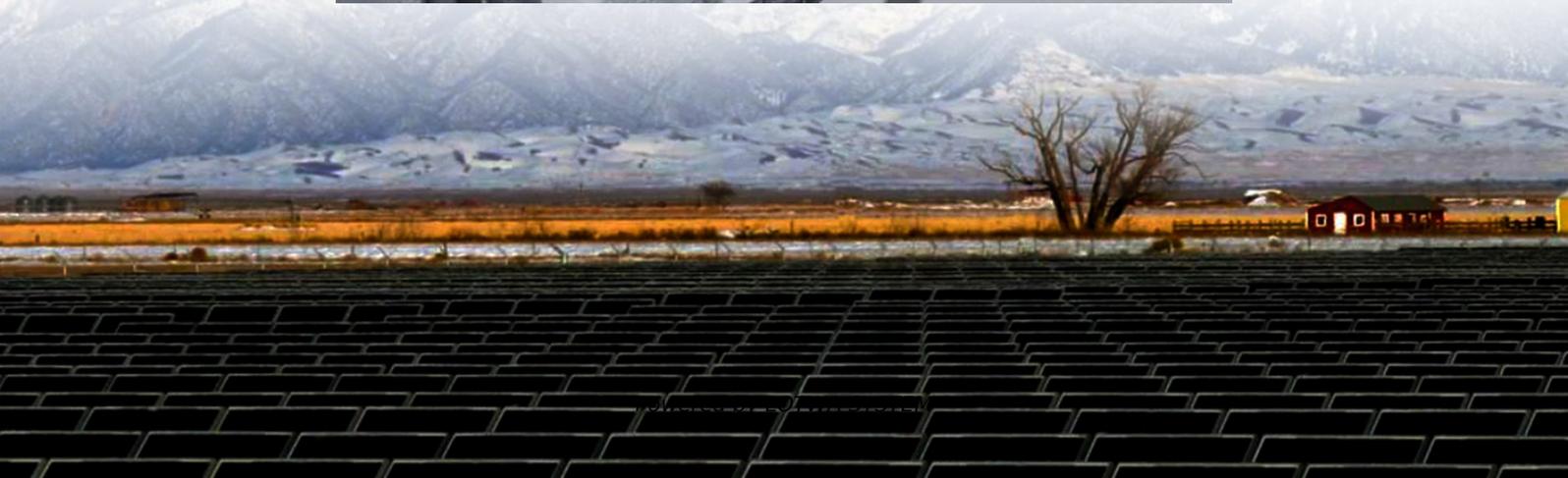


Environmentally friendly solar energy system application in North Africa





Overview

While more countries are promising to reach net-zero carbon dioxide emissions by 2050, North Africa's efforts and promises fall well short of what is needed to give the world a fair chance of staying below 1.5 °C global warming by 2050. Therefore, it is crucial that the nations within the region contribute to achieving the clean energy goals outlined in REN21's latest renewable energy overview. Given the region's solar belt status, and with the Coronavirus Disease-2019 (COVID-19) undermining many of these countries' emission goals, it has become imperative to evaluate in detail other sites within these countries to increase access to solar energy. Under the shadow of the 26th United Nations climate change conference of the parties, this goal should not seem unrealistic. This study represents the first attempt in the literature.

Solar energy North Africa PV HOMER Clean Energy Greenhouse gases.

Abbreviations COP

Conference of the Parties

HOMER

Hybrid Optimization Model for Electric Renewables

PV

Photovoltaic

MSP

Mediterr. Symbols and indices PPV, r

Rated capacity of the PV (kW)

fPV

PV derating factor (%)



HT□

Solar radiation incident on the PV array at actual conditions (W/m²)

HT,STC□

Solar radiation incident on the PV array at standard test conditions (W/m²)

αP □

PV temperature coefficient of power (%/°C)

TC□

Real-time PV cell temperature (°C)

TC,STC□

PV cell temperature under standard test conditions (°C)

Ta□

Air ambient temperature (°C)

TC,NOCT□

Nominal operating cell tem.

A global emission-free world is unlikely by 2050. Nevertheless, to maintain the current trajectory, all available clean energy technologies, including renewables, must be widely adopted by 2030 [1]. In this regard, the Glasgow climate pact, which was recently adopted by almost 200 countries at the 26th UN climate change conference of the parties (COP26), indicated the need to scale up clean energy and provide opportunities and support to other countries [2]. Hence, making the switch to clean energy has never been more crucial. In numerous countries, the development of renewable energy (RE) resources has been accompanied by the development of manufacturing industries that support such ambitions [3]. Clearly, a shift from fossil fuels into low-carbon solutions will be empowered by technolo.

As the inevitability of energy system transformation gathers pace at a global level, nations within the region (i.e., Sudan, Egypt, Libya, Tunisia, Algeria and Morocco) would need to make a significant effort towards their respective



clean energy targets. Furthermore, these countries are located in desert regions with lands not used for settlements.

Why do African countries need solar energy?

Many African countries struggle with power shortages because of the high costs of building and maintaining power plants. Solar energy, on the other hand, is much cheaper to install and maintain, especially in remote areas where building traditional power grids is difficult.

Is solar energy a solution to Africa's energy challenges?

With abundant sunshine throughout the year, solar energy is emerging as a powerful solution to the continent's energy challenges. Millions of people across Africa still lack access to reliable electricity, but solar energy is changing that.

How can solar power improve health in South Africa?

In South Africa, hospitals use solar energy to run medical equipment, store vaccines, and provide lighting for emergency surgeries. Reliable electricity means better healthcare services, saving lives and improving the quality of medical care. Several African countries are investing in large solar farms to generate electricity for national grids.

Does photovoltaic technology provide electricity in Africa?

One of the promising aspects of photovoltaic technology was providing household electricity in developing and emerging countries . However, the fact remains that in resource-rich Africa, North Africa in particular, one of the lowest components in electricity generation is renewable energy.



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