



Land Needs for Wind, Solar Dwarf Nuclear Plant's Footprint

 NEWS
SUSTAINABLE DEVELOPMENT

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A 1,000-megawatt nuclear facility needs just over one square mile

Intermittent wind and solar need much more area to generate the same power

No U.S. wind or solar facility generates as much as the average nuclear plant

Wind farms require up to 360 times as much land area to produce the same amount of electricity as a nuclear energy facility, a Nuclear Energy Institute analysis has found. Solar photovoltaic (PV) facilities require up to 75 times the land area.

A 2015 report, "Land Requirements for Carbon-Free Technologies," compared the land area that various types of electricity generation facilities would require to produce the same amount of electricity as a 1,000-megawatt nuclear power plant in a year. The results highlight the exemplary performance reliability of nuclear energy facilities as well as the very high energy density of nuclear fuel.

A nuclear energy facility has a small area footprint, requiring about 1.3 square miles per 1,000 megawatts of installed capacity. This figure is based on the median land area of the 59 nuclear plant sites in the United States. In addition, nuclear energy facilities have an average capacity factor of 90 percent, much higher than intermittent sources like wind and solar.

By contrast, wind farm capacity factors range from 32 to 47 percent, depending on differences in wind resources in a given area and improvements in turbine technology. Solar PV capacity factors also vary based on location and technology, from 17 to 28 percent.

Taking these factors into account, a wind farm would need an installed capacity between 1,900 megawatts and 2,800 MW to generate the same amount of electricity in a year as a 1,000-MW nuclear energy facility. Such a facility would require between 260 square miles and 360 square miles of land.

A solar PV facility must have an installed capacity of 3,300 MW and 5,400 MW to match a 1,000-MW nuclear facility's output, requiring between 45 and 75 square miles.

For comparison, the District of Columbia's total land area is 68 square miles. The island of Manhattan is 34 square miles, and New York City's five boroughs (Manhattan, Brooklyn, Queens, Staten Island and the Bronx) take up 305 square miles.

No wind or solar facility currently operating in the United States is large enough to match the output

