

**2021A10****(PERCENTAGES)**

**Level 1:** The capacity factor requires two kWh numbers: the estimated production and the theoretical maximum production.

$$\text{Capacity Factor (\%)} = \frac{\text{Estimated Production (kWh)}}{\text{Theoretical Maximum Production (kWh)}} * 100$$

The theoretical maximum can be found by multiplying the rated power in kW by the number of hours in a year.

$$\text{Capacity Factor (\%)} = \frac{\text{Estimated Production (kWh)}}{\text{Rated Power (kW)} * \text{Hours}} * 100$$

For each turbine in this project, the rated power is 1,500 kW. There are 8,760 hours in one year.

$$\text{Capacity Factor (\%)} = \frac{\text{Estimated Production (kWh)}}{1,500 \text{ (kW)} * 8,760 \text{ Hours}} * 100$$

Apply the estimated production for each turbine.

$$\text{Turbine 1 Capacity Factor (\%)} = \frac{4,160,000 \text{ (kWh)}}{1,500 \text{ (kW)} * 8,760 \text{ Hours}} * 100$$

$$\text{Turbine 1 Capacity Factor (\%)} = 31.66\%$$

$$\text{Turbine 2 Capacity Factor (\%)} = \frac{3,990,000 \text{ (kWh)}}{1,500 \text{ (kW)} * 8,760 \text{ Hours}} * 100$$

$$\text{Turbine 2 Capacity Factor (\%)} = 30.37\%$$

Repeat this process for the site – the site rated power is 3,000 kW.

$$\text{Site Capacity Factor (\%)} = \frac{8,150,000 \text{ (kWh)}}{3,000 \text{ (kW)} * 8,760 \text{ Hours}} * 100$$

$$\text{Site Capacity Factor (\%)} = 31.01\%$$

**Level 2:** The two turbines have different ratings, which means the denominator of their capacity factor calculations will be different. A larger denominator will lead to a smaller percentage. If the two turbines have the same estimated production, the turbine with the lower rating (Site A) will have the higher capacity factor.

Similarly, if the two sites have the same capacity factor, it means that the site with the higher rating (denominator) will also have to have the higher estimated production (numerator). This means that Site B will have the higher kWh production estimate.

# WIND STUDY

Wind Study is intended for grades 5-8 and 8-11  
Questions posted on: Monday    Answers posted on: Friday  
Find downloadable one-pagers at [www.oneenergy.com/one-energy-feed](http://www.oneenergy.com/one-energy-feed)

*An operating Wind for Industry® project.*

