Future of Solar Energy in Libya

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***Abstract*-** With increasing demand for energy and international payment to reduce carbon emissions from fossil fuels, Libya's solar conversion technologies are currently facing obstacles and cost-saving technologies for a complete energy system. This paper examines the most important sources of renewable energy in Libya, namely solar energy and through the solar energy data obtained from the solar energy research center in Tripoli Libya, that Libya is rich in solar So tremendously.

The goal of this paper is Assess the monthly average of solar radiation and the duration of sunlight to study the distribution of radiation and duration Sun rays over the city of Tripoli in Libya.

***Index Terms*-** Solar energy ,Tripoli , Libya.

I. INTRODUCTION

Libya is experiencing rapid growth in demand for electricity and potable water at low cost Currently, according to studies available to us today, the demand for electricity in Libya will exceed 115 gigawatts by 2030 unless alternative energy is produced and the application of systems to conserve energy sources.

The total demand for raw fuel for energy, industry, transport and water will increase by 1,600 million six hundred thousand barrels per day in 2010 to the equivalent of 3 million barrels per day by 2030[1].

Libya now reaches the power cuts for large hours throughout the day, it is no longer possible to postpone the use of solar energy in Libya. We call on through this paper the Presidential Council and the House of Representatives to take the necessary measures to take our country the appropriate position in the field of research and applications of solar energy in the era After Oil, Libya is one of the countries that are rich in solar energy. Its climate is shining throughout the year. The source can be exploited by setting up a photovoltaic. This depends on silicon and Libya is very rich in silicon.

The solar energy in Libya can be measured by the solar radiation rate of 7.5 kW per day in the promising areas, which receives between 3000 and 3,500 hours of sunshine each year, which means that harnessing these possibilities will not pose any competitive problems in exploiting This is because the desert accounts for 88 percent of the total area.

II. METHODOLOGY AND RESULTS.

The paper used a variety of research methods, including fieldwork and data collection, on the monthly rate of solar radiation on the city of Tripoli to collect evidence and information on the potential of solar resources in Libya. Several interviews were held with experts, managers, engineers and academics working in the energy, solar and meteorological sectors, including the Solar Energy Research Center in Tripoli Libya**.**

III. SOLAR ENERGY AS A SOURCE OF ENERGY IN LIBYA.

According to the Renewable Energy Authority of Libya, the average brightness of solar energy is about 3200 hours per year, the average solar radiation is 6 kWh per square meter per day.

Figure 1:energy on a map in Libya

The researcher also collected another set of data produced by the readings of the Climate Data Station at the Solar Energy Research and Research Center in the capital Tripoli during the period 2011-2016 at an altitude of 65.14 meters, 32.48 latitude [2] as shown in Table1

Years	Monthly average of solar energy in the city of Tripoli (km / h)2011-2016													
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	SUM	AVG
2011	589888.1	584335	9102372	1118358.5	1289029.8	1328243.7	1430379.6	1212052.8	1045230.2	7424921	5262584	4747889	11251294	937607.8
2012	555145.9	681616.3	9097663	1173780.6	1370098.8	1482726.6	1476173.3	1378189.6	1097072.3	8309991	6153324	5699929	19619886	1634990.5
2013	555145.9	739526.8	9097663	1192790.5	1216884.6	1428943.1	6160565	1781896	1070723	7533891.3	5861371.7	5699929	20909632	1742469.3
2014	571668.3	681657.2	9408499	5918913	1283594	1106493	1428947.8	1185585.2	1088914	8761019.6	6078506.1	3726189.7	82287733	6857311.1
2015	5521588.1	5867761.6	9331714.3	1234871	1398526	1376742.3	1519515	1273810	1032057	7723659.4	5861371.7	5061084.8	11772348	9810195.7
2016	1899990.3	697183	1028439.3	1209352.6	1313876.6	1320443.5	1485279.4	1314351.9	9992198.1	9992198.1	5957855.3	5092500.6	13372388.7	1114365.7

Table2: Monthly average of solar energy in the city of Tripoli (km / h)2011-2016

IV. Future projects for renewable energy in Libya

Libya is experiencing rapid growth in demand for electricity According to the studies available to us today, the demand for electricity in Libya will exceed 115 gigawatts by 2030 unless alternative energy is produced and the application of systems to conserve energy sources Libya needs renewable energies to be effective, practical, serious, economically and sustainably in order to produce energy, which in turn will allow the preservation of Libya's oil and gas resources for future generations. In order for Libya to provide sufficient energy demand from renewable sources, gradually to Libya so that 50% of the production of electricity depends on sources other than crude oil (oil) by 2040. One of the most important projects that make Libya one of the most important countries in renewable energy is a project.

4-1 Desert Tech Project

A project that makes Libya one of the largest exporters of solar energy produced from solar energy to Europe. More than one hundred electric generators, each equipped with thousands of huge mirrors, convert solar energy into electricity for transmission by submarine cables to Europe and then distributed to all parts of the European continent. Billion watts of power can be generated in this way, enough to provide six times the electricity needs of Europe, contributing significantly to significant reductions in carbon emissions. At the same time, the plants could be used as desalination plants in desert countries that desperately need fresh water. And makes Libya one of the largest energy exporters to Europe. Oil may run out but solar energy is inexhaustible. Thus, will be the real alternative, which will be one of the pillars of the growth and stability of Libya.

(Desertec) or desert technology is one of the best projects ... it aims to supply Europe with a card extracted from the sun in North Africa and the Middle East. The project is expected to produce about 60 Terra kilowatts per year between 2020 and 2025, and the quantity will rise to 700 Terra kilowatts in 2050 at a price of € 0.05 per kilowatt.

That one square kilometer of the desert is capable of producing 250 GW (1,000 million watts) per year, which means preventing the emission of 150,000 tons of carbon dioxide, which would have been exported if the same energy had been extracted by burning oil fuel. North Africa and the Middle East were selected geographically from Europe.

Extracting electricity from solar energy is not a futuristic technique in itself; it is part of the existing reality. It is now being

used to meet the growing global energy needs. It is interesting here that the North African Sahara receives solar radiation at a rate of 7 times its fall on Central Europe per square meter per day. A project is looking to cover European energy needs by approximately 15-20 per cent and a high-unsustainable percentage of other countries' energy and freshwater needs on the Mediterranean coast

What are the elements of Libya to receive this huge project:

Libya is considered the strongest candidate for the solar energy project for the following reasons

1. The project is fully planned and ready for implementation. The company expressed its willingness to give Semnan a seminar on it
2. The geographical location of Libya, where near distance to Europe represents an important factor for the export of this energy.
3. Increase the number of hours of sunshine, especially in the summer.
4. There is a huge network of power transmission towers.
5. High temperature in the Libyan desert.
6. Ease of land acquisition in Libya and this factor caused a problem in Europe.
7. The availability of fresh water in the Libyan desert in very large quantities.
8. The establishment of part of it on the Libyan coast provides fresh water for drinking and agriculture as well.
9. Being in the bed area for example has several advantages

- Leveling the area making it easy to erect solar mirrors.

- near the productive bed project, which saves the price of agricultural crops. and therefore, expect a boom in agriculture and animal in Libya.

10. Electricity can be stored in Mount Nafusa and Green Mountain for re-use at night and avoiding peak hours.
11. Provide fuel and spare parts for gas and steam stations. Which cost fictional figures. And benefit from other projects.
12. Stability of the public network and avoid frequent interruptions.
13. Gas stations are operating reserves and are very important as reserves in case of necessity.
14. A huge financial income into the treasury of the Libyan state.
15. The presence of raw materials for solar mirrors, such as silica sand used in the manufacture of mirrors. And diatomite, which manufactures thermal insulators [3].

V. Conclusion

There is a high-level strategy to focus on renewable energy and reduce pollution and carbon emissions in Libya. However, the current political situation in Libya has put most renewable energy projects and strategies under implementation and perhaps even a more stable situation by reviewing literature, field visits and secondary data shows that the demand for energy in Libya is increasing and renewable energy could be a solution to cover some of this request. Despite recent political changes in Libya, renewable energy remains of strategic importance. Solar and wind energy are major sources of renewable energy as well as wave and tidal energy. There is a need to attract investors to renewable technologies by strengthening existing infrastructure and laws. Renewable energy technology is still in its early days in Libya. There is still a need for a clear strategy and time-frame to move forward, particularly with regard to the development of the skills and knowledge required for the installation and maintenance of such systems.

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