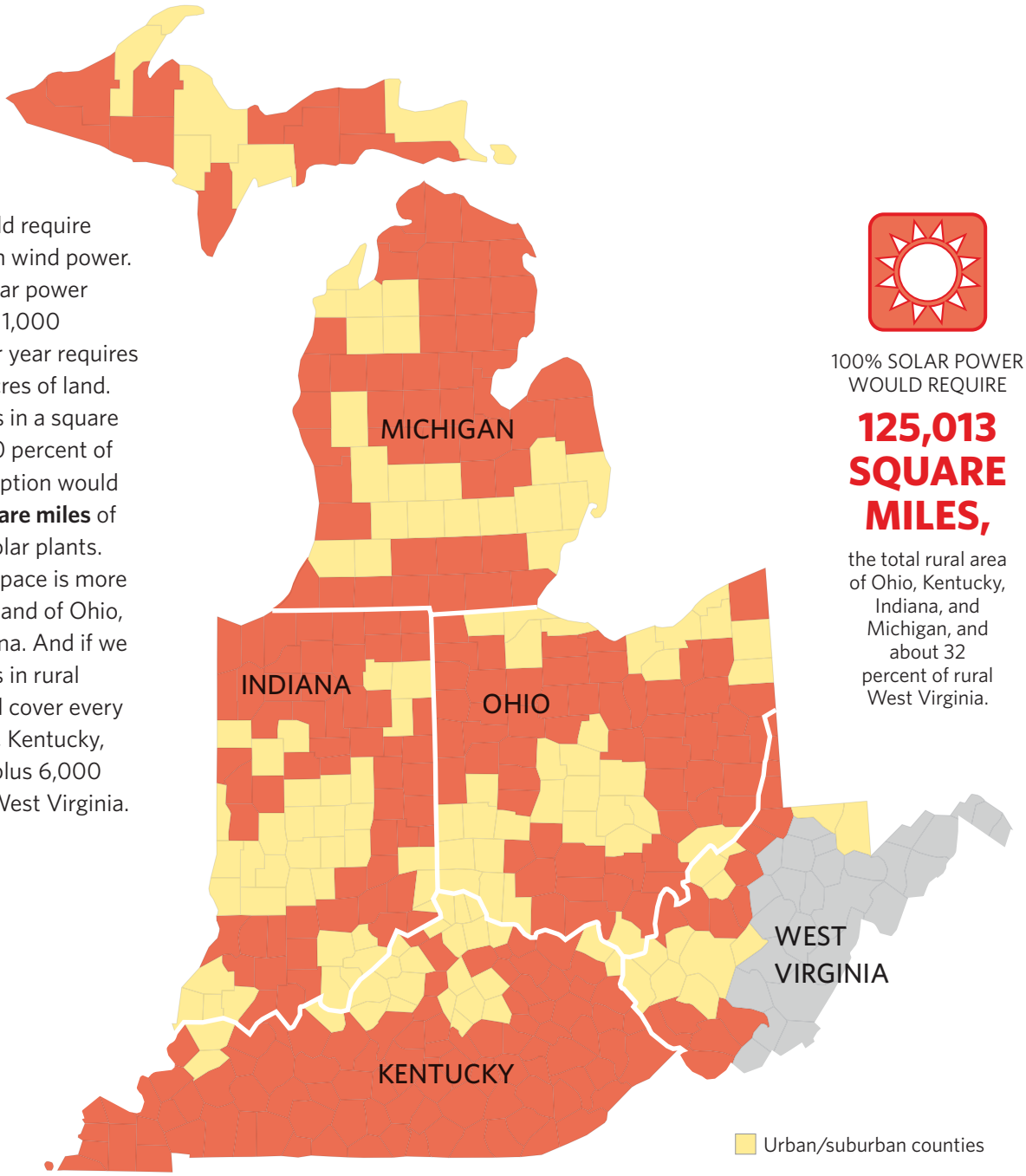
Solar Energy Would Burn Up a Lot of Land

In 2013, the U.S. consumed 28,574,429,271 megawatt hours of energy. Less than 1 percent of that came from solar power, and for good reason: unreliability—the sun doesn't always shine. But even if it did, could the U.S. reasonably get enough power from solar power plants to fulfill our energy needs? Hardly, because as it turns out, another major challenge would be finding enough *land* for the necessary equipment.

Solar power would require even more land than wind power.

A single large solar power plant that produces 1,000 megawatt hours per year requires an average of 2.8 acres of land. There are 640 acres in a square mile, so to meet 100 percent of U.S. energy consumption would require **125,013 square miles** of land dedicated to solar plants.

That amount of space is more than the combined land of Ohio, Kentucky, and Indiana. And if we only placed turbines in rural counties*, we would cover every acre of land in Ohio, Kentucky, Indiana, Michigan, plus 6,000 square miles from West Virginia.



100% SOLAR POWER WOULD REQUIRE

125,013 SQUARE MILES,

the total rural area of Ohio, Kentucky, Indiana, and Michigan, and about 32 percent of rural West Virginia.

* Counties not a part of a metropolitan statistical area, as defined by the Office of Management and Budget.

Sources: U.S. Department of Energy, Energy Information Administration; National Renewable Energy Laboratory, "Land-Use Requirements for Solar Power Plants in the United States," June 2013, http://www.nrel.gov/docs/fy13osti/56290.pdf (accessed August 31, 2015); and Opportunity Ohio calculations. County land sizes are from U.S. Census Bureau.

OPPORTUNITY Ohio

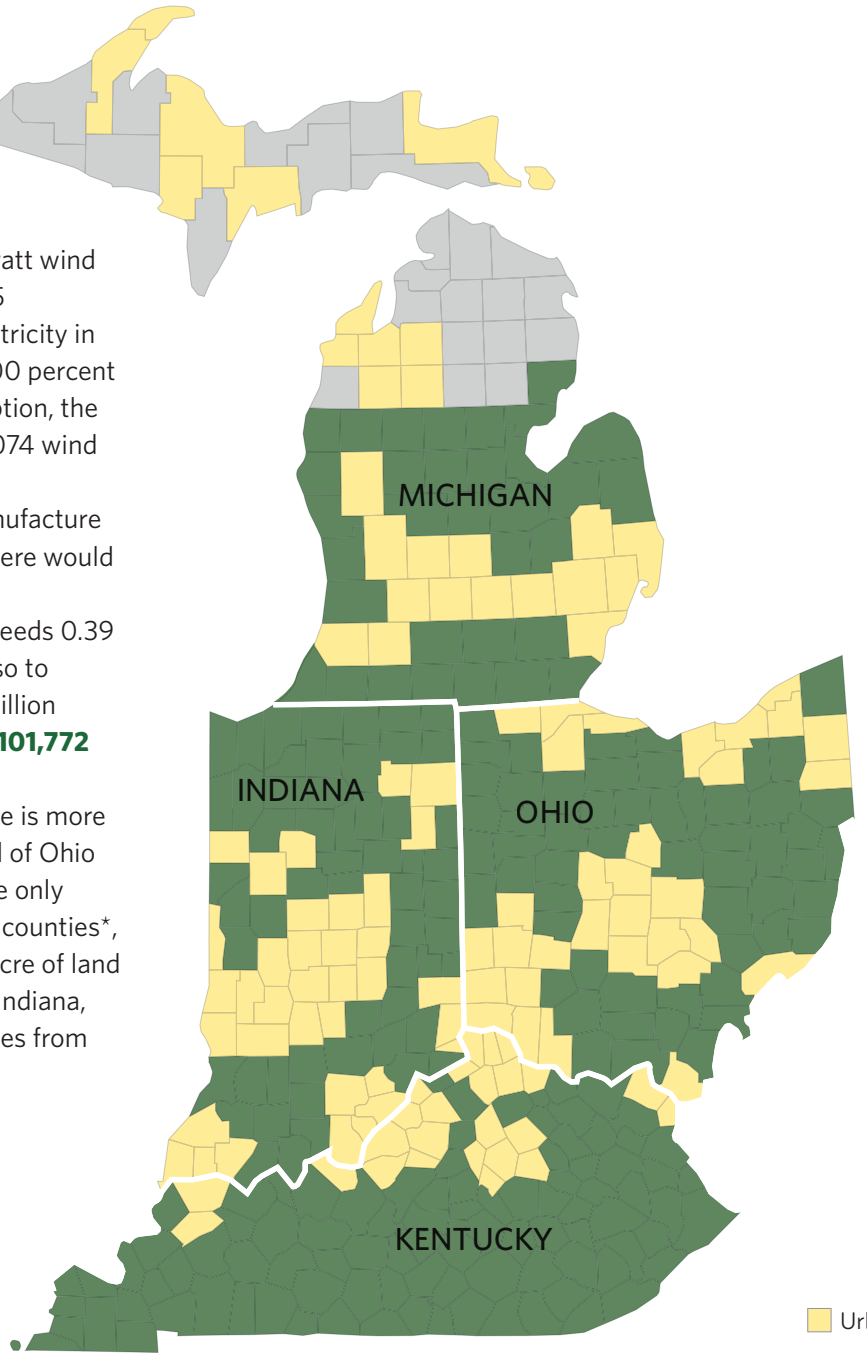
Wind Energy Imposes Heavy Demands on Land

In 2013, the U.S. consumed 28,574,429,271 megawatt hours of energy. Less than 5 percent of that came from wind power, and for good reason: unreliability—the wind doesn't always blow. But even if it did, could the U.S. reasonably get enough power from wind farms to fulfill our energy needs? Hardly, because as it turns out, another major challenge would be finding enough *land* for the necessary equipment.

A typical 2.5-megawatt wind turbine generates 5,475 megawatt hours of electricity in one year. So, to meet 100 percent of U.S. energy consumption, the U.S. would need 5,219,074 wind turbines.

Even if we could manufacture 5.2 million turbines, where would we put them? A typical 20-turbine wind farm needs 0.39 square miles of space, so to accommodate all 5.2 million turbines would require **101,772 SQUARE MILES.**

That amount of space is more than the combined land of Ohio and Kentucky. And if we only placed turbines in rural counties*, we would cover every acre of land in Ohio, Kentucky, and Indiana, plus 20,000 square miles from Michigan.



100% WIND POWER WOULD REQUIRE

101,772 SQUARE MILES,

the total rural area of Ohio, Kentucky, and Indiana, and about 54 percent of rural Michigan.

* Counties not a part of a metropolitan statistical area, as defined by the Office of Management and Budget.

Sources: U.S. Department of Energy, Energy Information Administration; National Wind Watch, "FAQ—Output," https://www.wind-watch.org/faq-output.php (accessed August 31, 2015); Wind Measurement International, "FAQ," http://www.windmeasurementinternational.com/wind-info/wind-energy_faq.php (accessed August 31, 2015), and Opportunity Ohio calculations. County land sizes are from U.S. Census Bureau.

OPPORTUNITY Ohio