U.S. Energy Information Administration

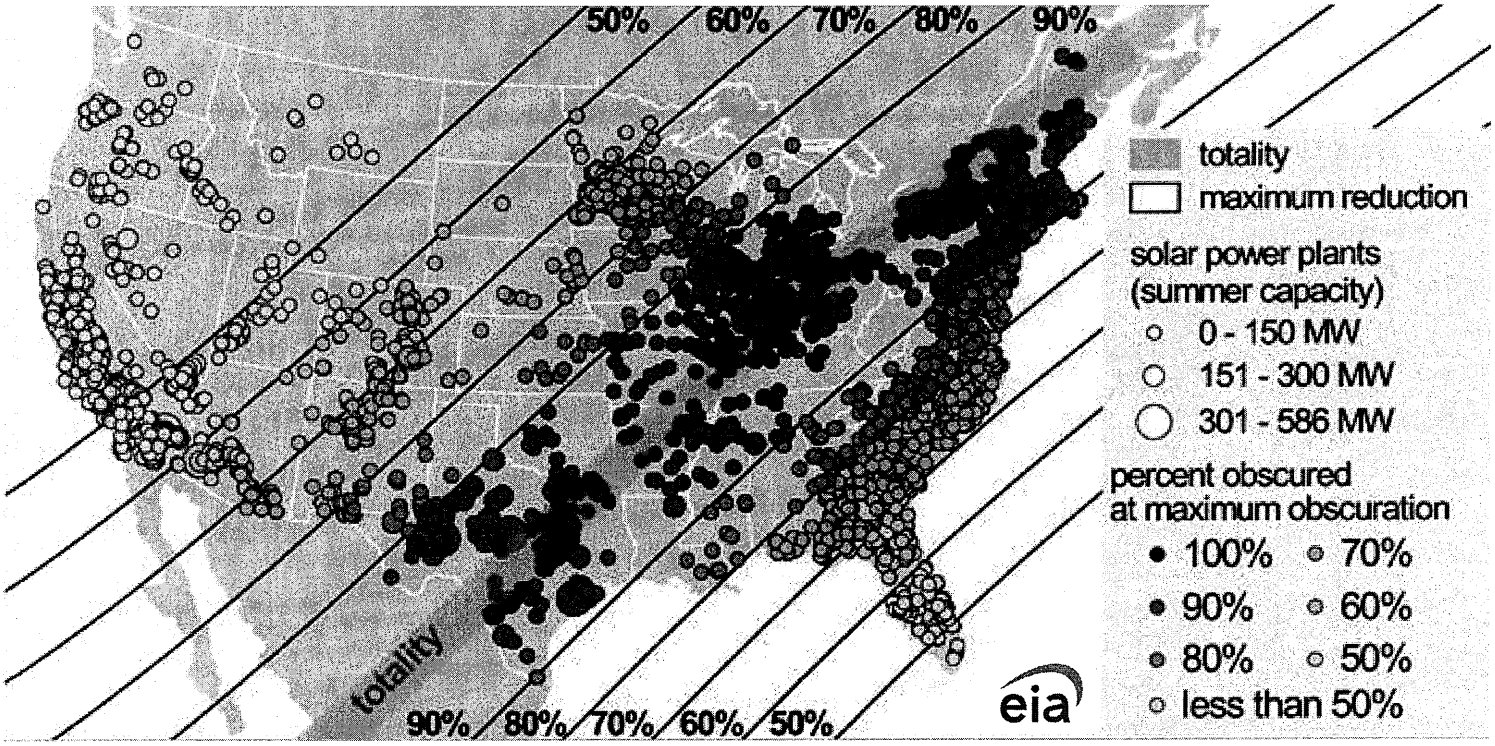
## Today in Energy

IN-BRIEF ANALYSIS

April 5, 2024

# April 8 solar eclipse will briefly limit solar electricity generation across the country

**Utility-scale U.S. solar generation and the path of the April 8 solar eclipse**




**Data source:** U.S. Energy Information Administration, Preliminary Monthly Electric Generator Inventory, February 2024

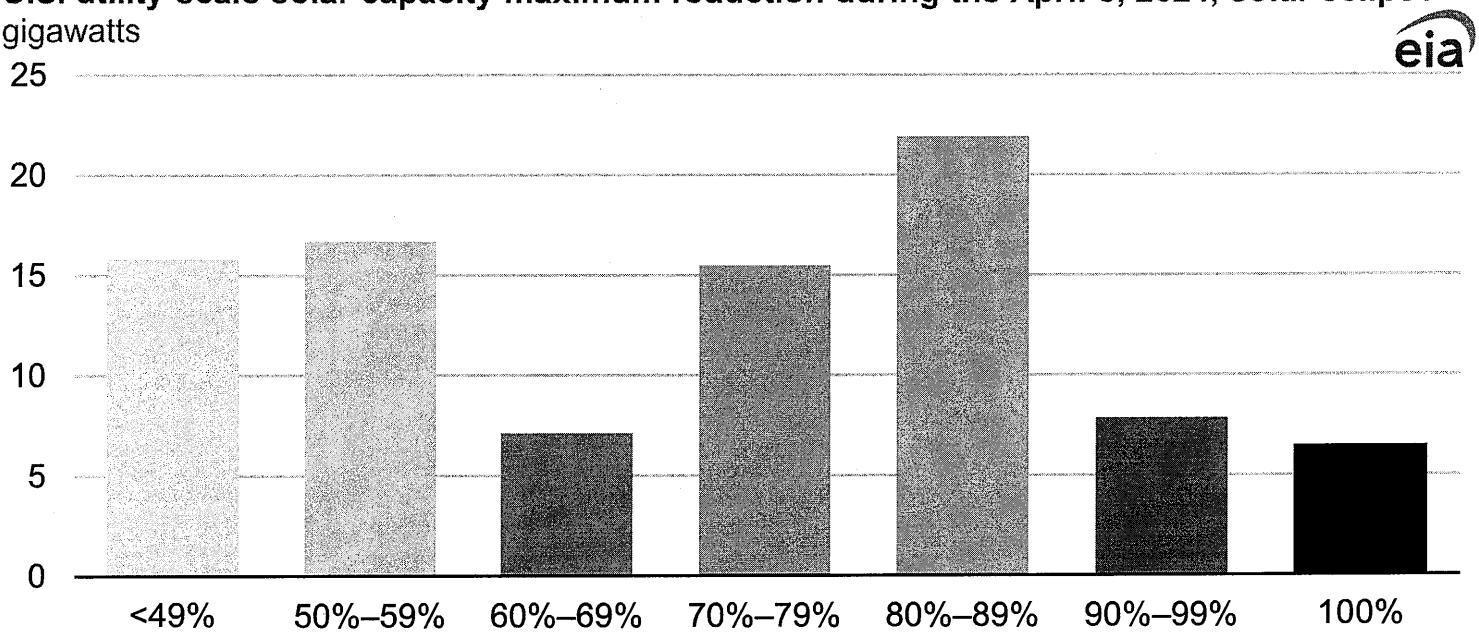
On April 8, 2024, a full solar eclipse will briefly but fully obscure sunlight to utility-scale solar generation facilities from Texas through Maine with a combined 6.5 gigawatts (GW) of capacity. In addition, the eclipse will partially block sunlight to facilities with a combined 84.8 GW of capacity in an even larger swath of the United States around peak solar generating time.

Solar-powered generators centered in the path of totality—where the moon will completely obscure the sun—will be affected the most because the moon will block all direct sunlight for more than four minutes. The partial eclipse could limit the sunlight in the path of totality for more than two hours. Areas around the path of totality will have varying levels of diminished solar generation during the eclipse.

Because we know about the eclipse ahead of time, utilities have prepared and planned for the lost solar energy. Several grid authorities have released plans for how they plan to deal with the change in solar generation during the eclipse. During the eclipse,

electricity generators in the affected areas will have to increase output from other sources of electricity generation to supplement the decrease in solar power.

**U.S. utility-scale solar capacity maximum reduction during the April 8, 2024, solar eclipse**




**Data source:** U.S. Energy Information Administration, Preliminary Monthly Electric Generator Inventory, February 2024

The solar eclipse will challenge electricity grids in two ways. First, utility-scale solar generation of 1 megawatt (MW) or greater, much of which is managed by balancing authorities, will have lower solar output along the path of the eclipse. System operators will respond by dispatching other generating resources. Homes and businesses that use small-scale solar will also require more electricity from the grid than usual. Because small-scale solar is not managed by balancing authorities, the increased demand from these homes and businesses will likely appear as an overall power demand increase on the electricity grid rather than a shift from solar power to grid power.

Second, battery storage is a significant factor in the grid's response to the eclipse. Battery storage helps balance the electricity system by absorbing excess solar or wind generation when demand is low and then discharging it when demand is high. In the United States, we have 15.4 GW of battery storage. During the last solar eclipse, in 2017, only 0.6 GW of battery storage was operating in the United States.

Texas will lose the most solar generating capacity because most of the state is in the path that will lose 90%–99% of solar power during the eclipse. Although most of California is in the 40%–59% partial reduction range, the state's significant use of utility-scale and small-scale solar capacity makes the eclipse's impact more significant. Florida is noteworthy because when the eclipse occurs, solar generation is likely to be the second-leading energy source on the system and account for about 20% of the state's total generation.

Solar electricity capacity has grown rapidly in the United States since the 2017 solar eclipse, especially in Texas. Utility-scale solar capacity was 8% (91 GW) of total U.S. capacity at the end of 2023. Solar power can be the third-largest source of midday generation in the United States during the spring and summer months. Solar is the largest source of midday generation in California and the second-largest source of midday generation in Texas, Florida, other parts of the East Coast, and in the Southwest.

The effect of the 2017 solar eclipse on the power system was minor. Since then, however, the U.S. electricity portfolio has changed significantly; almost 100 GW of utility-scale and small-scale solar capacity has been added to the system. During the 2017 eclipse, solar generation was the fifth-leading energy source in the United States behind natural gas, coal, nuclear, and hydroelectric. Even

with the eclipse, we still expect solar generation to be the third-largest contributor of electricity in the United States on April 8, behind natural gas and nuclear.

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