

## European Solar and Energy Storage Solutions

# Solar power generation in remote mountainous areas



## Overview

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Solar energy remains a viable energy source for rural mountain communities in remote off-grid areas (Bhandari et al 2014; Proietti et al 2017). In urban areas, grid connections can be provided through large solar farms or net metering to add solar energy from home or commercial generation to the grid.

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The solar irradiation and topographical maps state that the south-west region of Austria has more solar irradiation potential and has a lot of mountainous regions. This validates that at high altitudes in mountainous areas, as the slope increases, we get more irradiation (direct radiation) and less diffusion.

In summary, the objectives of this study are to (1) build a workflow to map the PV power plants on a continental scale with Landsat imagery on GEE, (2) produce a fine-resolution map of PV power plants in China, and (3) analyze the distribution characteristics of PV power plants in China.

In this paper, sizing of an off-grid hybrid renewable energy system, consisting of solar, wind, biomass, and diesel resources, was carried out for the remote area of Balnasari Qani, located in a mountain plateau of Afghanistan, which is not connected to the national grid.

The presented maps present the areas rich in solar resources and show correlation between mountainous areas and high GHI. The GHI evaluation in Austria shows an above average solar power per area in the southern part of the Austrian Alps. Can solar power be harvested in mountainous areas?

An economic aspect of solar power harvesting in mountainous areas is the cost of land. Prices of high altitude parcels could be expected to be lower due to their remote locations. Steep slopes and high distances to socio-economic

centers make it less attractive for residential building projects.

How do mountainous areas affect PV power plants?

In particular, these PV power plants situated in mountainous areas typically have unique installation spacing and installation angles for their solar panels. Additionally, the mountainous terrain also impacts the reflectance of the PV power plants (Wen et al., 2018).

Where can solar power be used?

In Nepal, for example, almost all remote airports and telecommunication facilities are powered by solar energy; solar cookers are widely used in the mountain regions of China and India. Wind power is a vast, but largely untapped source of potential sustainable energy in mountains.

Where can solar energy be produced?

Solar power can also be efficiently produced in mountains and other cold regions - contrary to popular belief. The Himalayas and Tropical Andes are particularly promising locations for the development of solar energy, where installations could produce approximately 20 percent more energy than they could at sea level.

Can a solar tree be installed in a mountainous area?

The solar tree has not been popularized yet, so the forest-photovoltaic field has many problems to be solved and is only in its infancy. The solar tree installed in mountainous areas will have a higher fixed load (self-load of solar power system), wind load, and snow load than the flat fixed panel.

Can solar power be used as an off-grid energy source?

The site is located in a high mountain plateau and has potential to set up off-grid HRESs using solar, wind, and biomass resources. The optimized system is proposed to meet the electricity demands for 300 families. Results indicated that a HRES consisting of solar photovoltaic-biomass-diesel is the most optimal solution.

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## Renewable Electricity Production in Mountain Regions: ...

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