

Are utility-scale photovoltaic plants affecting land-use impacts?

Abstract--The rapid deployment of large numbers of utility-scale photovoltaic (PV) plants in the United States, combined with heightened expectations of future deployment, has raised concerns about land requirements and associated land-use impacts.

How much land area does a photovoltaic need?

We find that conventional photovoltaic will require 0.5 to 1.2% of global land area to meet projected energy demands by 2085 without accounting for climate change effects. When considering climate impacts, this requirement increases to 0.7-1.5% of the global land area.

How much land is needed for solar PV installation in China?

By the middle of 2022, China's installed capacity of PV has reached 336GW. Given the current average land use footprint of 35 W/m² and a goal to build 5000 GW solar PV by 2050, the land required for PV installation will be 1.43 × 10⁵ km², close to the area of Liaoning Province.

Can photovoltaic meet energy demands?

We investigate the potential of photovoltaic to satisfy energy demands given climate change and technological development. We find that conventional photovoltaic will require 0.5 to 1.2% of global land area to meet projected energy demands by 2085 without accounting for climate change effects.

Will PV project develop on agricultural land?

First, PV will gradually withdraw on agricultural land. In the face of the strictest arable land protection system, PV project development should avoid competing with food and other crops for light sources, and comply with the national guarantee of arable land retention and permanent basic farmland requirements.

Is solar photovoltaics ready to power a sustainable future?

Victoria, M. et al. Solar photovoltaics is ready to power a sustainable future. *Joule* 6,1041-1056 (2021).
Dunnett, S. et al. Harmonised global datasets of wind and solar farm locations and power. *Sci. Data* 7,130 (2020).
Helveston, J. P., He, G. & Davidson, M. R. Quantifying the cost savings of global solar photovoltaic supply chains.

New PV installations grew by 87%, and accounted for 78% of the 576 GW of new renewable capacity added. 21 Even with this growth, solar power accounted for 18.2% of renewable power production, and only 5.5% of global power ...

Here, we developed and applied an integrated approach to evaluate the economic competitiveness and the potentials of subsidy-free solar PV power generation with combined storage systems in China, including ...

The efficiency (η_{PV}) of a solar PV system, indicating the ratio of converted solar energy into electrical energy, can be calculated using equation [10]: $\eta_{PV} = P_{max} / P_{inc} \dots$

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Unlike rooftop PV systems, which have limited or no land-use impacts by virtue of being mounted on existing structures, utility-scale PV plants are, by definition, sited on the ground and in the ...

Large-scale grid-connection of photovoltaic (PV) without active support capability will lead to a significant decrease in system inertia and damping capacity (Zeng et al., 2020). For example, ...

For the generation of electricity in far flung area at reasonable price, sizing of the power supply system plays an important role. Photovoltaic systems and some other renewable ...