

Development of Renewable Energy Industry in Libya

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ABSTRACT

The renewable energy technologies (RETs) became the unique choice to save our planet and the future of the new generation, but, the third world countries such Libya need wide steps to build up a strong industry base in this field. This paper presents the reasons of slow growth in field of (RETs) in Libya and the suitable methods to motivate and improve this industry. Many essential points must be taken in the concern to establish and improve the renewable energy industry (REI) in the country such as; professional manpower, government supporting, society supporting and the utilization from the experience of the developed countries and its previous experiments. Moreover, a live example was presented in this work about the procedures of the initial establishment for a local industrial limited company works in this field, this example shows the barriers which facing these companies from the beginning. Many stages and procedures in this study are presented in details and recommended to be applied to establish a base in (REI) in Libya.

Keywords: Renewable energy, Libya, Industry, Technology.

1. Introduction

Solar industry is developing steadily all over the world because of the high demand for energy while major energy source, fossil fuel, is limited and other sources are expensive. It has become a tool to develop economic status of developing countries and to sustain the lives of many underprivileged people as it is now cost effective after a long aggressive researches done to expedite its development. The solar industry would definitely be a best option for future energy demand since it is superior in terms of availability, cost effectiveness, accessibility, capacity and efficiency compared to other renewable energy sources.[1]

As we know that Libya is depending on oil and natural gas in its economy and energy production since 1961. These resources will be depleted while the energy demand in Libya in increase, otherwise, Their uses leads to increase global warming gas emissions and other environmental destruction. This will motivate the researchers and energy officials in Libya to head to the renewable energy.

Although, the renewable energy has been used in Libya back to the seventies, the main applications are for powering small remote loads such as communication repeaters, rural electrifications, water pumping and Cathodic Protection for the oil pipelines in the desert.

With the ever increasing demands on the energy, the renewable energy sector in Libya planned a number of projects in the last decade.[2]

Water heating energy consumption is about 12% of the national electricity production but the use of solar heaters has not been spread in all the country due to

1. No national or personal industry has been established for local individuals.
2. Lack of information for the people.
3. Low electric energy tariff.[3]

2. Renewable Resources and Expected Requirements Until 2050

The renewable energy sources for Libya according to the MED-CSP scenario is shown in Table: 1, while Libyan energy requirement scenario for 2050 is shown in Table: 2 [3]

Table 1: *Renewable energy sources for Libya* [3]

Type	Potential
Solar electricity	140,000 Twh/y
Wind electricity	15 Twh/y
Biomass	2 Twh/y
Total	157,000 Twh/y

Table 2: *Energy requirement for Libya* [3]

Type	2005	2050
Population	6 million	10 million
Electric power generation	3500Twh/cap/y	5000Twh/cap/y
Electricity demand	20Twh/y	50Twh/y
Water	6 billion m ³ /y	10 billion m ³ /y

The renewable energy Libyan plan is shown in Figure 1, the plan is divided into four basic phases. Due to the instable situation in Libya this plan is suspended. During 2015 the 6% target has not been achieved because of the instability. Additionally there is no true will to launch these projects. As an example of the bad planning. The first phase of the plan was to build 60 MW wind farm in the city of Dernah, the project lasts from 2008 to 2012. The farm consists of 37 wind turbines each rated 1.65 MW. Due to some issues about the ownership of the land used for the wind farm the project is delayed.[6]

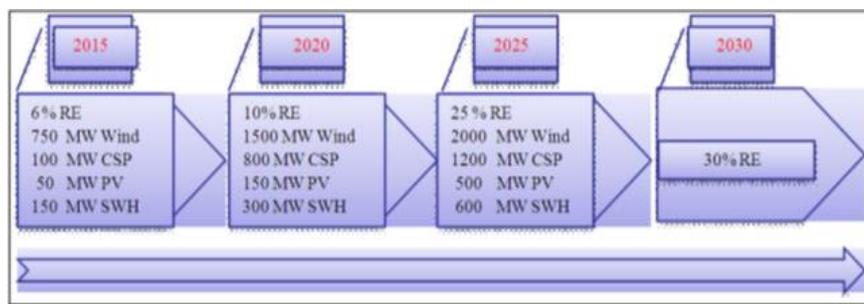


Figure 1. Renewable energy share, (Source: The renewable energy authority of Libya) [5]

According to the MED-CSP scenario, Libya not only need to cover the energy requirements but need to inter the (REI) to face the future requirements.

3. Localization of industry in Southeast of Asia

According to the Asian experiment, we will find a rapid development in field of industry in general, this is due to three methods used by these countries to import and localize the technology consequently shorten the road to a national developed industry. First these countries used the copy-paste policy to emulating the original product or the second choice; production under a license from giant corporations such as Japanese corporations; Mitsubishi and Toshiba as an example. The third method; collaboration agreements with these corporations to establish a national companies for example; the agreement between Mitsubishi motors corporation and Malaysian government to produce a national car called Proton, even if our topic is about the (REI) but, we can learn from the succeed Asian experiment in the industry how to communicate with the developed countries by agreements, international organizations and scientific institutions such as universities and research centres. In general, to success Libya in transfer and localize the (REI) must follow the three methods Aforementioned

3.1 Issuance Procedure For the Local Companies

We take a real local industrial company as a sample in field of (REI) located in Azzentan city to explain the issuance procedures, the difficulties and the barriers which face the local industrial companies. Before taking the permission from the central bank to import the required raw materials to work, need to open many files. Table 3 represents the initial procedure for limited industrial company established by two members, otherwise, most of these documents need to renew after one year only.

Moreover, for the nine procedures in Table 3, the company has to pay from 20 to 500 LD for each procedure as a tax, and for the renew too, regardless the loss of the files sometimes and start from the beginning.

Table: 3 *Procedures for establishment a local industrial company and number of documents in each file*

No.	Kind of procedure	No. of documents in the file
1	Issuance of license	8
2	Open account in the bank	9
3	Opening social insurance file 1	13
4	Opening social insurance file 2	4
5	Opening a tax file	8
6	Commercial record file	4
7	Commercial chamber	4
8	Industrial record	6
9	Statistical code file	9
	Total	65

The procedure to import the materials needs many another documents, so in general, the difficult of

procedures and the quantity of documents must be reduced to motivate the local investors to work and success in this field.

4. Government Responsibilities

To establish (REI) base for our country, we should understand the following responsibilities:

1. Explaining the importance of (RET) to the local society, and to understanding the transformation from oil interval to the clean energy interval, this will gain the society supporting consequently reducing the vandalism and negativity.
2. The ministry of industry should support the private companies and projects in field of (RET) by protect the local products in face of exported products in the (price, quality and efficiency).
3. ministries of industry and higher education must work in accordance to support the researches in universities and professional institutes in (RET) field.
4. The ministries of economy and industry must classify and distinguish between the companies in procedures and taxes for example (issuance a regulations to reduce the procedures and canceling or at least minimize the taxes on the companies which sustaining the environment such as agricultural, recycle and the industrial companies in field of renewable energy), on other hand the General Electricity Company of Libya (GECOL) should put added taxes on the irrational use of electricity.

5. Society Responsibilities

The society can contribute to success the conversion to the renewable energy stage by the following essential points:

1. Planting the importance of renewable energy among the new generation by lectures and motivate them to work in this field instead of crowding in oil specialization.
2. Institutions of civil society, social media and TV channels must explaining to the people the importance of renewable energy facilities and how to prevent from vandalism.

6. Professional Manpower

To import and localize the (REI), Libya must develop a technical base in the education institutions supported by intensive training cycles, and by opening branches for international companies in the country in field of renewable energy, consequently these companies will need a maintenance centers then training engineers and workers for these centers.

7. Assembly Stage

Any beginning of industry starts by import and assembly. The aim of assembly stage, that to reduce the cost of imported product otherwise to feel confidence that, local companies can start the first step in this technology. Some parts in the PV- system need high technology to produce such as, solar cells, batteries and solar charge controller while, the wiring, MC4 joints, plastic cases for the devices and the inverter need intermediate technology to made. Parts in the renewable energy systems can

be made from around (80-100%) of local raw materials and can be fabricated by local hands. Table 4 shows these parts. To reduce the cost must reduce the import, and assemble those parts which no need high technology to assemble.

Table 4: *Parts of renewable energy equipment which can be made locally*

	Unit or part name	Classification of field	Raw material
1.	Fan	Wind energy	Metal or fiber glass
2.	Solar thermal collector	Solar thermal energy	Metals, glass, thermal insulator, and wood
3.	PCM units	Solar thermal storage	Paraffins, (oil product)
4.	Cases of devices	Solar – wind energy	Plastic (oil product)
5.	Capsules and containers	Solar thermal storage	Plastic and metallic containers

As we know that the main commercial solar cells type in the market now are mono and polycrystalline cells, the prices are different considered higher for the first type, while have no more difference between them in the efficiency. The initial plan for the solar panel industry that to import the polycrystalline cells from cheaper and good quality sources then assemble them in one panel locally to reduce the cost, improve the experience for the local workers and will gain a step to this industry.

Two types of Phase Change Material (PCM) encapsulation can be achieved in field of solar thermal charge, micro and macro-encapsulation, the microencapsulation need high technology to achieve very small capsules reached to 1 μ m diameter while the macroencapsulation means filling the PCM in a macroscopic containment that fit amounts from several ml up to several liters. Macroencapsulation can be fabricated locally as shown in Figure 2.



Figure 2. PCM capsules fabricated manually by the author in previous work [4]

The second and third stages represent the progress in the assembly process, for example, stage one fabrication of plastic case for the MPPT solar charge controller then after several years start the second

stage by fabrication the coils and the capacitors besides the plastic case for the controller, stage by stage and so on the product will be 100 % locally. The success in the other stages depending upon the success in the first stage.

9. Conclusions

Because of the importance of the first stage on the (REI) way, the assembly stage was presented in details. We conclude from the previous study that, to start Libya the first step on the (REI), it must follow the next points:

1. The Ministry of industry must support and sponsor the local companies in field of (REI).
2. Ministry of higher education must fund the projects in the local universities related to renewable energy.
3. The government must communicate with developed countries especially the Asian countries to help and collaborate with private local industrial companies in field of (REI).
4. Review the local laws and regulations which standing as a barrier in face of industrial companies in field of renewable energy.

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