

Is a stand-alone PV/wind/generator hybrid system a viable alternative?

A feasibility analysis of a stand-alone PV/wind/generator hybrid system for a rural location in Comoros to identify the most optimal solution revealed that combining wind and diesel is the most viable and cost-effective alternative.

Are hybrid energy systems a viable option for remote locations in Africa?

Numerous studies on hybrid energy systems have been conducted using the HOMER tool for various remote locations in Africa. The majority of earlier studies on rural hybrid energy systems were primarily focused on technical, economic, and feasibility studies.

How much electricity does South Sudan generate?

In 2019, conventional sources such as diesel generators represent more than 99% of electricity generation in South Sudan with a capacity estimated at 204 MW, whereas solar accounts for only an estimated 1 MW of capacity, which accounts for less than 1% of electricity generation in the country.

What are the main sources of energy in South Sudan?

In South Sudan's rural communities, kerosene lamps, firewood, crop wastes, charcoal, and animal dung are the most frequent sources of energy for lighting, heating, and cooking.

What are the challenges of hybrid power systems?

Hybrid power systems (HPS), which combine photovoltaic (PV), diesel generators (DG), and energy storage systems (ESS), are commonly used for energy supply in off-grid or isolated areas. The main challenges for these systems are reliability, investment and operating costs, and carbon emissions problems.

The present review paper presents a brief outline literature review on hybrid photovoltaic-diesel power system in Sudan. The study is considered from several points of view, which include: o Introduction to the industry of electricity in the Sudan; which includes general introduction, renewable energy characteristic and potential in Sudan o Solar energy systems that discusses ...

The hybrid systems prioritize PV generation, followed by batteries and diesel generators. In areas with grid availability, the system integrates grid power with client consent. ...

Krishan and Suhag [14] reported that for the state of Haryana of India, wind-PV-battery combination is the most feasible energy solution to meet the residential and agricultural electricity demand at a COE of \$0.288/kWh. Ahmed et al. [15] studied the hybrid power system based on the PV-DG-battery system for supplying energy to remote areas of ...

The HOMER program is used for modelling and analysis of the hybrid power system composed of wind

turbines, solar photovoltaic panels, and batteries to improve the reliability of the system and ...

The study demonstrated that the ideal system with the least cost and the best performance was that which consists of thirteen solar PV systems (70.98 kW), four biomass systems (160 kW), one wind turbine (20 kW) and 15 NI-Fe battery banks (288 kW h), with a total system present cost of \$581,218 and a 0.254 \$/kWh cost of energy.

An unsung benefit of hybrid systems is that by choosing a location with naturally high wind resources, the temperature of the solar modules is also reduced by the breeze, thus increasing the PV ...

The textbook presents a brief outline of the basic engineering in designing and analysing PV diesel hybrid power systems. The study has been taken from the point of view of introduction ...

HOMER results show from an economical point of view that the system composed of a 5-MW rated PV system and a 30-MW rated wind system has a total net present value (NPV) of \$167 million, whereas the levelized cost of electricity (LCOE) sits at 0.084 \$/kWh.

electric generation, 9% from biofuels, and only 1% from solar PV [7]. Sudan has a very high potential for solar and wind energy, as can be seen from Figure 1 [8] and Figure 2 [9]. The wind and solar generation capacity rise from the south to the north. The northern regions tend to have higher solar irradiance and wind speed., whereas

Optimization of an off-grid hybrid PV-wind-diesel system with different battery technologies using genetic algorithm. Sol Energy 2013; 97: 460-473. Crossref. Google Scholar. 13. ... KG, et al. Feasibility study of a standalone hybrid energy system to supply electricity to a rural community in South Sudan. Scientific African 2022; 16: e01157.

In most remote regions, traditional sources are neither available nor economical. Thus, a solution is only feasible if renewable sources available locally are exploited and used in such areas for the production of electricity. Luckily, India has great potential from these sources, most of which are still untapped. In terms of independent operation of these ...

PV alone PV-Wind Hybrid Figure 5. NPC comparison of PV alone and PV-Wind Hybrid systems for Gothenburg, Lund, Karlstad and Borlänge, hub height of 20 m, load 1800 kWh. Summary and conclusions PV-Wind-Hybrid systems are for all locations more cost effective compared to PV-alone systems. Adding a wind turbine halves the net present costs (NPC ...

Sudan: Solar PV: 0.0812: 91.56: 100: Compared with diesel-only case. [122] ... in the Philippines and RE shares up to 99 % for a solar PV-wind-battery-diesel system [22] in South Korea. ... a wind-diesel hybrid energy system might not be feasible to provide uninterrupted electricity; these areas are also among the 13 areas mentioned. ...

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The hybrid system, which consists of photovoltaic (PV) array, wind turbines, batteries and diesel generators, is designed to meet three known electric loads, 500 kW, 1 MW, and 5 MW to be able to fulfill the primary load for 250, 500 ...

The Norwegian company's next assignment in South Sudan is the construction of a 1.25-MW PV-diesel hybrid system at the UNMISS compound in Wau. The project is due to be finalised in the second quarter of 2020. Scatec Solar will provide maintenance services for the hybrid systems at both sites. Choose your newsletter by Renewables Now. Join for free!

Serir et al. [23], assessed an energy management control using three Maximum Power Point Tracking (MPPT) methods (Perturbation and Observation, Fuzzy Logic Controller and Adaptive Fuzzy Logic Controller) to a hybrid power system based on a photovoltaic array, wind system, a battery bank, and a moto-pump. The simulation achieved using Matlab ...

Moreover, STS is feasible if the cost is less than 375 USD and 250 USD for Sudan and South Sudan, respectively. ... an in-depth analysis of the behaviour of hybrid photovoltaic (PV)-wind systems ...

Technical-economic analysis of the insertion of PV power into a wind-solar hybrid system PV-DG-battery 0.207 Alam and Bhattacharyya (2016) [39] Decentralized renewable hybrid mini-grids for ...

A grid-integrated hybrid renewable energy sources based system comprising a solar photovoltaic (PV) array and a wind energy conversion system (WECS), which uses a position-sensorless synchronous reluctance generator for the electric power generation from the wind turbine and a sensorless field-oriented control for the maximum power extraction.

At the same load, the optimization findings reveal that the grid-connected hybrid (PV/wind) system is more efficient and cheaper than standard PV systems. According to the modeling results, the hybrid system connected to the grid ...

electricity generation in South Sudan with a capacity estimated at 204 MW, whereas solar accounts for only an estimated ... A feasibility analysis of a stand-alone PV/wind/generator hybrid system ...

The study reported the system can reduce carbon emissions by 788 tons per year with reduced LCOE. In India, Jain & Sawle [75] investigated a grid-connected system for a town containing solar PV, wind, and hydrogen. A hybrid system in Egypt with grid, solar PV, wind, and battery reported a reduced LCOE [76].

Solar energy is harnessed through photovoltaic (PV) systems to generate electricity, while, wind energy is

another option, utilizing wind turbines (WTs). These PV and WT energy systems can be operated independently (standalone) or combined in hybrid configurations to ensure sustainable and steady operation during fluctuating seasonal load demands.

A subsidiary of Adani Green Energy was contracted to build a 600MW wind-solar hybrid system in India at the start of 2021. ... An ageing 545MW wind farm in Egypt is to be reborn as a 3GW PV and ...

One of the major projects accomplished in 2020 was the installation of a hybrid solar PV-diesel system at the United Nations House compound in Juba, the capital city of South Sudan [5]. As a ...

Both PV system and converters account for 4% each of the total Capital/Operational & maintenance cost share (%) Converters 3.72% 3.73% PV 4.47% 4.47% 91.81% Wind 91.80% 0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00% 70.00% 80.00% 90.00% 100.00% O& M Capital cost 13 International Journal of Environmental Science and Technology Fig. 36 Monthly power ...

In South Sudan, access to electricity remains critically low, with only about 13% of the population connected to the grid, a figure even lower in rural areas. Despite higher accessibility in urban centers like Juba, the reliability of electricity remains a challenge due to insufficient infrastructure and generation capacity. Addressing this issue, Aptech Africa has ...

A hybrid photovoltaic-wind turbine driven system with H₂ storage unit is proposed for a residential building complex in which an emerging technology, called desiccant enhanced evaporative (DEVAP) ...

Study for 5 MW PV power station for new industrial city in Ma'an Area-South of Jordan together ... In addition to the energy saving which will be resulted from the hybrid wind-PV system for individual consumers. ... Hammad M, AbdelGadir Eltahir KM. Technical and economic feasibility of solar photovoltaic water pumping system in Sudan. Energy ...

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