Gaia 133 vs Proven 15

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Comparing wind turbines can be tricky without an understanding of exactly what affects the amount of energy they produce. This guide explains a few important differences between the Gaia 133 and the Proven WT15000.

The Gaia 133

The Gaia 133 is a wind turbine with an impressive pedigree. Designed and built in Denmark, it follows the same design principles as the full-size wind turbines installed on hill-tops and out to sea. A low-speed, geared rotor equals reliable low-noise operation at all wind speeds and the absence of inverters means there's less to go wrong and less space needed inside the property.

10 years of successful operation

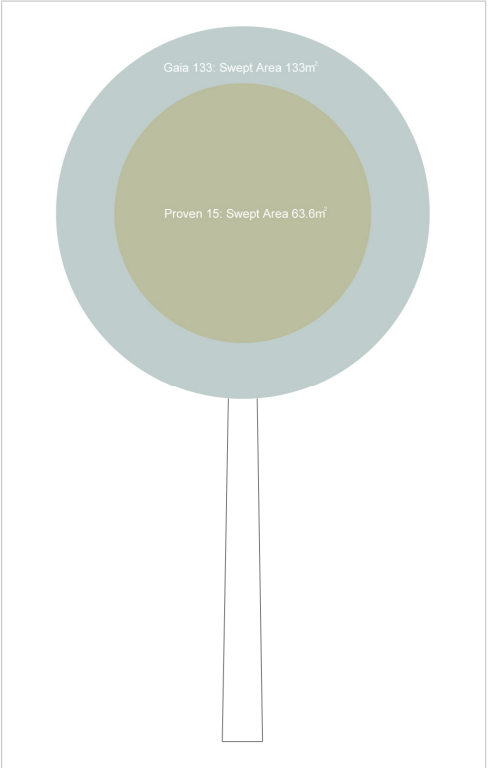
The small wind industry is relatively new, and some manufacturers of small turbines have had significant problems with reliability. The Proven WT15000 has only recently been reintroduced to the market, whereas the Gaia 133 is a well established and tested design with a 10 year record of reliable operation in many different environments.

Bigger is Better!

The best way of comparing two turbines is to look at how big they are, or more specifically how big their rotors are. The technical term is 'swept area', which literally means the size of the area 'swept' by the blades as they turn. The bigger the rotor, the more wind it captures and therefore the more energy it generates. The relationship between swept area and output is linear, so (all other things being equal) if you double the swept area of a turbine you get double the output.

What does this mean for the Gaia 133 vs the Proven WT15000? Well, the Gaia has a swept area of 133m^2 and the Proven's is 63.6m^2. Simply therefore, the Gaia has a much bigger swept area and produces more power as a result.

The diagram opposite shows how much bigger the Gaia's rotor is. None of the wind blowing past the blue area would be captured by the Proven's rotor.



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The Rated Power Myth

Unfortunately, it has become common for wind turbines to be compared by looking at their maximum power output or 'rated power' in kilowatts (kW). The problem with this is that many manufacturers rate their products at very high wind speeds (usually 12m/s or more). This means that the turbine will only produce it's rated power when the wind is blowing very hard - which is not that often.

It makes a lot more sense to see how much power a turbine will generate in the kind of wind speeds that are frequent in most parts of the UK - in the range of 4 - 9m/s. Because these lower speeds are much more common, a turbine that performs well in them will generate much more energy over the course of a year than one that performs best in the 10 - 5m/s range.

The table below illustrates that the larger rotor of the Gaia 133 allows it to generate significantly more power that the Proven WT15000 at "normal" wind speeds*

Wind Speed	Proven WT15000	Gaia 133
4m/s	0.6kW	**1.1kW**
5m/s	1.9kW	**2.8kW**
6m/s	3.8kW	**5.0kW**
7m/s	5.8kW	**7.3kW**
8m/s	8.1kW	**8.9kW**
9m/s	10.3kW	**10.4kW**

***Data taken from manufacturer's power curves**

Tower Height

Also critical to performance is the height above the ground. Typically a Proven WT15000 is supplied on a 15m tower, whereas as Gaia 133 is typically supplied on an 18m tower, where the energy in the wind is 10% higher.

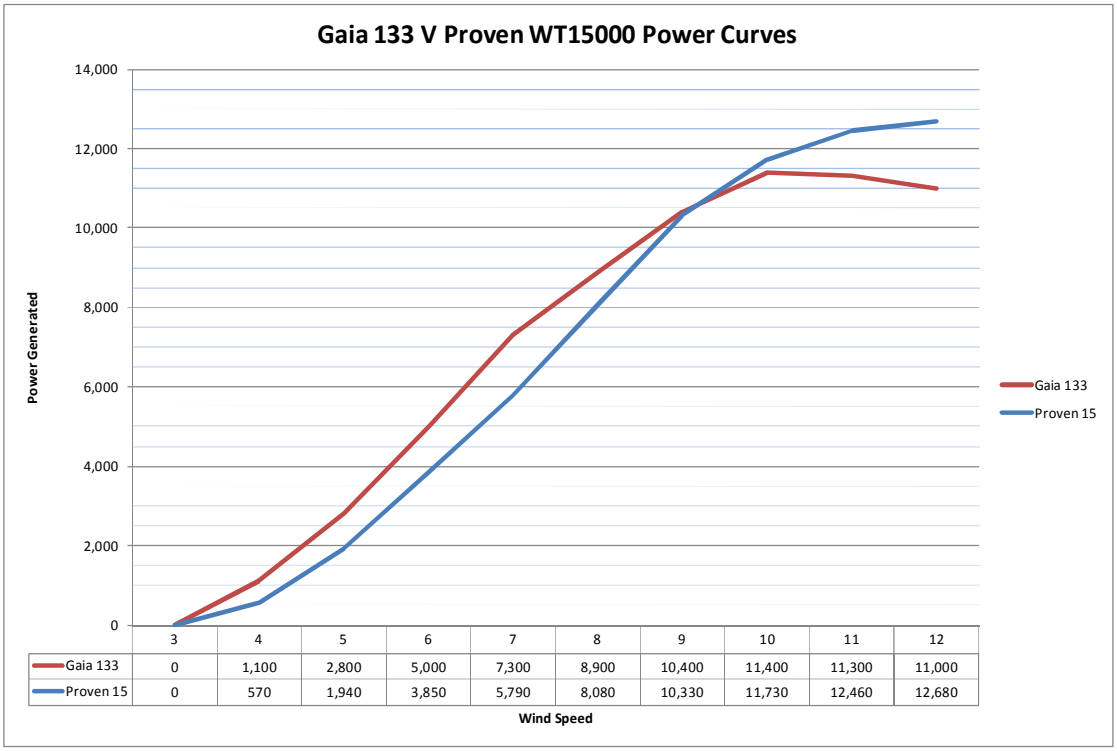
Annual Energy Capture

So how much electricity could you expect a Gaia or a Proven WT15000 to generate per annum? Lots of different factors influence energy capture, but it is possible to estimate and make a rough comparison.

The table on the right shows that on a site with an average wind speed of 4.3m/s at 10m height, A Gaia 133 should outperform a Proven WT15000 by about 20%. Assuming an electricity price of 10p per unit, that translates to approximately an extra £1,800 per year including the proposed new feed-in tariff.

Proven 15 (4.7m/s average @ 15m height)	**Gaia 133** (4.9m/s average @ 18m height)
24,330kWh (units)	**30,090kWh (units)**

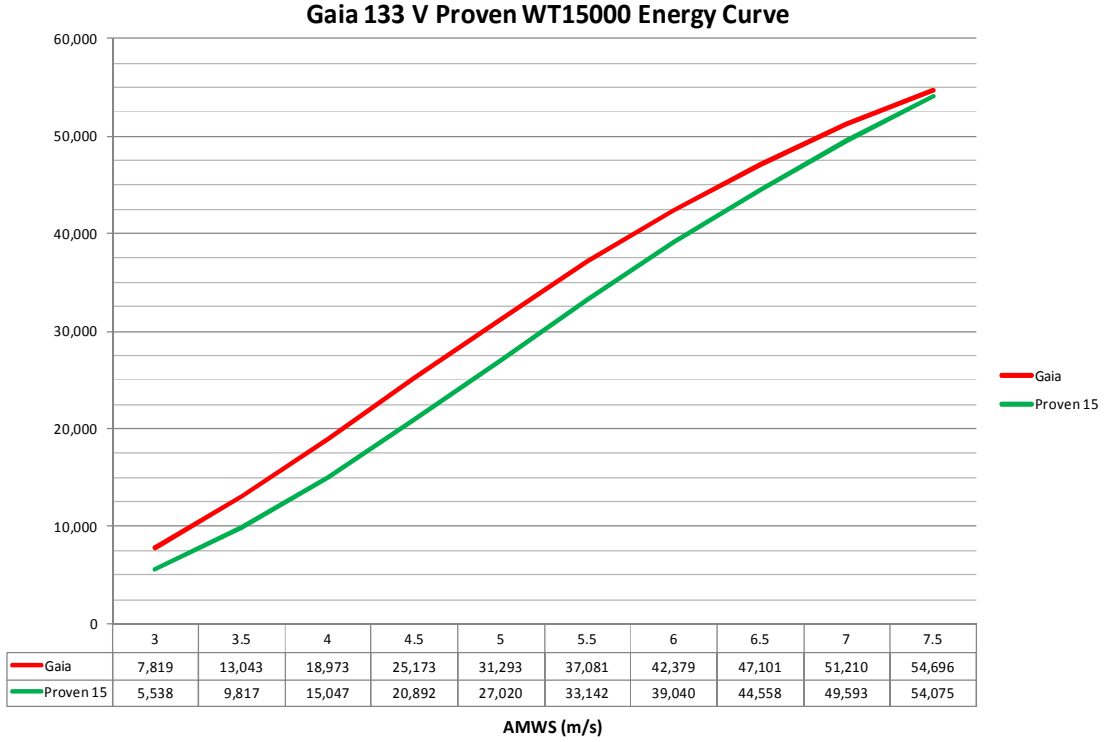
The graph below shows a comparison of the Proven WT15000 and Gaia 133 power curves showing the power generated at different wind speeds.



	3	4	5	6	7	8	9	10	11	12
Gaia 133	0	1,100	2,800	5,000	7,300	8,900	10,400	11,400	11,300	11,000
Proven 15	0	570	1,940	3,850	5,790	8,080	10,330	11,730	12,460	12,680

As can be seen from the chart to the left, despite its apparently higher rating, the Proven WT15000 does not generate more power than the Gaia 133 until the wind speed reaches 10m/s, (22mph), which only occurs less than 10% of the time at a typical mainland site with an annual mean wind speed of 5m/s.

The result of the Gaia's better performance at "normal" wind speeds is that the amount of energy generated by the Gaia 133 throughout the year will be higher than the Proven WT15000 except at extreme sites found in Scottish Highland and Islands.



	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5
Gaia	7,819	13,043	18,973	25,173	31,293	37,081	42,379	47,101	51,210	54,696
Proven 15	5,538	9,817	15,047	20,892	27,020	33,142	39,040	44,558	49,593	54,075

To find out more about the Gaia 133, please contact your Segen account manager directly or use the details below. The sooner you talk to us, the sooner you could be generating you own renewable energy.

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