

**Original Questions:**

1. What is the actual net production output as a percentage of the rated capacity of other sources of energy such as solar, coal, natural gas, and nuclear? **See response to question L1.**
2. What is the actual net production output of the Ubly (Thumb Michigan) wind farm as a percentage of rated capacity? How about Stoney Corners or other operating Michigan wind farms? **See response below.**
3. What would be the net production output as a percentage of the rated capacity of a wind farm, such as Duke's proposed Gail Wind project? (The wind doesn't blow all the time; thus, if wind powered a turbine 25% of the time a 100 mw capacity system would produce 25 mw net, not considering maintenance shutdowns, etc.) **Project specific.**
4. What is the efficiency of wind energy and what are its effects on transmission loss, coal plant shut downs, and the grid? **See response below.**
5. What percentage of the electric generation for Michigan can be realistically produced by wind turbines? **See response below.**

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**Questions and Responses**

*These questions may have been recategorized and reorganized. Some may have been sent to another "theme" area (this will have been explained in red under the "Original Questions" section). In other cases two or more questions will be answered with one response.*

- AA2. What is the actual net production output of the Ubly (Thumb Michigan) wind farm as a percentage of rated capacity? How about Stoney Corners or other operating Michigan wind farms?

**Response:** The Ubly Project is a 69 MW farm, and the Stoney Corners project is a 19 MW farm. Net production is very site specific as it depends upon wind speed, terrain, the model of turbine, and the design of the project. Since these are fairly recent projects, there is limited information available concerning net production as a percentage of their rated capacity.

- AA4. What is the efficiency of wind energy and what are its effects on transmission loss, coal plant shut downs, and the grid?

**Response:** The maximum efficiency a turbine can operate at, according to the Betz' Law, is 59%. If the blades of a turbine were to capture 100% of wind energy, they would act as a wall, stop all air movement, and harness no energy. On average, the amount of energy extracted by wind turbines as a percentage of the total energy available, taking into account friction, technical design, and other factors, ranges between 20-40%. The average is 33%. Once turbines convert wind energy into electricity and transmit it to the grid, it acts as any other form of energy and does not have any unique transmission losses. For more information, see <http://www.windenergyplanning.com/wind-turbine-efficiency/>. Also, see [http://www.ucsusa.org/clean\\_energy/technology\\_and\\_impacts/energy\\_technologies/how-wind-energy-works.html#The Mechanics of Wind Turbines](http://www.ucsusa.org/clean_energy/technology_and_impacts/energy_technologies/how-wind-energy-works.html#The_Mechanics_of_Wind_Turbines).

- AA5. What percentage of the electric generation for Michigan can be realistically produced by wind turbines?

**Response:** Michigan is currently ranked 14<sup>th</sup> in the country for onshore and offshore wind potential. Wind energy has the potential to power 71% of Michigan's electricity, as measured by electricity sales in the last decade. This statistic is drawn from the Union of Concerned Scientists and can be accessed at [http://www.ucsusa.org/assets/documents/clean\\_energy/acfgpapzz.pdf](http://www.ucsusa.org/assets/documents/clean_energy/acfgpapzz.pdf)

Information on the estimated availability of wind energy in Michigan was also developed for

Michigan's Wind Working Group, with the assistance of experts at the National Renewable Energy Laboratory (NREL). Currently, 3.6 % of the electricity generated in the state is from renewable energy. Less than 1% of Michigan's electricity is produced by wind. For more information, see <http://cdn.publicinterestnetwork.org/assets/gRgnxFImBOdlvsogFisDcA/Energizing-Michigans-Economy.pdf>.