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### RESEARCH ARTICLE

#### SURVEY OF SOLAR ENERGY USAGES & ITS APPLICATIONS IN LIBYA

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#### Abstract

Due to its hot climate of Libya, especially in the summer and the length of the radiation of the Sun throughout the year and increasing degree of radiation of the Sun year after year because of other factors, and also the adoption of Libya in power generation on oil and that prices may vary, either as it becomes a large popularity, leading to a rapid depletion in Libya, and either rise, leading to higher energy production costs, it was necessary to use renewable energies of Libya and most of this renewable energy is solar energy. Whereas the annual average solar radiation on a horizontal surface (m<sup>2</sup>) between 5.5 kWh per day on the coastline of Libya and 7 kWh per day, of southern areas and also a lifetime of sunshine during the year up to approximately 3100 hours in the coastline and 3900 hours to the South. According to this research, the most important objectives required to achieve are “production of electricity at the lowest possible cost and environment friendly” and “take advantage of the massive solar power in Libya”. So I have in this research study how to convert solar energy into electrical energy and The expected benefit because of it in Libya, and a focus on cost element in preparation the solar cells, and the most important activities that we can exploit in use of solar energy, and a focus on economic efficiency of solar cells, and also the comparison between the use of solar cells and most stations operating in Libya using fuel oil, We also study solar systems components and factors affecting the performance of the solar cell, and because Libya depends on this heavily, and study of the most important activities and current uses of solar energy in Libya. Accordingly, it was concluded some of the conclusions and recommendations and proposals and some possible solutions that serve this side of the subject.

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#### Introduction:-

The sun is considered the main source of all the energies for instance, water and wind energy due to solar energy as well as hydrocarbon fuels such as coal coal and oil and natural gas have been created by the sun's energy interaction with organic materials.

Where the earth gets most of its energy from the sun in the form of electromagnetic radiation, which consists of 2% UV and 42% visible rays and 55% infrared and earth retains just one per cent of these rays, and represents the solar energy falling on per square meter above the clouds about 1250 watts and at earth level average this about 100 watts

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of energy and solar energy equal to that received by the Earth each year from 5 to 10 times the energy keep fuel, including uranium. [1]

And States are racing with each another to develop the investment of solar energy through continuous scientific research to develop the means that to require advantage of that energy.

Where tried expertise and studies that by 2020 will be the world is need for energy more than 40% From what exists at this time and when it will be the world is consumption to 300 million barrels of oil per day and that turned the world thinking to the search for alternative energy sources, especially since the increased demand on oil and gas has led to higher prices. the producing countries are investment a lot of money in the field of solar cells and on the level of researches, development and application in order to access to lower their prices and increase their efficiency and to facilitate the production ways and build them promising for expanded production and application. Scientists had countable that daylight may provide 10,000 times the quantity of energy you need human now. however, the conversion of solar radiation into a kind which will be exploited for the advantage of people it is dangerous and needs to hard work, analysis and development and best utilization of capability. We must take courage steps in Libya towards encouraging inflated exploitation of this kind of energy that used in the manufacture, development, and analysis on the most effective techniques in the exploitation of solar energy and considered oil alternative and secure in energy production and making development and prosperity to the community. [7]

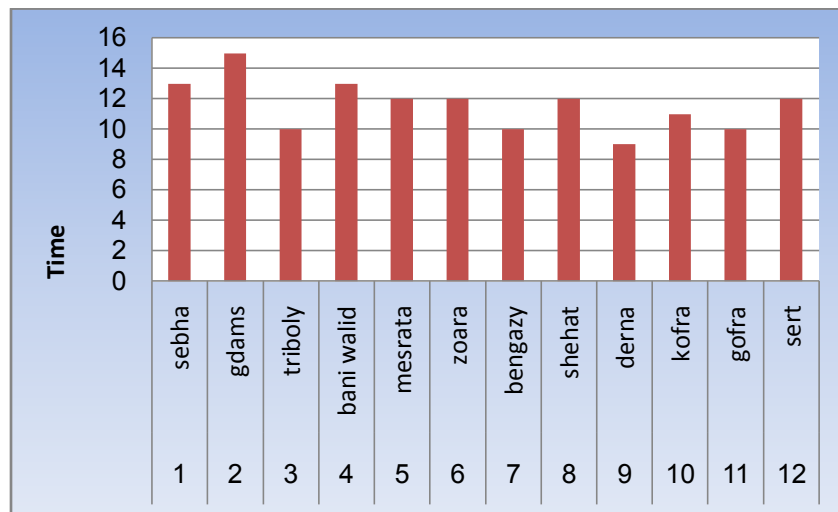
**The importance of research and its objectives:**

The research aims to address the following issues:

1. Establishing agricultural projects in isolated areas with good agricultural soil and feeding electrical loads The required solar energy generators and the contribution of these projects to increasing the country's national product.
2. Reducing the burden on the public electrical network and reducing losses in the capacity of this network as a result of The increased longitudinal span of feeding rural areas and reducing the deficit in the volume of energy generated compared to the required energy.
3. Harmony and compatibility with the trend adopted at the global level of the need to exploit renewable energies or energies. The alternative, the most important of which may be solar energy.

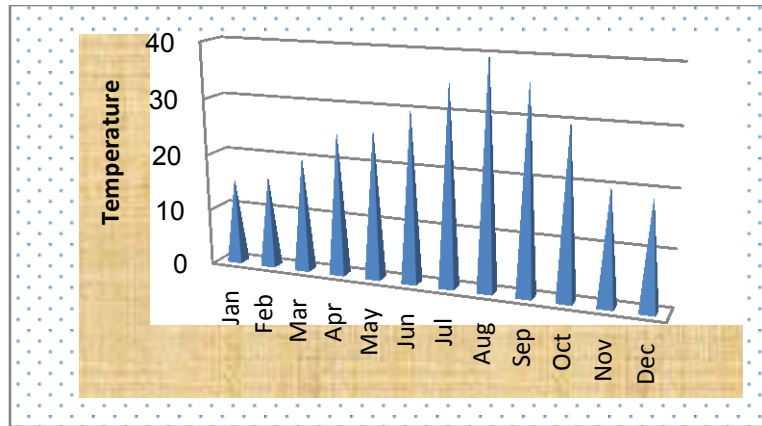
**Solar energy sources:**

As we see in the previous figure, we find that the sun's rays increase in the summer compared to the winter in some regions in Libya, and this indicates that solar energy is an important project in Libya to produce electric energy. [9]



Fig(1):- The monthly solar radiation in different cities in Libya.

and if we look at the following figure we find that the temperature rises very significantly during the season Summer This indicates that sunlight is more abundant during this season compared to winter.



Fig(2):-The load profile and the average temperature throughout the year.

#### Efficiency of solar energy conversion into electrical energy at the solar cells:

It is the flexibility extracted from cell to ability it receives cell from daylight. And this efficiency determined by the theoretical value of the most amount of energy can be converted to electricity and the maximum efficiency is regarding 25%, although this efficiency is low, but when we have a tendency to compare it with energy conversion efficiencies we have a tendency to discover it ancient. for example, the cars engines ancient does not increase the energy conversion efficiency in it of thermal to mechanical than 25%. [4]

#### Factors affecting the performance of the solar cell:

1. Intensity of solar radiation incident on the photovoltaic cell.
2. The degree of photovoltaic cell temperature.
3. Resistance severally and conjointly parallel resistance.

#### Advantages and disadvantages of solar energy in Libya:

##### - Solar energy features:

1. Clean energy without emissions, noise or fumes.
2. Renewable energy and do not run out.
3. Stable energy where it is a constant source of energy.
4. Economic without monthly bills and rare maintenance. [2]

##### Solar energy disadvantages:

1. The primary price is comparatively high.
2. Is suitable for very large loads.
3. Large systems need to surface area for the installation of panels or complexes. [5]

#### Most important problems in the use of solar energy:

1. The first problem is the presence of mud on the solar cells and check out to wash alternative energy devices of it, has been analysis conducted on this subject demonstrated that over five hundredth of the solar energy potency lose and obtain lost within the case of non-cleaning machine of the longer term to the sun for a month.
2. The second problem they are solar energy, storage, and use them throughout the night or cloudy days or unclean days and high storage prices and that still got to search and development.[3]

#### Steps required for the design of solar power system to feed any project inside Libya:

1. Establish amount| the number of accessible daylight at the project web site and additionally the extent of change this amount throughout the seasons of the year.
2. Establish the characteristics of the plenty used, current Average and of use cycle.
3. Choice of kind paintings which is able to be used during this technique and verify their characteristics and website which is able to prove in it.
4. Determine the required current provided from solar panels when the fall of the solar radiation.

### **Comparison between the use of solar cells and the most important stations operating in Libya with the energy of oil:**

#### **- Solar cell systems:**

1. Self-feeding
2. Its parts are static and have no friction or wear, and maintenance is rare
3. Produced in energy without noise and environmentally friendly, as there is no waste
4. Lightweight which leads to easy transportation and installation [8]
5. Its prices are declining as a result of the continuous scientific progress in making cells and the world's interest in them.

#### **Fule-powered systems (diesel):**

1. It is need to refuel constantly
2. It is need to regular maintenance due to friction and wear caused by movement
3. It is noisy and harmful to the environment due to waste and fuel combustion
4. Heavy weight, and it depends on the amount of capacity, so it is difficult to transport. [8]
5. The prices of supplying electric power are increasing due to their dependence on oil energy.

#### **Economics of solar energy and how to reduce costs:**

The cost of raw materials for devices victimization solar energy the foremost important obstacle to be used additionally to the large house required to put these bundled hardware-ray non-sun focused and in spite of those factors, there square measure some uses of solar energy square measure thought of economic at now, at the side of electricity generation in remote pumping areas water natural action, optical and wireless transmission and cathode protection and signal lines for oil and in telecommunications networks telecommunications et al. [6]

It is necessary before taking account of price| the worth the price and thus the economics of solar energy that the solar acknowledge the type of application to boot to the specifications of any place can remote area or near city or inside the inner city And you would like to acknowledge the daily operation quantity and whether or not or not there is a necessity to store energy or not? Is there a necessity for maintenance and also the frequency? And if you take of those factors into consideration and followed the proper ways in which to need advantage and use this kind of energy in an exceedingly efficient and take a glance at to develop it into a kind higher product may lead to lower value of ampersands one of them and do not forget that the increase in analysis and development inside the manufacture of solar cells options an enormous role in reducing costs than it is presently. [3]

#### **The most important activities which the solar energy used in Libya:**

1. Solar energy contributed in the spread strengthen communication towers (Libyana and al madar) at the level of Libya which led to provide communications coverage over most of Libya. The General Company for Post or (telecommunications corporations and wireless) are considered as one of the leading within the use of alternative energy systems as a source for generating power to feed communications systems scattered throughout the Libya , the corporate established the primary alternative energy system to feed the re-trial of the station in 1979 in Zalla With a complete capability (1100 Watt) and has been increasing during this space wherever distributed range (8) stations with operational capability (1920 watts) in 1988 P. After that these stations have proven dependability in operational additionally as economic practicability. Were put in range (22) station re-wireless feed alternative energy within the year 1997 with a capability of station (2880 watts) as a primary stage and were installation range (34) Re- station (2002) a similar capability as a second stage and were installation of (3) stations within the year (2004) for feeding systems the flexibility of fastened wireless phone (576 watts). Were put in range 2 stations by cadres Libyan specialised in alternative energy department, compass (Sabha- Ubari) and a link (Hon- Sabha) within the year 2006 the capability (576 watts) are put in range 4 alternative energy plants compass (Nalot-Ghadames) within the project to switch the digital waves (Tripoli - Nalot- Ghadames) within the year 2007 P has been put in within the same year, the range the amount the quantity 36 station to feed the fastened wireless phone systems among the project of three hundred A-line conductor phone fastened and can be put in within the near-term number four stations within the project of 500 A-line wireless fastened phone.[8]
2. The development of solar energy in remote rural areas which contributed to attach the electricity and providing electricity for the aim of internal and external lighting, street lighting and running unit devices also as electricity to pump water from the agricultural and pastoral wells.

3. Solar energy contributed within the chemical change and pumping particularly in remote agricultural and pastoral areas.
4. Solar energy contributed to the exploitation of the immense territory of Libya within the institution of agricultural comes that serve the country's economy.
5. Within the oil sector has been the exploitation of alternative energy within the cathodic protection to shield the oil, gas and mineral pipeline installations from corrosion, rust et al. [7]

**Reason for non-adoption of Libya on this energy heavily:**

Because of the oil it provides essential as energy and domestic producer in Libya and the lack of any threat of a rise or decrease in costs and also not full of Libya of any dispute happens within the world is inflicting the increase in oil costs as a result for it become oil it the idea for the assembly of electrical power and to not consider renewable energies like alternative energy heavily, however in recent times it is been interest in renewable energies as a full and most significant alternative energy thanks to the premise of close to depletion of oil in Libya , and inflated interest within the world thanks to the shortage of oil on the soundness of fixed-rate and it is on the increase.[9]

**Conclusions and recommendations and the most important proposals and solutions:-**

**- The most important conclusions.**

1. The effectiveness of the solar panels reduced to less than 50% as a results of the dust, and the height of the use of solar energy when the sun is perpendicular to the solar panels.
2. Libya is a place of strategic projects and solar energy plants.
3. Solar energy and as a results of analysis progress obtained is the really different to oil in Libya.
4. Reduced solar panels prices as a results of progress of research project within the business and the setup of solar cells.
5. Solar contributed to the enlargement of telecommunications services in Libya.
6. Although the price of solar cells, however they are very economical in communications projects and development of rural areas and alternative water and desalinization.
7. Weakness of relying on solar energy in Libya in terms of the institution of stations to get power.
8. Still photovoltaic conversion is often used rather than thermal conversion.
9. Double the analysis take into account solar energy in Libya compared to alternative countries despite the availability of solar energy throughout the year.

**The most important recommendations and suggestions and solutions:**

1. Create a base for information solar radiation and temperature and the intensity of the wind and the amount of dust and other of information necessary for the use of solar energy and the exchange of this information locally and an Arab.
2. The application of all the ways to rationalize energy conservation and study the best ways as well as citizens support, which use solar energy in their homes and their farms, and other.
3. Should be limited to high-quality analysis within the Arab world and a global study of solar energy analysis and turn them into real energy.
4. Support analysis movement in solar energy and other renewable energies, financially and morally, and the establishment of special training courses in this field locally and internationally, and interest in continued the academic program and the high level of quality to provide a Libyan cadres and Arab are able to deal with developments in the level of the use of solar energy.
5. Focus on continuous improvement at intervals the standard of use of different energy through analysis centres and analysis centres thought is the aim of reference altogether matters relating to solar and renewable energies in Libya.
6. Encourage cooperation with developed countries in solar power and get pleasure from of their expertise and capabilities to be engineered on the idea of equality and mutual benefit.
7. Activating the role of solar power in Libya and institution of stations and each station Consisting of Libyan cadres.
8. Should take advantage of the development boom in Libya and the deployment of the solar panels on the roofs of high-rise buildings to reduce carbon pollution and also produce several job opportunities for job seekers level.
9. Find more modern techniques and high efficiency in the utilization of sunlight, like technology of solar power production of heat by mirrors the utilization of this technology ensures energy savings on cloudy days and at night.

**References:-**

1. Martin, Christopher L.; Goswami, D. Yogi. "Solar Energy Pocket Reference" International Solar Energy Society. ISBN 0-9771282-0-2, 2005.
2. Mills, David. "Advances in solar thermal electricity technology". Solar Energy. Doi: 10.1016/S0038-092X(03)00102-6.k, 2004.
3. Scheer, Hermann. The Solar Economy (Renewable Energy for a Sustainable Global Future). Earthscan Publications Ltd. ISBN 1-84407-075-1. (2002).
4. Tabor, H. Z.; Doron, B. "The BeithHa'Arava 5 MW(e) Solar Pond Power Plant (SPPP)--Progress Report". Solar Energy. doi:10.1016/0038-092X(90)90093-R. (1990).
5. Tiwari, G. N.; Singh, H. N.; Tripathi, R. "Present status of solar distillation". Solar Energy. 75 (5): 367–373. Bibcode: 2003SoEn...75..367T. doi:10.1016/j.solener.2003.07.005. (2003).
6. Solar Energy Research Information. [http:// www. Makeitsolar.com/solar- energy- information](http://www.Makeitsolar.com/solar-energy-information).
7. Hamza and Melad paper about "solar energy in Libya" 2010.
8. Vecchia, A. et al. "Possibilities for the Application of Solar Energy in the European Community Agriculture". Solar Energy. doi:10.1016/0038-092X(81)90158-4. (1981).
9. Tzempelikos, Athanassios; Athienitis, Andreas K. "The impact of shading design and control on building cooling and lighting demand". Solar Energy. doi:10.1016/j.solener.2006.06.015. (2007).