab - International cooperation focuses on transferring renewable energy technologies to the Arab countries, helping to create products and systems of Arab renewable energy contributing to the development of the energy sector and related sectors, as well as using energy for sustainable development purposes. Among the procedures that can help to develop and motivate cooperation mechanisms is benefiting from regional and international initiatives to serve the interests of the Arab countries, which requires the existence of a single Arab position adopted by all the Arab countries.

B) Role of LAS

The role of LAS within the Pan Arab Strategy for the Development of Renewable Energy Applications is highlighted in the necessity to coordinate between the Arab countries to adopt a unified view toward energy issues, and regional and international initiatives. LAS should also help in setting specific targets for the participation of renewable energy in the Arab energy system, through the role played by the AMCE coordinating between the Ministries of Electricity in the Arab countries.

2.3.1.4 Motivating Financing Procedures

Most of energy investments in the Arab countries concentrate on serving the sector of the energy generated from fossil fuels. In spite of allocating part of the investment and international donations, granted through governmental agreements, to serve the renewable energy projects, they become very limited when compared to investments in fossil energy projects.

Hence, there is a need to create Arab financing mechanisms with facilitated lending conditions through low annual interest and long repayment periods. Another alternative is to introduce the idea of Green bonds (Sukuk), and encourage banks to engage in energy projects as financing entities and partners in the capital. At the international level, facilitated loans are allocated to finance the renewable energy projects. Here, we can discuss the ways to make use of the above mechanisms mentioned in the section talking about regional and international initiatives.

2.3.2 Second Aspect: Developing Manufacturing Capacities in the fields of Renewable Energy

2.3.2.1 Support Cooperation between Public and Private Sectors in the Equipment Manufacture and Development of its Applications

Most of the researches related to the manufacture and development of renewable energy equipment are conducted in countries allocating high rates of investments to the relevant areas. Significant investments lead to motivating private sector companies to invest in developing equipment, provided that there is a framework guaranteed by the country to the entities investing in the field of renewable energy. Such frameworks should include incentives for local manufacturing fields such as stipulating the necessity to include a minimum amount of local components), and other incentives to motivate the involvement of relevant entities. This can be summarized in providing mechanisms to stimulate cooperation (legislations, financing, etc.) and providing investment climate that is suitable for the private sector. Perhaps, it would be appropriate to initiate the creation of a database for the technologies and applications of renewable energy to be available to all Arab countries. In this regard, we can benefit from the guide tackling the Arab countries capabilities in the areas of renewable energy and energy efficiency issued by the AMCE in 2011, being updated currently.

2.3.2.2 Building the Arab Cognitive Capacities and localizing Technology

The Arab strategy works on building national capacities in the field of renewable energy technologies. In parallel with the great development in the field of energy whether fossil or renewable, scientific research activities should consider ways to

raise the efficiency of generating and using of all renewable energy systems, in addition to working hard to replace ineffective consumption patterns of energy with other effective patterns. The procedures of building the national capacities are summarized in:

- Supporting the regional cooperation in the areas which have Arab reference (such as project planning, feasibility studies, and energy economics)
- International cooperation in preparing and developing national cadres to design, manufacture and localize the components of renewable energy systems by facilitating the training opportunities at home and abroad in different specializations
- Facilitating the exchange of information and disseminate the knowledge between producers and users of energy at both the national and regional levels

2.3.2.3 Promoting Scientific Research, Transferring and Localizing Knowledge

The structure of research institutions differs from one country to another in our Arab region. Universities and scientific research centers contribute in increasing the available knowledge and work on its development. The expansion in the renewable energy applications and researches includes all stages of education sectors. Therefore, it is essential to link the scientific research and technological development to the industrial sector through:

- Facilitating the exchange of information and knowledge dissemination across all levels of energy producers and users
- Having universities and research centers to play an important role in the transfer and exchange of knowledge and techniques
- Including renewable energy topics in graduate studies curriculums
- Use scientific research centers available in the Arab world and work on overcoming the energy sector problems to make the

researches meet the sector requirements through allocating a budget for scientific research that enables it to:

- Increase reliability on renewable energy alternatives allowing them to play a role which is parallel to the conventional resources
- Reduce the investment cost of the equipment so as not to affect its performance rates and operation periods
- Adapt technological developments of renewable energy with the local needs of each country

2.3.3 Third Aspect: Optimal Use of Renewable Resources

2.3.3.1 Incorporating Environment Protection Policies and Adapting with Climate Change Phenomenon

A) **Renewable Resources Environmental Aspects**

The extensive use of fossil resources increased the interest in climate change. By clean development mechanism, we can establish emission reduction projects to help developing countries maintain sustainable development. This mechanism also ensures that the rich countries transfer clean techniques to the south and help it to develop by issuing certified certificates of Co2 emissions equaling to the emissions reduced when the project is established. Developed countries buy these certificates against a remuneration paid to the developing countries where the project is established. The types of projects of Clean Development Mechanism include renewable energy projects like electricity generation from wind energy, solar energy and hydrogen fuel cells, biomass projects, projects of energy efficiency optimization, fuel replacement, and cogeneration and afforestation projects as the trees absorb co2 from the air.

C) Utilization Projects of Clean Development Mechanism and Carbon Trading

Co2 has become a trading commodity. It is now sold in European markets with different prices per ton. According to the current estimates, the volume of carbon trading in 2012 amounts to $60 billion, which is a great leap compared to previous

rates. Selling carbon certificates saves an additional income for investors working in clean energies, however; such income cannot transfer a losing project into a successful one; it only improves the rate of return for the project.

2.3.3.2 Implementing Environment and Natural Resources Preservation Policies and their Optimal Use in Power Generation

Preservation of the environment and natural resources means using unconventional methods and modern technology to achieve sustainable development through an effective management aiming to maintain and preserve a sustainable environment. Statistics show that many Arab countries have achieved a significant progress in preparing legislative policies and frameworks and in improving environment and living indicators. This requires the development of legislations relevant to energy issues and development especially those related to renewable energies.

Chapter 3: Strategy Implementation Process

2.4 Process

To implement the Arab Strategy, it is proposed to work through the following aspects:

First: Adopt national and regional policies that create a suitable environment to develop renewable energy techniques and propagate its field applications in addition to increasing the contribution of renewable resources in the energy mix used in sustainable development processes.

Second: Promote international and regional cooperation and knowledge exchange in this field and raise awareness of technical and applicable capabilities of renewable energy.

Third: Encourage private sector to participate in developing applications and methods of renewable energy and support scientific and applied research in that field, which in turn provides renewable energy equipment with affordable prices.

Therefore, the Strategy implementation process will focus on the necessary trends to achieve its desired targets and review the key legislative and institutional frameworks that may improve the development of renewable resources technology and communicate its applications. This is followed by proposing measures and procedures to enable the legislative and institutional structures in Arab countries to achieve a real and significant development in increasing the contribution of renewable resources in the region.

2.5 Executive Action Plan to Monitor the Strategy Implementation

2.5.1 Forming a Follow- Up Committee for the Strategy Implementation and Assessment

Achieving the Arab Strategy targets is related to the implementation of its procedures and mechanisms and therefore it is important for the Arab League to coordinate with the member states and ensure positive rates of collective work to achieve the targets. It is also important to develop the performance based on a

volunteering commitment of each country in a transparent environment and the awareness of each party of the significance of the strategy objectives. This requires following up the implementation of the strategy by a committee or a team. The following is the team's scope of work[10]:

- Coordination between Arab countries in the field of renewable energy resources
- Monitoring national and regional achievements in accomplishing the strategy objectives
- Issuing annual reports on the status of renewable energy in Arab countries and the progress in achieving the Strategy targets
- Proposing necessary development and update for the Strategy according to the future variants in the energy field in general and the renewable energy in particular

Ensuring the implementation of the strategy and achieving its objectives; depending on renewable energy efficiently with all developmental, social, cultural and economic outcomes, requires clear identification of the responsibilities and the follow up mechanisms. The action plan of the Strategy includes a follow up method for its implementation phases, coordination of the cooperation between Arab countries and proposing the necessary development and update for the Strategy in accordance with the future variants in this field. This plan will be submitted to the AMCE periodically to be informed with the implementation progress of the Strategy in its different phases and any possible obstacles to enable the Council to perform its role and propose the best alternatives to implement the Strategy and overcome all obstacles. Attachment (3) includes the action plan for the implementation of the strategy for the year 2012-2013.

[10]Working groupof renewable energy has been formed to follow up all issues related to renewable energy at the top of which the Arab Strategy submit its recommendations to the Committee of Experts on renewable energy and energy efficiency created after the amendment of the Statute of the Council in March 2010.

2.6 Cooperation Enhancing Mechanisms for Deployment of Renewable Energy Systems Applications

2.6.1 Arab/Arab Cooperation

In recent years, some Arab countries acquired distinguished experiences in the field of renewable energy technologies, either in application or training. Accordingly, there is an urge to participate in technical progress process to produce equipment and tools with techniques consistent with the Arab culture and atmosphere. This requires searching for mechanisms and tools aimed at planting seeds of renewable energy technologies, working on them regionally, and marketing for them internationally.

Along with this, we should benefit from the available Arab experiences in spreading the usages and applications of renewable energy technologies that can be of the following shapes and forms:

- "Energy for the Poor" Initiative was launched by King Abdullah bin Abdul Aziz of Saudi Arabia in June 2008
- Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) in Cairo, with its role in activating the Arab and regional cooperation in the spread of supporting policies for renewable energy, and in exchanging views on the regional level on issues related to renewable energy
- Preparation of a program for building capacities consistent with the needs of Strategy application in coordination with the LAS, to be implemented by Arab experts
- Providing a modern frame for all specialized statistical researches, and finding a broad database as a reliable basis in conducting studies and researches required by programs of economic, social and management development
- Providing approved official data and indicators from countries with the aim of providing the state requirements, as well as planners and researchers needs of basic data required by the

development plans like the guide prepared by the Secretariat of AMCE

- Exchanging information and experiences in the field of renewable energy among the Arab countries, both at the bilateral level or through Arab Organizations

2.6.2 Arab/European Cooperation

The energy field status quo proves our ability to achieve in this domain following the same approach followed in the oil field during the past years. In light of the above, the region countries need to work to:

- Take the maximum benefit of the aforementioned European initiatives by coordinating with the European countries in capacity building and transferring technologies as an integral part in the implementation of these initiatives
- Complete the "Euro-Mediterranean electricity interconnection project", including proposals that enhance the benefits of "Inclusive Arab electricity interconnection project", which represent one of the most important projects of the Arab economic integration. The results of those projects can be reflected positively in other areas of the joint Arab action, such as supporting environmental communications, deploying uses of IT, and developing related industries, as well as the positive effects on the Arab environment
- Unify the Arab vision regarding the international conferences and agreements in fields of energy and environment, which gives the chance to take advantage from international donations, grants and loans that are enhancing the investment opportunities in renewable energy field

2.6.3 Arab/International Cooperation

On the economic level, the Arab countries have become among the largest trade and investment partners with many other countries in the world. This requires more efforts to balance those relationships, depending on the increase of mutual investments and the progress of technical cooperation in fields of generation,

development and scientific research. Rise of renewable energy affairs requires cooperation at the Arab and international levels, and establishment of R&D centers in the Arab countries. All these procedures help in transferring and setting modern techniques, finding Arab products and systems in renewable energy field to contribute in the development of the energy sector and related sectors, and working to use renewable energy for sustainable development purposes. Here are the procedures that can help to develop the cooperation mechanisms:

- Launch an initiative named "Energy with no limits" based on deployment of renewable energy uses and strength of electricity interconnection between the Arab countries. This initiative aims at developing the export of produced energy between the Arab countries from all sources, with focus on renewable resources. This will make them acting as energy banks to each other when needed
- Confirm the participation of Arab countries in international conferences and agreements regarding issues of sustainable development and environmental energy. The aim of such participation is to contribute in the discussion around the outputs of these conferences and agreements and how balanced they are; and to take into account the economic interests and abilities and social and developmental requirements in Arab countries
- Activate outputs and recommendations of all forums for deploying renewable energy applications
- Cooperate in building capacities in the unavailable fields in the Arab region
- Take benefits from the "Clean Technology Fund, CTF," which is managed by the World Bank in deploying renewable energy uses

4 Chapter Four: Performance Indicators and Strategy Application Results

2.7 Performance Indicators to Implement the Strategy Aspects

2.7.1 Performance Indicators Concept

Performance indicators of the Arab Strategy for Renewable Energy help in identifying and assessing the progress in the strategy aspects to achieve the desired targets by selecting a clear way to measure the extent of the progress. These indicators usually cover the period defined to implement the strategy being interim, short-term or long-term period based on the size of accomplished developments out of the Strategy implementation at local and regional levels.

Performance indicators aim at implementing the Strategy to achieve the following:

- Set a specific system to follow up and ensure compliance with the implementation of the Strategy aspects. This includes the stated national targets and Arab goal set by the Strategy
- Find a unified mechanism to assess the development and whether it is appropriate to the targets set in the Strategy
- Verify that the contents of the strategy aspects are consistent with what is really being achieved and try to update it on logical and real basis
- Apply a specific method to involve member states to work on the calculation and analysis of these indicators by providing the concerned team with the information required according to the set time plans
- Prepare a form for national data entry and processing to be distributed to Arab countries to contribute in the assessment of the national and regional achievement level. LAS may see that this data entry is necessary to be available for specialists on its affiliated websites affiliated

- Provide a database as a base for building a system of self-assessment to check the progress in using the renewable energy at the national and regional levels and to estimate the size of the job opportunities that were made available as a result of this development

2.7.2 Performance Indicators Structuring

There are two main types of indicators related to the implementation of the Strategy which are:

A. Follow-up indicators that aim to know and monitor all activities and events that member states have carried out to implement the strategy targets, either at the announced plans level or the size of the projects implemented in each country separately

B. Assessment indicators that aim to measure the impact and the result caused by the group of activities and events carried out at the regional level to achieve the targets of the Strategy

2.7.3 National Follow-up Indicators Identification

These are the indicators by which the implementation of national plans can be followed up to verify if the targets stated at the local level were achieved. Main follow-up indicators of the Strategy implementation may relate directly to the quantitative indicator showing the energy generated annually from renewable energy plants at the national level, and it may be compared to the national targets stated by countries to define their level of commitment toward their achievement.

Some sub-indicators, called follow up indicators, shall be defined to obtain the abovementioned indicator. These sub indicators can be used in calculating the assessment indicators that show the progress in the Strategy implementation.

Follow-up indicators are obtained through information received from the member states, as it relates directly to national achievements concerning the development in the use of renewable energy technologies whether for the purposes of electricity generation, thermal energy generation, or any other purposes.

It is important to get these indicators on regular basis which ensures they are always updated. Moreover, the task of collecting and securing the information required on the national level should be considered as the responsibility of the focal points in each country. Focal points are also responsible for the validity of this information. The team of renewable energy related to Experts Committee of Renewable Energy and Energy Efficiency shall collect this information to be used in following up and assessing the degree of commitment to the Strategy implementation toward achieving its stated goal.

Performance indicators for the member states concentrate in the installed power indicators and generated energy indicators, for example:

- High power hydropower stations
- Low power hydropower stations
- Wind energy station
- Grid-connected solar cells systems
- Off grid solar cells systems
- Concentrated Solar Power Stations
- Marine power plants (wave energy and tidal power)
- Geothermal power plants
- Biomass energy
- Solar water heaters (SWHs)
- Biofuels and its types

In addition to the above, there are some follow-up indicators necessary for conducting the assessment process, and these indicators are as follows:

1) Stated National Targets regarding Renewable Energy

There are two modes to deal with this indicator, the first, for the countries that did not state specific targets with regards to the development of renewable energy use. In this case, the reference is taken from any stated targets or strategies related to the development of the renewable energy sector, whether at

the level of specific technology (for example, wind energy sector) or at the level of all renewable energy technologies.

The second mode is related to countries that have stated targets that can be measured "Identify renewable energy involvement as a percentage of general energy balance, the total installed capacity or the generated energy at the country level."

2) Actual Performance Indicator (At the National Level)

It is the percentage of generated power from renewable energy plants to the total generated power in each country. This indicator is considered a key indicator which the Strategy depends on in following - up implementation of the Strategy aspects. This comes from the fact that the stated goal of the Strategy was calculated according to the same methodology and depending on the stated targets by the member states. This indicator is calculated on the national level annually (or every two years, according to the above) to understand how the use of renewable energy developed in each country toward achieving the nationally stated goal.

3) Deviation Indicator (at the National Level)

It is an indicator that identifies the extent of deviation from the stated targets and plans at the national level. This indicator may be negative in case the achievements did not meet the stated targets. It may also be a positive deviation in case the actual achievements exceeded the stated goal. The Deviation Indicator is calculated as a percentage between planned and actual performance.

2.7.4 Determining Regional Assessment Indicators

Since the assessment indicators aim to measure the impact and the result caused by the range of activities and events carried out at the level of the Arab region, to achieve the stated target of the Strategy, it can be perceived that the key assessment indicator is directly related to the Quantitative Indicator showing the total power generated annually from renewable energy plants, at the level of the Arab region starting from the national levels. It is also to compare this Indicator with the stated targets so as to determine the extent of commitment toward achieving these targets. It is normal to link this indicator with the indicator of the growth of electricity generated whether from renewable energy plant or

conventional plants, in addition to its consistency with the stated goal in the second chapter of the strategy.

These indicators show whether the implementation of the strategy is moving in the right direction or rather more efforts are needed at the regional level to be able to achieve the desired goal.

In addition to the above, there are some necessary assessment indications, which include:

1) First Actual Performance Indicator

The percentage of the total energy generated from all renewable energy plants except hydraulic stations to the total energy generated from conventional plants of all kinds in the member states in the same year. This indicator is calculated at the regional level annually (or every two years, according to the above) to understand how the application of renewable energy developed toward achieving the stated goal of the strategy.

2) Second Actual Performance Indicator

The percentage of total energy generated from renewable energy plants including hydraulic stations to the total energy generated from conventional plants of all kinds in the member states in the same year. This indicator is calculated at the regional level annually (or every two years, according to the above) to understand how the renewable energy applications developed toward achieving the stated target of the strategy.

3) Thermal Actual Performance Indicator

The percentage of the development of the total thermal energy generated from renewable thermal energy plants in the year in which the process of measurement or statistics was conducted. It shows the development of the thermal renewable energy sector, such as Solar Water Heaters (SWHs), water

desalination by solar energy, solar thermal energy to generate steam and a group of other applications.[11]

4) Deviation Indicator

It is an indicator that identifies the extent of deviation from the stated targets of the strategy. This indicator may be negative in case the actual achievement did not meet the stated targets. It may also be a positive deviation in case the actual achievement exceeded the stated target of the strategy.

2.7.5 Supporting Indicators at the National Level

These are quantitative indicators to evaluate the development extent of the policies and national legislations related to renewable energy in the member states. They serve the application of the strategy terms and are linked to the following activities or events:

No.	Activity or Event	Quantitative Indicators
1	Announcing a policy concerning the development of renewable energy	
2	Forming a specialized team work or designing a body concerned with developing the renewable energy	
3	Setting a goal for renewable energy	

[11] Performance Indicator of Green Transportation: The percentage of increase in amounts of fuel of transportation produced from renewable technologies: and is calculated as follows: performance indicator of green transportation: {[Z / X] ×100}.

X is the total amount of fuel produced for transportations from renewable technologies until the end of the year the measurement was conducted in.

Z is the amount of fuel produced for transportations from renewable technologies during the period from the previous measurement until the end of the year the measurement was conducted in.

4	Adopting a law to determine the definition of the energy generated from renewable energy	
5	Asking the private sector and investors to build renewable energy plants	
6	Adopting financial incentives to be invested in the field of renewable energy	
7	Establishing a fund to support the projects of renewable energy	
8	Making awareness activities and building capacities in the field of renewable energy	

2.7.6 Outcomes and Proposals

The national focal points work on calculating the national follow-up indicators and preparing reports to be sent to the working group assigned with following-up and audit works. Such reports should include all national follow-up indicators in addition to analytical views to identify the strengths and weaknesses as well as to develop a plan for joint coordination regarding the provision of data and solutions to ensure a highly efficient and effective implementation.

Then, the team assigned to follow up the strategy implementation shall prepare the indicators report including propositions submitted based on the outcomes obtained from the above-mentioned indicators. These propositions shall cover all issues related to the efficiency and effectiveness of each indicator and its impact on the general goal of the strategy. The team shall analyze the main indicators related to the target as well as the operational and procedural tools in relation with the Performance Indicator.

The preparation for the subsequent phase of performance assessment system depends on the outcomes of the indicators' report. A summarized final report on the rate of the strategy implementation for the reference period shall be prepared using the data described by the performance indicators' report. The impact of such report on the completion progress of the strategic plan will be

determined in accordance with Chapter 3. Moreover, the report should include the remarks and proposals that are deemed necessary by the team to update the strategic plan through the modification, addition or deletion to be reviewed and discussed by the Experts Committee of Renewable Energy and Energy Efficiency before submitting it to the Executive Office of the AMCE.

2.8 Expected Outcomes and Conclusion

It is necessary that the renewable energy, which has great potentials in the Arab countries, plays a key role in the energy supply at the regional level in order to face the environmental and economic threats. Impact of such threats, on the economies of the Arab countries, is growing in a great and significant way.

2.8.1 Economic Outcomes

1. Increase the proportion of investments and industrial and commercial competition which helps increase the regional capital
2. Increase the foreign exchange reserves due to the promotion and activation of foreign investments in that field
3. Achieve considerable savings in the consumption of fossil fuels resources, which provides the opportunity to export it with international prices instead of selling it locally with subsidized prices
4. Activate carbon trading and green certificates in the Arab region within the Clean Development Mechanism
5. Create new working areas in the region, particularly in relation with building the local industries for renewable energy technologies

6. Reduce reliance on fossil fuels resources which constitute a heavy load on the public treasury of the importing countries
7. Support the requirements of sustainable development through using all energy resources for the region's countries benefit

2.8.2 Environmental Outcomes

1. Reduce pollution rates and contribute to the reduction of climate change phenomenon
2. Make use of the global carbon trading

2.8.3 Social Outcomes

1. Fight unemployment by providing new job opportunities in the field of renewable energy at the technical, administrative and legislative levels
2. Improve the individuals' life standards through fulfilling their energy needs, especially in rural areas which reduces migration from the countryside to the cities
3. Create job opportunities directly related to the development of renewable energy in addition to the development and localization of its technology
4. Increase the energy security for the member states which contributes to sustainable development processes
5. Reduce the poverty rate in Arab countries by providing the energy necessary to poor areas which will create new jobs and lead to improve the social level in these areas

Conclusion

Applying this strategy and achieving its goal, to depend on renewable energy resources in an integrated and effective way, requires a clear identification of the responsibilities and follow-up mechanisms which this strategy seeks to include. An action plan for the periodic follow up of all its implementation stages shall follow. It is necessary to coordinate cooperation among the Arab countries and propose the development and update required for the strategy in line with the future changes in the field. It is also important to submit the strategy periodically to the AMCE to be informed with the strategy implementation progress in its different phases, and any obstacles that may hinder it. This will enable the Council to guide the strategy through the best scenarios susceptible of completing its implementation and to overcome any obstacles it may face.

Appendix (1): General Background

In its 7th round (April 2007), the Arab Ministerial Council for Electricity-one of the ministerial councils formed under the umbrella of LAS - issued resolution No. (98), to develop the cooperation and coordinate the efforts exerted in the power transmission and generation in Arab countries. The Council decided to organize a workshop on "policies and measures leading to enhancing the renewable energy applications", the workshop included four aspects:

First: Legislative and institutional frameworks.

Second: Renewable energy: R&D, technology sharing, and financing resources.

Third: Renewable energy application in the Arab world and benefit from previous experiences.

Four: Renewable energy and the capabilities of its application in the Arab region.

The outcomes of the above workshop were considered the first step towards implementing this strategy which invites all individuals working on energy related planning in each country to consider the integration of energy supply methods planning. This is in addition to building national capabilities in renewable energy technology, and promoting mechanisms that reduce the obstacles facing the investors and users. Add to this, the subsequent development of policies and legislations that encourage the optimal use of renewable resources. This requires organizational procedures like institutional structures and legal frameworks that ensure transparency in the energy market.

The strategy depends on many aspects; the most prominent of which is the role of the AMCE in monitoring its implementation through the Arab and international cooperation. This is in addition to developing organizational procedures to put the Strategy into effect which guarantees building national and Arab capabilities that contribute in the development of renewable energy uses.

It is expected that the implementation of this strategy will generate a collection of economic, environmental and social impacts that act as indicators to measure its success. This requires a proper action plan to implement the items and aspects of the strategy and achieve its targets.

The AMCE interest in the issues related to the renewable energy applications is dated back to its 2nd round, when the Council issued resolution No. 19 on 25/09/1997 marking the application of alternative energy resources and the rationalization of electricity consumption as one of the Council's priorities. The Council also called upon all Arab countries that have experience in that field to submit briefs on their experiences to benefit from. The Council' objectives included developing cooperation and coordinating efforts to use renewable energy resources available in Arab countries. These goals focus on:

- Coordinating Arab policies in the areas of electricity generation; development, integration and diversification of energy resources taking environmental considerations into account
- Enhancing the Arab integration and encouraging investment in manufacturing equipment for generating, transmitting and distributing electricity in order to localize the manufacture of electrical equipment
- Encouraging scientific research on electricity and developing renewable energy technologies and applications
- Unifying the efforts and coordinating the Arab stances in international events to achieve the Arab interests, in cooperation with Arab and international authorities and organizations working in the field of electricity and energy
- Encouraging member states to share knowledge and experience, and build calibers making use of the available abilities in the Arab countries
- Developing plans and programs, and preparing studies that would develop renewable energy applications

In order to inject a new spirit in the Council and strengthen the member states confidence in its quest to achieve tangible interests, the AMCE in its sixth session, approved the report prepared by its Secretariat on the development of the Council's work. The ninth paragraph of this report states the following "It is important to encourage Arab states to cooperate and exchange experiences and expertise in the areas of renewable energy applications." Moreover, the subject of

promoting and developing the use of renewable energy technology was on the agenda of the Council's seventh session when it issued its resolution no. 92 on 25/4/2007. Such resolution included "Calling upon Arab countries to strengthen the coordination between the concerned research and application institutions to develop renewable energy applications, and assigning the Council Secretariat to hold a workshop for the member states Executive Office experts on the sidelines of the upcoming meeting."

In the framework of following up the implementation of the above resolution; a coordination meeting was held- in the General Secretariat headquarters in Cairo- to discuss policies and procedures that lead to promote renewable energy applications. The meeting, after viewing the Council's resolution, found that the recommendations of the workshop should be the starting point, as the workshop ended with a request to develop an Arab strategy for renewable energy applications in the next phase.

Accordingly, this strategy was prepared based on the resolution no. 111 of 2009, issued by the AMCE in the 8th session. This resolution includes the following text related to the renewable energy field:

"Forming a specialized expert team with specific tasks, to include experts from the Arab countries, The Arab League Educational, Cultural and Scientific Organization (ALECSO), Arabian Industrial Development and Mining Organization (AIDMO), Arab Union for Electricity (AUE), Economic and Social Commission for Western Asia (ESCWA), Regional Centre for Renewable Energy and Energy Efficiency (RCREEE), and the Secretariat of the Arab Ministerial Council for Electricity (AMCE)". The task will be:

1. Developing and reforming the draft Pan Arab Strategy for the Development of Renewable Energy Applications within the approach and methodology recommended by the team, taking into account the Arab strategies developed on other energy resources, in preparation for submitting the draft strategy to the Executive Office

2. Completing the Arab pilot framework to improve energy efficiency in the electricity sector, after collecting all data related to the improvement of energy efficiency (2nd part of the form prepared by the Council Secretariat and circulated to the Arab countries)
3. The team shall hold periodic meetings until finishing all its assigned tasks, taking into account the contribution of renewable energy in the generation of transmitted electricity through The Arab Electricity Interconnection Grid lines
4. Requesting Arab countries to nominate their respective specialized expert who shall be one of the members of the abovementioned team, to the Council Secretariat no later than the end of July 2009
5. Assigning the Council Secretariat to call for the first meeting of the team during October 2009

As a response to the Council Secretariat's invitation, the team held the first meeting at the General Secretariat headquarters during the period from 12-14 Oct, 2009. The meeting was attended by experts from the Hashemite Kingdom of Jordan, Bahrain Kingdom, the Republic of Tunisia, The People's Democratic Republic of Algeria, KSA, Syrian Arab Republic, the Republic of Iraq, the State of Kuwait, the Republic of Lebanon, Libya, the Arab Republic of Egypt, in addition to AIDMO. The meeting resulted in determining members and a coordinator for each section of the strategy, as well as setting a deadline for completing the preparation of strategy on December 2010.

On the other hand, there are many resolutions issued by the AMCE in its extraordinary session No. 127 on 14 Jan, 2010; the Economic and Social Council in its regular session No. 85 on 11 Feb, 2010, and the Arab League Council No. 7199

at its regular session No. 133 on 3 March, 2010, regarding the amendment of the statute of the Council by introducing a new committee titled “Committee of Renewable Energy and Energy Efficiency Experts” for providing help and assistance to the Council and Executive Office. This committee works on the topics related to renewable energy resources and energy efficiency, and is supported by the membership of specialized technical experts in ministries and institutions concerned with electricity, renewable energy and energy efficiency affairs across from all Arab countries. The specialized Arab, regional and international entities, bodies and organizations can contribute in the committee meetings and the formation of specialized committees or work teams of the member states, in order to provide assistance to the Council in achieving its goals and objectives and carrying out tasks. The joint Arab action institutions can also participate in the membership of these committees or work teams, to benefit from the expertise and staff of those institutions in the preparation of studies and researches necessary for the Council work, including "setting the Arab strategies necessary for the development of the Arab electricity sector, diversifying and integrating the sources of electricity, developing the renewable energy applications, and improving the efficiency of energy production and consumption"

Appendix (2): National Plans for Electricity Generation from Renewable Resources

Hashemite Kingdom of Jordan

There are two small wind farms in Jordan; the power of the first is 320 kilowatt whereas the power of the second is 1125 kilowatt. Therefore, they are classified as pilot projects and not as commercial ones. Moreover, the wind energy is used in water pumping in remote areas. The number of solar water heaters (SWHs) produced annually is about 4000 systems which show the increase of solar energy investments.

Jordan announced the first phase of a project for electric energy generation from solar energy with an investment cost of 400 million dollars. This project will be implemented in four phases in Ma'an governorate (212 kilometers south of Amman) to produce about 100 megawatts of electricity at the end of 2012.

Renewable Energy Motives and Goals

- The national plan in the Kingdom is targeting that the share of renewable energy in the total energy mix reaches 7% in 2015 and 10% in 2020
- There is a draft law to encourage using renewable energy, to motivate the private sector for spreading its applications and to apply net metering system
- The draft law stipulates establishing a fund to finance projects of renewable energy and energy efficiency
- There are some entities that conduct researches in the renewable energy fields and their supporting policies

United Arab Emirates

Masdar was founded in 2006 as a company that works according to the comprehensive vision of the United Arab Emirates. Masdar's policy is

consistent with the directions of the Gulf Cooperation Council Countries (GCCC) targeting the development of all fields of renewable energy sector and sustainable technologies.

Masdar city, which has an area of almost 6 square kilometers, is a platform for demonstrating future energy, clean technologies and research. It is expected that the city accommodates 40 thousand people and hundreds of companies. It also includes Masdar Institute which focuses on the applied research having direct output on final energy applications. Masdar Institute interacts with the scientific research centers throughout the world, such as Massachusetts Institute of Technology (MIT), General Electric's center for environmental Creativity Eco-magination Centre Center of GE, Excellence in Building Technologies R&D center, BASF, Schneider Research and Development Center, and others.

Masdar also includes Masdar energy unit which is working to develop and operate renewable energy projects not only in the UAE but also in the Arab region and the rest of the world. Examples of its projects are the joint venture with Abengoa Solar and Total to develop Shams 1 plant for solar energy concentrators in the western region of Abu Dhabi to become the largest solar power plant in the world. In addition to the wind energy generation farm with a power of 30 Megawatt and solar cells plants on Sir Ban yas island in Abu Dhabi to contribute in the generation of 7% of Abu Dhabi's needs of energy from renewable resources in 2020. The most prominent international project is London Array farm to generate energy from offshore wind with a power of 1000 Megawatt.

On the other hand Masdar Carbon company is specialized in managing projects to reduce carbon emissions by enhancing energy consumption efficiency, recover waste heat, collect and store carbon and focus on Clean Development Mechanism investment in the Middle East, Africa and Asia. Masdar Capital unit, which includes a portfolio of leading renewable energy companies and promising clean technologies, supports Masdar Carbon Company in this regard. Moreover, some companies help it to grow and develop by providing capital and management expertise.

In this regard, we find that UAE plays an important role in sustainable energy sector. It reached a level that qualifies it to occupy the forefront in this important field along with many of the developed countries. Such developed

countries achieve high growth rates. This reflects the strategic goal of Abu Dhabi's position, especially after hosting the headquarters of The International Renewable Energy Agency "IRENA".

Renewable Energy Motives and Goals

- The Ministerial Council for Services resolution No. 12/155 of 2009 was issued on the renewable energy applications, aiming to provide 7% of the UAE power needs in 2020 through renewable energy resources
- United Arab Emirates initiated great leap to improve and develop renewable energy technologies by establishing "Masdar" Future Energy Company in 2006 as a company that works according to the comprehensive vision of the United Arab Emirates
- Dubai city announced Dubai Sustainable City project in July 2012, which aims to provide 50% of electricity consumption, 50% of water consumption, waste treatment with a percentage of 100%, and expand landscapes by 75% of the total area of the city, generate 50% of the electricity needs from renewable resources and also convert transportation means to be 100% sustainable means

Republic of Tunisia

Thermal power plants represent the main resource for electric energy in Tunisia in addition to a percentage not exceeding 4% of hydro power and wind energy. The Ministry of Industry, Energy and Small and Medium Enterprises set prices of electricity in Tunisia. The tariff of electricity in Tunisia is cheap if compared to the international one.

At the level of renewable energy, the National Renewable Energy Agency ANME, which was founded in 1985, works to achieve the following goals: (1) energy saving, (2) promote renewable energy application (3) introduction of new patterns of energy generation from resources that consider the environmental dimension.

By the year 2000, Tunisia became one of the Arab countries that depend on importing the crude oil as its production is no longer satisfying its energy demand. Therefore, the Tunisian government issued several resolutions aiming at rationalizing the energy consumption and searching for new resources to be produced. There are 120 megawatts produced from windmills that have been installed in different areas in addition to 62 Megawatts from hydropower plants.

On the other hand, solar water heaters are one of the successful experiments in Tunisia. Solar water heaters project started through a joint cooperation between the Tunisian government, the Global Environment Facility and the Belgian government in 1995 within a program to support solar water heaters by 35% of the heater capital cost .The remaining cost is included in the electricity bill as installments to be paid over seven years. This helped spreading these heaters in Tunisia and establishing a local market that localizes the solar water heaters industry.

Tunisian Solar Plan aims to implement 40 projects under the partnership of the public and private sectors during the period from 2010 to 2016. In the context of this plan, the private sector will implement 29 projects and the public sector will implement 5 projects of which 3 projects will be implemented by Tunisian Company of Electricity. Moreover, it has been undertaken to establish several private projects in cooperation with institutions in Germany, Italy, Japan, the European Union (EU) and the United Nations Development Program (UNDP).

Renewable Energy Motives and Goals

- 4.3% of primary energy consumption by 2014 without taking into consideration firewood and charcoal, and 13% with them
- Law no. 72 of 2004 was issued including a definition of the national program for renewable energy and power generation from different resources
- There are distinguished packages encouraging solar heating systems and photoelectric cells

The People's Democratic Republic of Algeria

Algeria is characterized by huge reserve of energy resources, especially natural gas. This is in addition to promising capabilities to use renewable energy resources, especially solar and wind. The energy position in Algeria is very developed as the sources of electricity are provided from three main sources: natural gas with 94.5%, hydropower with about 5% and solar energy with 0.5%.

New Energy Authority of Algeria has been established. It works on promoting renewable energy applications in Algeria, and responsible of the implementation ofsolar thermal plants with "BOOT" combined cycle system. This project is implemented by Spanish companies union using solar concentrators' technology with a parabola of 150 megawatt total power. It consists of 130 megawatt combined cycle and a solar field of 25 megawatt power. This project required investment of about 316 million Euros and was implemented by Abener Spanish company using (BOO) system.

Renewable Energy Motives and Goals

- Identify the contribution of renewable resources in the balance of the national electricity to be nearly 6% in 2015
- Apply feed-in tariff system for purchasing energy generated from renewable resources
- A major portfolio of energy projects has been identified within the framework of the Algerian Indicative Program for infrastructure development and electricity generation from 2009-2017 on one hand and the renewable energy development program 2009-2050 on the other hand
- The existence of independent entities to implement renewable energy projects, which include the establishment of solar power plants and wind power plants

Kingdom of Saudi Arabia

King Abdullah City for Atomic and Renewable Energy (KA-CARE) was established on 3/5/1431 A.H. to introduce atomic and renewable energy within the system of power generation and water desalination in Saudi Arabia. This helps reducing the reliance on hydrocarbon resources, provides additional guarantee for water and power generation in the future and saves the hydrocarbon resources which will lead to prolonging their life and thus keeping them as a source of income for a longer period.

The decision to establish the City was taken as a result of a true understanding, a conscious vision and an overall look at the energy sector and its future needs. It also came to embody –in its comprehensive outlook- the need for this sector to meet the requirements of sustainable national development.

What is required from the atomic and renewable energy sector, especially when looking to the future, is to provide power and water to all the society segments in addition to the appropriate energy for the industry. It should at the same time reduce the consumption of fossil fuels in order to preserve them for future generations, increase the power generation efficiency, enforce consumption rationalizing, and enable the national industry to develop a future energy system depending on qualified national competencies. The sector should achieve all of the above by direct work and continuous coordination with business partners inside and outside the Kingdom.

Since its establishment, the City aims at achieving two main goals; the first of them is to fulfill the purpose of its foundation. This goal requires implementation and empowerment mechanisms to ensure the existence of and sustainability of a power generation and water desalination system using atomic and renewable energy. This will be achieved by building an integrated and sustainable economic sector based on atomic and renewable energy system, which aims to achieve the three elements of sustainability:

- Find and develop the qualified manpower to build the atomic and renewable energy sectors

- Establish the power generation and water desalination system to be economically viable
- Reduce the environmental impact of the entire power generation and water desalination system of by replacing energy based on hydrocarbon source with clean energy, in almost all the stages of the energy system development

To formulate its strategy, the City depended on the studies and projects accomplished before its establishment. It also depended on conducting thorough studies on atomic and renewable energy sectors around the world to take advantage of the available experiences in the field of planning and implementation. This is in addition to the various technical, scientific, research, administrative and financing experiences in this area. The City relies on the previous achievements of several entities in the Kingdom, such as the solar atlas and wind energy atlas, which were issued by King Abdul Aziz City for Science and Technology (KACST), in addition to benefiting from the experience gathered by research and educational institutions in the area of solar projects such as King Abdullah University of Science and Technology (KAUST). The City is also working in coordination with the relevant authorities to ensure the success of national initiatives related to renewable energy such as King Abdullah initiative for solar water desalination supervised by the KACST.

The City presented strategic studies on atomic and renewable energy and the available options to reduce the consumption of hydrocarbon fuels within the power system and water desalination. These studies show the possibility of reducing consumption by 50% by 2032, which results in maximizing renewable energy contribution in this goal to about (30%). The concerned bodies are currently working on formulating the legal and investment frameworks of the renewable energy sector, including the proposed purchase tariff and mechanism of purchasing from companies that generate power from renewable energy.

The following table shows the national plan for power generation from renewable resources in the Kingdom:

No.	Activity or Event	Quantitative Indicator
1	Announce a policy for renewable energy development.	King Abdullah City for Atomic and Renewable Energy (K.A. CARE) was established.
2	Form a specialized team or designate an entity concerned with the development of renewable energy.	King Abdullah City for Atomic and Renewable Energy (K.A. CARE) was established.
3	Set a goal for renewable energy.	Done: 30% of generated power
4	Adopt a law to determine the tariff of the power generated from the renewable energy.	Currently Formulating the law
5	Invite the private sector and investors to build renewable energy plants	Is currently being planned.
6	Approve financial incentives for investing in renewable energy sector.	Under study
7	Establish a fund to support renewable energy projects.	Under study
8	Carry out awareness and building capabilities activities in the area of renewable energy.	Still working on the issue.

Renewable Energy Motives and Goals

- The Kingdom approved the aim to make the solar energy contribute with 41 gigawatts in 2032, 15 gigawatts of which are of Photovoltaic cells and the rest are of solar concentrators, so that the power, generated from solar energy, will range from 16-22% by this year
- Many policies and programs encouraging renewable energy research and applications were adopted
- In the field of wind energy, Saudi wind atlas was prepared, where studies and tests in 8 different locations in the Kingdom are being prepared to discuss the possibility of generating power from wind energy
- Also, a policy is being prepared for the renewable energy application that sets targets for renewable energy share in the energy mix

Republic of Sudan

The Biomass covers about 87% of the energy needs in the Sudan, while oil contributes with 12% and the thermal and water plants with 1%. The total hydropower in Sudan is about 345 megawatts generated from four tanks; the biggest one of them is Erroseires tank with capacity of 280 megawatts. Operating Merowe Dam project added 1250 megawatts to the renewable resources.

The first stage of identifying wind energy resources was completed through cooperation between the Ministry of Energy and Mining of Sudan (GOSS) and the Ministry of Electricity and Energy in Egypt represented by the New and Renewable Energy Authority. The two entities cooperated to implement a program to identify the wind resources in Sudan and to prepare the wind atlas which determines the promising areas that can be utilized in wind farms establishment.

Sudan established a specialized department in renewable energy under the Ministry of Electricity and Dams, which includes a section fir solar energy. It concluded a contract with a consulting firm to conduct studies aiming to identify promising areas for generating power from solar and renewable energy. It also signed a memorandum with the French company Solar Euro-Med to establish solar power stations.

Renewable Energy Motives and Goals

- Renewable energy share in the energy balance reaches 1% by the end of the country's five-year plan 2007-2011

The Syrian Arab Republic

The renewable energy strategy in Syria depends on maximizing the share of renewable energy applications to meet part of the energy needs. This is expected to be associated with a reduction in the reliance on hydrocarbon sources, and thus theimprovement of the ecosystem, and the achievement of sustainable development. The Syrian National Plan of Renewable Energy was issued in 2004. The law of Feed-in Tariff was issued in February 2012 to determine the purchase price of electricity and purchasing power generated from waste, biomass, wind energy and solar energy.

In general, there are some applications for wind energy in water pumping and water heating using solar energy for domestic applications (up to 80 degrees Celsius). The Syrian Ministry of Electricity is aiming at completing the establishment of a wind farm to generate power in the region of Homs in cooperation with the German government. However, this cooperation stopped as a result of the economic sanctions against Syria. On the other hand, the total area of solar water heaters (SWHs) in Syria is about 800 thousand square meters.

The Republic of Iraq

Hydroelectric power represents about 13% of the total installed powers for electricity generation in Iraq. Fossil-fuel power stations include steam, gas stations and diesel stations. The installed power of the hydroelectric stations at the end of 2012 reached 1864 megawatt while the available power of this installed power was 855 megawatt only. This is due to a remarkable decrease

in the amount of water flowing into Iraq through the Tigris and Euphrates rivers during the past years. This had a negative impact on the Ministry's plan in adopting projects of electricity generation using hydroelectric stations.

Due to the importance of keeping up with the progress, the technological development and the necessity of supporting the electrical system with additional powers and diversifying its resources, it becomes vital to care about renewable energy. The government thus established Renewable Energy and Environment Center at the Ministry of Electricity in 2010 where a promising plan was developed for the implementation of some important projects in both generation and distribution sectors.

At the present time, international specialized and qualified companies are being invited to implement solar and wind energy projects at 15 sites in 8 provinces in Iraq. This activity is considered one of the Ministry's priorities in renewable energy application is to provide remote areas isolated from the national grid with electricity.

This vital project is one of the largest projects implemented in Iraq, where the total capacity will be 50 megawatt.

On the other hand, the Ministry's plan for the years (2012-2015) seeks that the share of renewable energy reaches 2% of the total electrical power generated at the end of 2015. Among its goals also is the activation of the energy efficiency and conservation programs by introducing efficient equipment such as the modern lighting projects using LED, solar water heaters (SWHs) and self-generation systems in the power distribution sector.

It should be noted that Iraq is one of the first countries to adopt the leading projects of solar energy by providing 20000 street lighting systems using solar energy technology with a total capacity of 3.5 megawatt in 2008-2009. The Ministry of Industry has established a factory to assemble solar panels in 2010. Moreover, many of the country's ministries have adopted some leading projects, which concentrate on solar energy applications in the field of watering, irrigation and water filtration.

Renewable Energy Motives and Goals

Currently preparing for achieving a 10% contribution for the next years (2020).

Palestine

The Palestinian Cabinet approved the general strategy for renewable energy on 14/3/2012 in Palestine according to the plan prepared by the Energy Authority. This plan aims at getting 240 gigawatt/hour gradually (at least) to generate electricity from renewable resources which equals 10% of the electricitygenerated locally in 2020 according to the strategic plan for the energy sector.

Application of renewable energy resources (thermal) is estimated at 18% of the total current energy consumption in Palestine, which represents 2287 gigawatt/ hour (as electricity). It is used especially in water heating and heating thus the proportion of depending on renewable energy is equivalent to 25% (as electricity) by 2020.

Solar water heaters (SWHs) are also used on a large scale in the residential sector in Palestine (more than 72% of families use solar heating systems). The total current installed powers in all sectors are more than 1.5 million square meters of solar collectors (the highest rates in the region). The strategy implementation has 2 phases:

First Phase (2012-2015): The goal is to get 25 megawatts of different types of renewable energy (solar cells, wind power, biogas ...) and this phase includes:

- Implement projects with small powers. Several small projects were implemented by using solar cells in different remote areas and the total installed power was almost 105 kilowatts
- Complete the project of the first generation station operated by solar energy with power of 300 kilowatts. The Japanese agency JICA in Ariha district area funded this project and it has been completed and connected with the grid in July 2012

- Many solar projects are under construction with a power of more than 500 kilowatts.
- Several projects are under study for wind energy application for electricity generation with a power of 100 megawatts.
- Implement the Palestine Solar Initiative (PSI) with a power of fivemegawatts. It aims at setting up different small projects with a power up to 5 kilowatts for each to be installed on the houses roofs with total of 1000 houses. This initiative consists of three phases extending for three years and it is currently under construction. Every citizen having this system in his home will get special electricity tariff for the energy generated from solar cells
- **Second Phase (2016-2020)**: The goal of this phase is to get 105 megawatts after having the local market attracted to the renewable energy technologies and its applications. This will be achieved through the implementation of projects with high powers enabling us to reach the desired target by 2020 which is 130 megawatts

Renewable Energy Motives and Goals

- Establish a comprehensive assessment of renewable energy resources in Palestine
- Target an electricity generation rate of 10% in 2020 according to the strategic plan for the energy sector
- The Palestinian Cabinet's approval on the general strategy for renewable energy dated 14/3/2012

- Apply special tariff policy for purchasing energy generated from renewable resources
- Enhance the use and manufacture of renewable energy, encourage investment and provide scientific research potentials

The State of Kuwait

Although the State of Kuwait is known for abundance of oil resources, the Ministry of Electricity and Water of Kuwait adopts a feasibility study to establish a solar station in integration with the combined cycle with a capacity of 100 megawatts. In this regard, it shall use the solar concentrators technique in cooperation with the German solar energy plants in the German Aerospace Center DLR.

Kuwait aims at making the renewable resources contribute with 5 % of the generated power by 2020 as a strategic goal. It also aims at implementing many technical and economic studies to establish a solar thermal station and choose the best technologies. This is in addition to the completion of a technical economic study to establish a solar thermal station with a capacity of 280 megawatts where the capacity of solar component is 60 megawatts.

Renewable Energy Motives and Goals

- Kuwait aims at making the renewable resources contribute with 5% of generated power by 2020
- Several technical and economic studies and researches are being implemented to establish solar thermal stations for power generation and the application of solar energy in the various cooling and air conditioning systems

Lebanese Republic

Statistics indicate that 13% of homes use solar water heaters (SWHs) for domestic applications, which is equivalent to about 250 thousand square meters up to the year 2011, with reference to the installation of 43,500 square meters

just in 2011. The Ministry of Energy and Water works through several joint initiatives with the Central Bank of Lebanon (Banque du Liban) and Management of United Nations Development Program (UNDP) to install 190 thousand square meters between the years 2009 and 2014, reaching installation of one million square meters in 2020. With respect to generating energy from wind, a declaration of intent was launched, which will be followed by a global tender to secure the generation of 60 to 100 megawatts of wind energy during the next two years. The aim is to be able to generate 400 to 500 megawatts of wind energy in 2020.

The Ministry of Energy and Water works on installing the first fan in favor of the Lebanon Electricity Company in 2013. The Ministry is also working on installing the first pilot project to generate power from solar concentrators in 2013.

Renewable Energy Motives and Goals

- Government's approval of National Energy Efficiency Action Plan based on the Arab guidelines to improve energy efficiency. This makes Lebanon the first Arab country to adopt the plan at the level of governments, leading to the strategic goal represented in the contribution of renewable energy in generated thermal power with 12% in 2020
- Launch National Energy Efficiency and Renewable Energy Action NEEREA through cooperation between the Ministry and Banque du Liban, which would create a market with investments of 200 million dollars until 2015
- Lebanon will benefit from the Neighborhood Investment Facility (NIF) mechanism through a grant of five million Euros. The grant will be used for project related to renewable energies and the Mediterranean Solar Plan – Project Preparation Initiative (MSP-PPI)

- Cedro project was carried out with investments of 9.07 million dollars for the installation of (PV) solar cells in a large number of public schools and public sector institutions with capacity of 1.8 kilowatts per site. Such solar cells are currently being connected to the network according to the NET METERING principle
- The national strategy for the potential application of biomass has been completed to achieve the goal stated by the Ministry of Energy and Water; producing between 15 to 25 megawatts within four years
- The hydropower generation projects plan was completed and will be announced before the end of 2012

Libya

Libya enjoys significant capabilities of solar energy and wind power, which are promising resources for generating electricity in the future and they are available in plenty. Recently, the Libyan Ministry of Electricity and Renewable Energy was established in 2012 to draft policies for the renewable energy application and development in Libya. In this respect, the Executive Agency for Renewable Energy was established in 2007, currently working under the Ministry. The Agency is concerned with carrying out projects for renewable energy applications, utilizing the available renewable resources, and performing works to achieve its designated goals and duties. Furthermore, Solar Energy Research Center is established since 1978 to prepare all research and studies related to renewable energy, carry out experimental and research projects, and share knowledge and technology in order to localize such projects. This Center is now working under the Ministry of Higher Education and Scientific Research.

Small and isolated solar cells systems were used in Libya for more than thirty years in many applications; such as communications, electricity of remote areas and cathodic protection with a total capacity of five megawatts. Water heating systems,using solar energy, were also used on a small scale equaling to 1000 systems.

Libya pays a significant attention to renewable energy as a source for generating electricity using clean and environment-friendly sources. Libya adopts policies that enhance the technical, legal, financial and investment aspects for renewable energy in order to create a proper environment for the public and private sectors. This encourages both sectors to carry out various types of projects and achieve the goals of these projects' plans. It also applies incentives that encourage and promote renewable energy applications at all levels through methodologies favoring the public interest.

In this context, the National Plan for Renewable Energy (2013-2025) was prepared based on the available potentials of renewable energy resources (solar and wind energy). The Sunbelt, in which a large part of the Libyan Desert is located, provides the highest rates of solar radiation reaching (7 kilowatts/square meter per day). A preliminary Atlas for the wind was prepared showing the wind speed indicators where its annual average reaches (10 meter/second) at a height of 50 meters above the ground level. A map of vertical solar radiation was drawn showing that the annual average reaches about 3000 kilowatt/hour per square meter.

The plan aimed to implement several projects by dividing them into short-term and medium-term plans, with installed powers in solar and wind energy as well as solar heating systems. In the short term plan, 260 megawatts will be generated from wind farms, 25 megawatts from solar concentrators embedded in combined cycle plants and 85 megawatts from solar cells plants embedded in the electrical grid.

The medium-term plan aims to generate 630 megawatts from wind farms, 375 megawatts from solar concentrators' plants and 715 megawatts from solar cell plants.

The plan of (2013-2025) shall pay attention to applying a national program for the use of solar water heaters (SWHs), through providing them in the local market with power equivalent to 450 megawatts along the two periods of the plan. The plan also aims at providing the environment required to encourage the adoption of this program, through enacting the laws and regulations and adopting the motives which support and promote the application, supply and manufacturing of renewable energy.

Renewable Energy Motives and Goals

- Increase the share of electricity generated from renewable energy resources in the national energy supply system to about 3% (2015), 7% (2020) and 10% (2025)
- Exert efforts seeking to transform Libya into one of the exporting countries of electricity generated from renewable energy resources through the proposed international initiatives
- Establish the Ministry of Electricity and Renewable Energy to which the Executive Agency for Renewable Energies is affiliated
- Work on preparing and drafting laws and governing regulations for all the renewable energies aspects

Arab Republic of Egypt

The Ministry of Electricity and Renewable Energy in Egypt is responsible and mandated with the development of renewable energy applications, which Egypt is very rich with. New and Renewable Energy Authority was established in 1986 to be the national focal point for the efforts exerted in spreading renewable energy applications. The Authority is also concerned with generating electricity for commercial purposes, localizing the renewable energy technologies and rationalizing the consumption of fossil fuel which can either be exported abroad to represent one of the national income sources, or be used locally in the petrochemical industry so as to maximize its products export returns.

The Egyptian Supreme Council of Energy has in February 2008 adopted a strategy for renewable energy that depends mainly on the involvement of the private sector, to make the total electricity generated from wind energy by 2020 reaches 12% of the total electricity generated from the electric grid. 8% of the electricity generated from water sources will be added to this percentage. So, that the total percentage of electricity generated from renewable resources reaches at that time 20%.

In the field of wind energy, a power generation plant of 550 megawatts was implemented in Zafarana in addition to other projects, which makes Egypt the largest wind farm in Africa and the Middle East. These projects have been implemented within the frame of international cooperation agreements through financing structures including facilitated loans to finance the equipment cost. This had a positive impact on the implementation of the program phases so far in terms of providing the required finance, creating the technical cadres qualified to deal with these technologies and improving the economics of these projects.

The Cabinet meeting no. 25 held on 8/7/2012 issued the resolution no. 25/7/12/23 on the Egyptian plan for solar energy. This plan aims to establish electric energy projects with installed capacity up to about 3500 megawatts by 2027 (2800 megawatts from solar thermal concentrators in addition to 700 megawatts from photovoltaic cells) through the involvement of the private sector by 67% byimplementing the required power and 33% governmental projects through NREA.

In Egypt, a power plant was operated using solar thermal systems in integration with the combined cycle in July 2011, through a plant of 140 megawatts in which the solar component reaches 20 megawatts, using the parabolic solar concentrators'technology.

New and Renewable Energy Authority also embodies a center for the researches and tests of renewable energy and energy efficiency that was created on 1996 in collaboration with the European Union and Italy. This center is concerned with environmental studies and benchmark tests for the performance and quality of renewable energy equipment. It also participates in supporting the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) in which the European Union, the German Development Cooperation (GIZ), the New and Renewable Energy Authority (NREA) of Egypt and the Danish International Development Agency (DANIDA) are partners.

In addition to the role of the Authority in the field of renewable energy, there is the role of the universities and scientific research centers in the field of renewable energy researches, to localize the renewable energy technology and find a product suitable to local conditions.

Motives and Goals of Renewable Energy

- The Supreme Council of Energy in Egypt has in February 2008 adopted a new energy strategy that depends mainly on the private sector's involvement in the field of wind energy farms establishment to make the total electrical energy, generated from wind energy, by 2020, reach 12% of the total electricity generated from the electric grid
- Establish solar power plants with a total power of 3500 megawatts to be divided as follows; 2800 megawatts by using solar concentrators and 700 megawatts by using photovoltaic cells
- Conclude agreements to purchase the energy generated from wind plants over a period ranging between 20-25 years with a price that covers the cost and the return of investment
- Provide a guarantee from the government for the financial obligations of the Egyptian Electricity Transmission Company (EETC) according to the terms of the energy purchase agreement
- Exempt renewable energy equipment from customs duty and sales tax
- Identify purchase currency provided that the purchase price of the energy includes a proportion in local currency to cover local costs, local generationand the rest shall be in foreign currency
- Establish renewable energy support fund
- Getting the approval of all entities which are the mandate-holder of the land and clear it from mines

- Make preparations and initial studies necessary to establish projects in those lands such as studies of environment, bird migration, soil and others
- The land is granted for establishing the project against a proportion of the generated energy which the Cabinet determines, provided that:
- The country recovers the possession of land without the project components according to the agreement at the end of the working life of the project
- The authority recovers the value of the actual costs incurred in preparing and processing the land from the investor. These costs shall be included within the project investment cost
- The investor shall pay the cost on annual installments over a three-to-five fiscal years period following the generation beginning

Kingdom of Morocco

Kingdom of Morocco depends in the generation of electricity on thermal plants to be followed by the hydropower. The total of installed electricity generated from wind power is about 240 megawatts. As a result of the Kingdom's attention to renewable energy, a concerned center was established to develop its applications. The center will assume the responsibility of implementing various activities in different renewable energy fields such as: studies, knowledge transfer, training courses and equipment inspection. The center goals shall be the following: (1) Providing energy resources (2) Expanding energy services to reach more citizens (3) Achieving greater competitiveness in the energy generation sector (4) protecting the environment.

The Moroccan Government has established several wind farms in this regard in collaboration with some foreign entities such as the German Development Cooperation (GIZ), German Development Bank (KfW) and the European Investment Bank (EIB). On the other hand, wind speeds in areas such as

Tangier, Tetouan and Agadir range from 8-11 megawatts/seconds. This means the possibility of creating other farms in these areas. The plan of renewable energy aims to make the share of renewable resources reach about 42% by 2030. Concerning the solar energy, a solar thermal plant was operated, in cooperation with the Global Environment Facility (GEF), in integration with the installed cycle of 470 megawatts power including 20 megawatts in October 2010 from the solar energy.

On another hand, the biomass provides about one-third of the primary energy demand in Morocco. Its application increased heavily in the rural areas. It is known that Morocco produces daily about 8000 tons of waste and about 1.1 million cubic meters of sewage most of which are subjected extensively to processing and reuse processes in remote rural areas.

The launch of the largest project for electricity interconnection for solar energy was announced in Morocco with a cost of nine billion dollars. The installed capacity of this project will reach 2000 megawatts by 2020, to reduce the country's dependence on electricity, oil and gas import.

The Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE) works to launch projects with powers of: 2000 megawatts of solar energy and 2000 megawatts of wind energy through applying mechanisms to facilitate the involvement of local and international investors. Moroccan Agency for Solar Energy (MASEN) was created also to finance its projects.

Renewable Energy Motives and Goals

- The Center of Renewable Energy was established in 1982 to develop its investments and spread it all around the Kingdom
- The issuance of a number of laws on the development of renewable energy projects
- The Moroccan strategy includes the establishment of renewable energy plants with powers up to 42% of the total installed

capacity with wind energy, solar energy and biomass sharing each with 14%

Republic of Yemen

Yemen strategy for renewable energy includes the expansion in spreading the renewable energy applications, particularly in rural and remote areas. Yemen has three labs for the manufacture of solar water heaters. In cooperation with the German government and the World Bank, a national plan was prepared to increase the use of renewable energy resources in Yemen.

The Republic of Yemen pays great importance to national capabilities' building programs in collaboration with countries, international and regional organizations having experience in the field of renewable energy. These entities include Egypt (New and Renewable Energy Authority), the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) and Economic and Social Commission for Western Asia (ESCWA). ESCWA adopted -by funding from OPEC- the provision of electricity for Kaawa village - which is about 70 kilometers far from Aden city - using solar cells.

The national strategy for renewable energy in Yemen sets many motivating mechanisms to be used to encourage the private sector investment in the field of wind and geothermal energy - (as now there is an initiative to prepare a plant that generates 60 megawatts in Al Mukha district from wind energy resources, as well as drilling the first exploratory well with a depth of 1500 meters to generate electricity from the earth's heat in Al-Lassi region in Dhamar province. The national strategy identified that 2900 megawatts can be practically generated from geothermal heat in the Republic of Yemen) - waste gas and types of solar energy. Anaction plan was assigned to the strategy for 10 years for wind energy. Another action plan was assigned for concentrated solar power and the last one is for solar water heaters. There is a recommendation to establish a fund for renewable energy in addition to initiating the preparation of the investment plan for renewable energy in the framework of the renewable energies support program related to World Bank starting from the first quarter of 2013.

Renewable Energy Motives and Goals

- Optimal use of energy resources to reduce dependency on fossil fuels, reduce electricity imports in the future and improve the energy supply security
- Variation of the energy mix by increasing the share of renewable energy resources in generating the electricity (linked to the national grid and from the independent grid reaching to households in isolated areas) to reduce dependency on fossil fuels, improve the country's economic situation and protect the environment and climate by reducing greenhouse gases
- Working to reduce the deficit faced by the electricity sector in electricitysupply and the demand at peak time, through encouraging renewable energy applications by improving the energy efficiency and preserving it among the major categories of consumption

Appendix (3): Proposed Action Plan for Following-up the Implementation of the Pan Arab Strategy for the Development of Renewable Energy Applications for Two Years

Activity	Preliminary Action	First Year (2012)				Second Year (2013)			
		First Quarter	Second Quarter	Third Quarter	Fourth Quarter	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Assign strategy team[12] to follow up the implementation of the strategy (led by the head of the team and as he deems appropriate)	♦								
Address the countries to prepare the data required to calculate the indicators contained in the strategy				✓		✓		✓	
Send data to the strategy team to follow-up			✓		✓		✓		✓
Set indicators and analyze data			✓		✓		✓		✓

[12]The Strategy team's name was modified to be working team of renewable energy according to the Resolution No. 209 issued by the twenty-eighth meeting of the Executive Office of the Arab Ministerial Council for Electricity (1-8-2013).

Activity		Preliminary	First Year (2012)				Second Year (2013)			
The meeting of strategy team members for follow-up			✓		✓		✓		✓	
Send semi-annual follow-up report					✓		✓		✓	
Periodical workshops	Arab countries' experiences in the legislations and laws		✓							
	Building manufacturing capacities				✓					
Training courses	Electricity Feed-in Tariffs			✓						
	Interconnection mechanisms and smart networks							✓		
Update Arab countries guide for renewable energy and energy efficiency									✓	

Activity	Preliminary	First Year (2012)				Second Year (2013)			
Media release					✓				✓
Media material in the form of TV advertisements or documentary programs					✓