

# Efficiency of Solar Energy in Comoros Islands

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## **Abstract.**

*Comoros Islands are part of the developing countries in the 2030 horizon, on these Islands face many energy difficulties. It is well demonstrated that to develop country we need a stable economy which depends entirely on a stable, safe, renewable, sustainable, and above all clean electrical energy resource. This is why this paper discuss the efficiency of solar energy in Comoros Islands. The study focused on two objectives including: to study the benefits of solar energy in Comoros Islands and second objective to study the limitations of solar energy in Comoros Islands. The study used the documentary analysis from various altimetry databases namely: Google scholar, Elsevier, Springer link, indexed journal, and data information of SONELEC Company and various chapter reviews as methodology. The finding of using of solar energy like primary source of energy showed it helped in: Geographic location, clean energy, economic tolerance and change of climate, for the first objective. In the second objective showed that: change of climate, rising prices of new technology. The study recommended that enacting a law to let other private companies to produce and supply solar energy; to increase the use of solar energy like the primary source of energy in Comoros Islands; the government train superior technicians by putting them on university programs to learn how to use and fix these new solar energy technologies materials. The study concluded that a little has been noticed that solar energy is a more effective, renewable, sustainable and clean energy way to address our energy problems by relying on the first used of solar energy from SONELEC Company.*

**Keywords:** Efficiency, Solar Energy, thermal panels, photovoltaic panels and Comoros Islands.

## **Introduction**

According to Praene et al (2021) 3.8% of the electricity supply in Comoros Island is provided by hydropower. Solar energy is renewable resources. In order to run socio-economic activities the use of energy is inevitable. Not all Comoros people have access to the national grid electricity. The rate of energy produced in Comoros Island: Anjou, 3MG; Foubouni Ngazidj, 3MG; Milizam, GMG and Moheli, 100K. 80% of MG used in Ngazidja. Since the industrial revolution, the world is always looking to discover new types of resources because the demand for consumption is very high. It was on more than 26 trillion KWh in 2020 and by 2040 we will consume more than 37 trillion KWh of energy worldwide (Pravalie et al., 2019).

For several years humanity has always been in search source of energy to be able to develop, it is a common and influential question on our society to strengthen the socio-economic domain, to escape from poverty, and to have the peace and security. The change of life in this sphere demanded the use of energy which is sustainable and energy for the benefits of current generation and upcoming generation to enjoy this planets

Comoros Islands have a very high temperature to be able to use solar energy as primary sources of energy compared to the speed of electromagnetic waves with all these components like; air temperature, relative humidity, wind speed, air pressure and rainfall amount arrive with a frequency of 0.1 Hz (Morel et al., 2021).

Comoros Islands have some challenges in energy resources despite having various sources that are very strategic and very important to use to have a system of renewable energy source, with great potential to produce electricity at large scale to the point of having a guarantee and energy stability and without forgetting that they are very beneficial for the environment (Praene et al., 2021).

Solar energy is abundant and above all it becomes more and more very hot and also it is cheaper. It is a very promising source of energy because it is cost-effective, highly efficient solar cells technology but above all it is very easy to find the sun everywhere (Tang et al., 2017).

Renewable resource such as solar energy offer an opportunity to have electricity at very low prices and constant despite climate change we can use photovoltaic solar panels to use heat and recharge the batteries to have electric current. We can see that since 1990 to 2018, more than 210% of energy consumed with high capacity of renewable and sustainable energies (Dadashi et al., 2022). As we speak now no study which has been done showing the benefits and limitation of solar energy in Comoros Island. This point of view influence the author to write this paper to remind investors and users on the benefits and challenges of using solar energy. In other hand this academic paper came up with reasonable solution against the mentioned challenges or limitation.

### Research questions

1. What are the benefits of solar energy in Comoros Island?
2. What are limitations of solar energy in Comoros Island?

### Research objectives

1. Study the benefits of solar energy in Comoros Island
2. Study the limitations of solar energy in Comoros Islands.

### Research methodology

The study used the documentary analysis from various altimetry and databases namely: Google scholar, Elsevier, Springer link, indexed journal, data information of SONELEC Company and chapter review as methodology.

### Literature review

Maoulida et al (2023) the study done in Comoros. They find that even permanent problems in terms of energy production, supply and distribution to the citizen, photovoltaic Thermal solar panels that co-produce electricity and local hot water for local use. The performance of photovoltaic in three climate and market for photovoltaic or thermal system has good potential for development

Aboudou & El-Ganaoui (2019) study done in Comoros. They find that lack of energy, energy autonomy, used of renewable energies in Comoro is very limited by photovoltaic solar panel. Two major resources in Comoro photovoltaic and diesel generator

Maoulida et al (2021) the study in Comoros. This study find that photovoltaic solar system have storage battery, profitable in the margin of economic, Environmental assessment, less expensive investment and low cost of energy.

Hammar et al (2012) the study done western Indian Ocean. The study find that the benefits of solar energy were security, availability, insufficient and potential for solar photovoltaic

Modeste (2020) the study find that less energy consumption, less carbon emission and thermal comfort.

Dadash et al (2022) study done in Arabic countries. The study find that climate has influence in climatic changes and keeping energy prices

Morel (2021) the study find radiometers and weather. To measure incident global, diffuse short wave radiation incident global UVA+B-band radiation, air temperature, relative humidity, wind speed and direction, air pressure, rainfall amount with sampling frequently of 0.1Hz

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Tang et al (2017) the study find increasingly serious and environmental cities solar energy as an abundant and cheap energy, high efficient solar cell technology, greatly facilities for research

Surrop & Raghoo (2018) they explained the reduction of carbon emission, decarbonize the grid mitigate the climate change effect.

Praene et al (2021) the study find that solar energy for security, sustainability, availability, affordability and manageable for future

### Statement of the problem

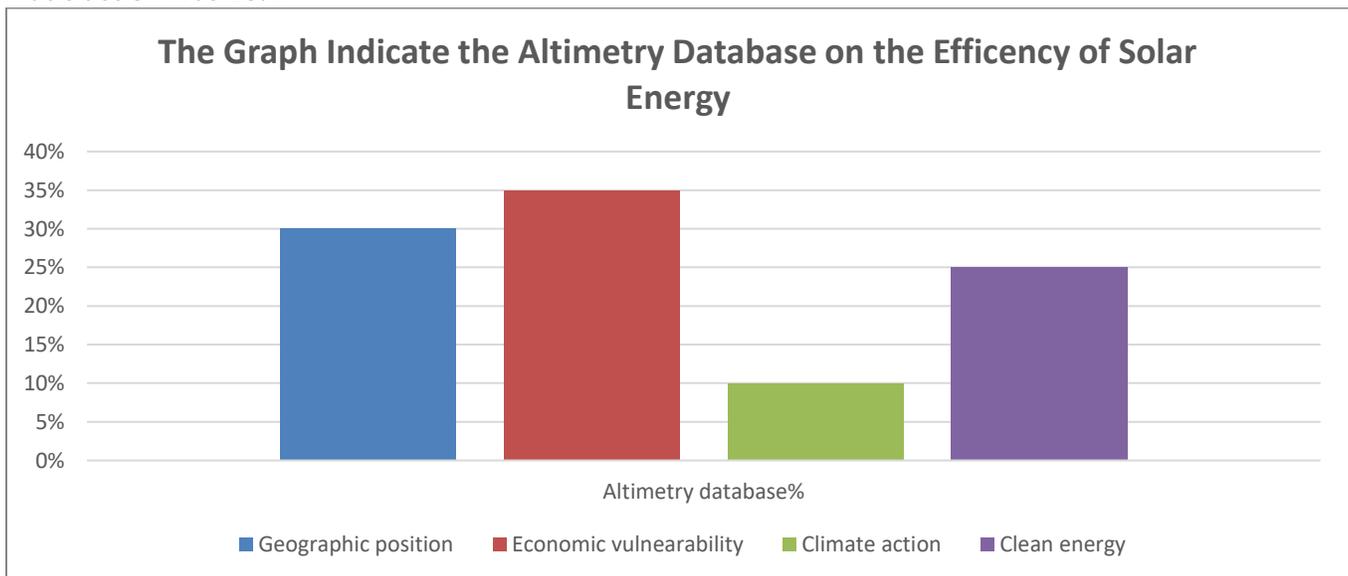
However Comoros Island have a lot of energy resources still the efficiency of solar energy is not clear to Comoros's people. Based on the literature reviews this project aimed to study the benefits and limitations of using solar energy in Comoros Island

### Finding and discussion

Table 1 showing the benefits and limitation solar energy

Benefits and limitation of solar energy	Geographical position	Economic vulnerability	Climate action	Clean energy
Percentage on source of data base showing the efficiency of solar energy	30%	35%	10%	25%

According to table 1 analyzed the benefits and limitation of solar energy: economic vulnerability have highest rate of 35%; Geographical position was the second advantages for 30%; clean energy for 25% and the great challenges of climatic action was 10%.



Source of Data: Inzoudine & Sharma, 2024

### Geographical position

According to table 1 analysis the geographical position was the second benefit of using solar energy. Almost the whole part of the earth the sun is reached with the radiation. The usefulness of solar energy appears important in equatorial areas where the sun is almost overhead in all part of the world. The areas experienced tropical regions, desert landscape and prolonged dry season have great essential opportunities to use solar energy because of lack the permanent source of energy. Because this energy cover the large part of the earth they easy available and don't depend on physical factors such as availability of mountains or waterfalls to allocate them (Hammer, 2012)

**Economic vulnerability** The majority of people in Comoros Island still live under 1 USA dollar per day. People can't afford to get a single meal per day. The use of solar energy act the remedy to them. As the table shown 35% of data showing solar energy was less expensive but the market of ranged from 0.59% to 0.94% the solar energy still demand high market (sun et al., 2023). According the Maoulida et al (2021) the solar energy was profitable in the margin of economic, environmental problems, less expensive and low cost of energy. Aboudon & El-Ganaroui (2019) the solar energy was promising technology in terms of economic efficiency. Furthermore the use of solar energy the hardwires are less expensive. According to Etongo & Naidu (2022) the data showing 82.9% the solar energy is cheap and affordable to all people and save cost for 100%.

### **Clean energy**

The solar energy is efficiency renewable resource. The table 1 analyzed that it carried 25% of its benefit. This solar energy have less emission of carbons and it keep the environment clean. Surroop & Raghoo (2018) argued that the use of solar energy is working efficiency and prevent from the environment problems such as cutting down trees. According to Tia et al (2016) report showing a photovoltaic electrolysis system have high solar to hydrogen efficiency. Modeste (2020) have high thermal comfort when it is being in use than other source of energy. The solar energy system achieve 48-h average solar to –Hydrogen efficiency of 30% these results demonstrated the potential of photovoltaic electrolysis system for cost effective solar energy storage (Tia et al., 2016). Etongo & Naidu (2022) showing the security energy was solar for 91. 7% and environmentally friendly perception was 76.7%.

### **Climatic action.**

The nature of climate inconstant it changes according to the season. The usefulness of solar energy appear well during the summer in most of areas on the earth. However solar photovoltaic have batteries to absorb solar energy in such as that they store energy for long period of time. This idea supported by Dadash et al (2022) whose believe climatic changes have influence on solar energy. Due to climatic change and high competition from other sources Saud Arabia now is thinking to invest in solar energy. And now 210% of solar energy consumption taking place. Maoulida (2023) the solar energy can perform better in the use of photo vatic in any three climate. The solar energy improve the solar efficiency, highly relevant, solar spectrum, and light filters (Sun et al., 2023)

**Recommendation.** The studies to recommend enacting a law to let other private companies to produce and supply solar energy; to increase the using of solar energy like the first and primary source of energy in Comoros Islands; the government train superior technicians by putting them on university programs to learn how to use and fix these new solar energy technologies materials. Comoros Island is among the poorest island in world. It needs to have many alternatives sources of energy in order to fight poverty

**Conclusion.** The study concluded that a little has been noticed that solar energy is a more effective, renewable, sustainable and clean energy way to address our energy problems by relying on the first used of solar energy from SONELEC Company.

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**Conflict of interest.** This academic paper has any conflict of interest to any block.

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