

WINDEXchange

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Michigan Wind Resource Map and Potential Wind Capacity

The U.S. Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) published an 80-meter (m) height wind resource map for Michigan. This map is a key component of understanding the state's potential wind capacity from a development, policy, and a jobs and economic development impact perspective.

About the 80-Meter Michigan Wind Resource Map

The wind resource map shows the predicted mean annual wind speeds at an 80-m height, presented at a spatial resolution of about 2 kilometers that is interpolated to a finer scale for display. Areas with annual average wind speeds around 6.5 meters per second and greater at 80-m height are generally considered to have a resource suitable for wind development. Utility-scale, land-based wind turbines are typically installed between 80- and 100-m high although tower heights for new installations are increasing—up to 140 m—to gain access to better wind resources higher aloft.

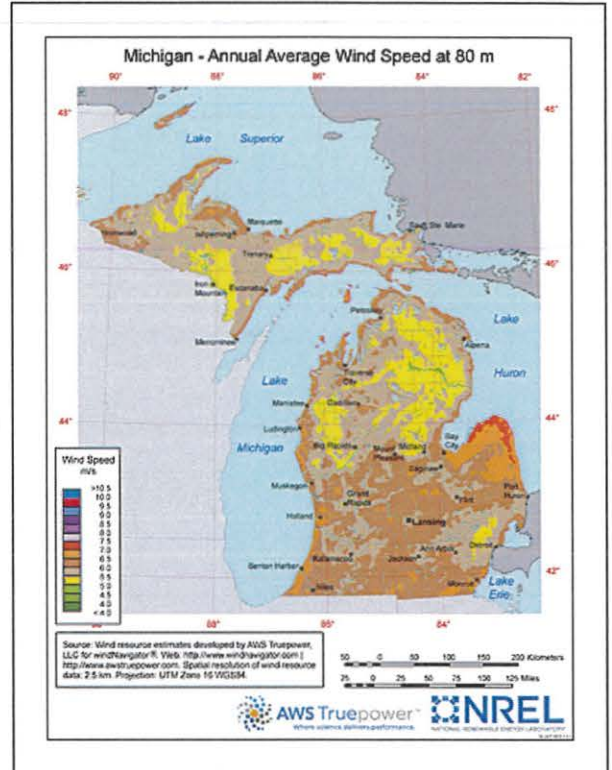
The average wind speeds indicated on this map are model-derived estimates that may not represent the true wind resource at any given location. Small terrain features, vegetation, buildings, and atmospheric effects may cause the wind speed to depart from the map estimates. Anyone planning to estimate energy production potential should seek expert advice or detailed wind resource assessments.

Michigan Potential Wind Capacity at 110-m and 140-m

The potential wind capacity maps show land area with a gross capacity factor¹ of 35% and higher, which may be suitable for wind energy development. AWS Truepower produced the wind resource data with a spatial resolution of 200-m, which was binned into 20-kilometer (km) grid cells. Map shading shows the amount of area with the potential to be developed within each 20-km cell: the darker the color, the larger the potentially developable area within each cell. Areas that are excluded from development by law, such as wilderness areas and national parks, and other areas unlikely to be developed, such as urban areas and water bodies, are shown in grey. Potential wind capacity maps are provided for a 2014 industry standard wind turbine installed on a 110-m tower, which represents plausible current technology options, and on a 140-m tower, which represents near-term future technology options.

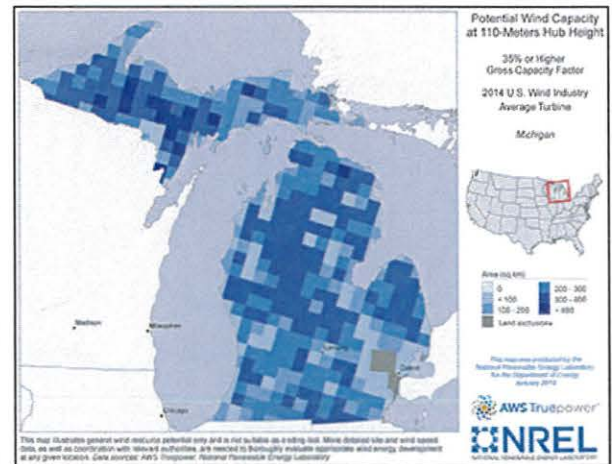
Site evaluation for wind projects should be coordinated with appropriate authorities and should consider potential effects on local resources and land uses, including but not limited to impacts to wildlife, sound, the visual environment, radar, aviation, safety and other local priorities. Various federal agencies have authorities relating to the siting and permitting of wind plants, depending on the location and resources that might be affected. For example, potential impacts to air traffic and military missions are evaluated by the Federal Aviation Administration (FAA) and U.S. Department of Defense Siting Clearinghouse through the FAA's airspace obstruction evaluation process. Potential impacts to migratory birds and endangered species are evaluated by the U.S. Fish and Wildlife Service. Other federal agencies that may have a role include, but are not limited to, the U.S. Army Corps of Engineers for projects impacting wetlands and waterways and the Bureau of Land Management or U.S. Forest Service for projects on federal lands. Similar state, tribal, and local agencies may also have jurisdiction.

The chart shows another way to understand the potential wind capacity above a given gross capacity factor at 80-, 110-, and 140-m tower



[Enlarge image](#)

This Michigan wind map shows the wind resource at an 80-m height. [Download a printable map](#).



[Enlarge image](#)

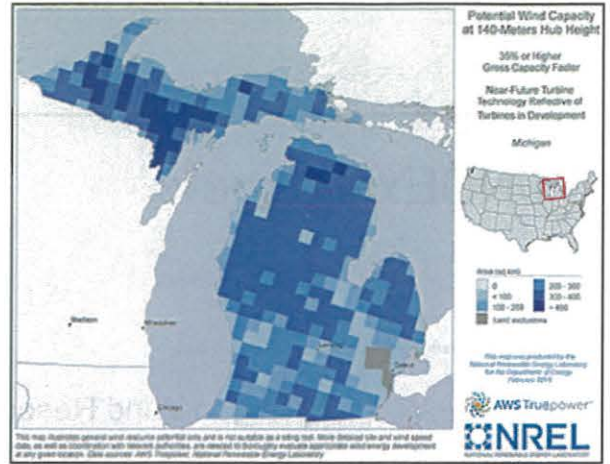
This Michigan wind map shows the wind potential at a 110-m height. [Download a printable map](#).

- * Grid Granularity = 400 sq km
- * 35% Gross Capacity Factor (GCF) \approx 30% Net Capacity Factor (NCF)¹

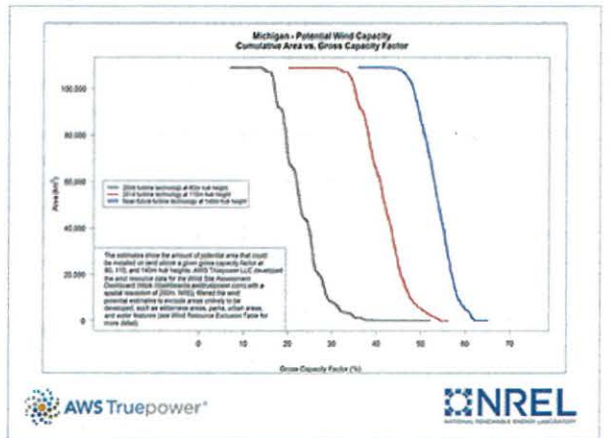
heights for Michigan. The [table](#) lists the estimates of land area with a gross capacity of 35% and greater at 80-, 110-, and 140-m heights and the potential wind capacity from development of the "available" land area after exclusions. In the table, "installed capacity" shows the potential megawatts of rated capacity that could be installed on the available land area. Areas excluded for wind development by law as well as urban areas and water bodies are not included (see Wind Resource Exclusion Table for more detail).

These maps and wind potential estimates resulted from a collaborative project between NREL and AWS Truepower. The U.S. Department of Energy's WINDEXchange initiative supported these mapping efforts.

1. NREL assumed a 35% gross capacity factor, a measure of total energy produced compared to the wind turbines' rated nameplate capacity over a year, as the minimum energy production that may be suitable for development. Assuming 15% losses and a 35% gross capacity factor results in a net capacity factor of nearly 30%, which is the long-term historical average fleet-wide net capacity factors in the United States. (Wiser and Bolinger 2014)



This Michigan wind map shows the wind potential at a 140-m height. Download a [printable map](#).
* Grid Granularity = 400 sq km
* 35% Gross Capacity Factor (GCF) ~ 30% Net Capacity Factor (NCF)¹



The chart shows the potential megawatts of rated capacity above a given gross capacity factor (without losses) at varying hub heights. Download a [printable chart](#).

WINDEXchange is a resource of the Department of Energy's Wind Program.

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Content Last Updated: 9/24/2015