

Game Changing Small 3 Kilowatt Wind Turbines with Low RPM Generator and Longer Blades to Capture More Energy in Lower Wind Speed Areas



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CEOCFO: Dr. McIntosh, what is the focus at Sonsight Wind?

Dr. McIntosh: It is to develop and manufacture advanced small wind turbines that successfully compete with rooftop solar even within moderate wind areas. We are currently working on a 3 kilowatt turbine design. We took the perspective that we had to first develop a good low RPM generator and build the turbine around it because the advantages of a truly low RPM horizontal axis turbine can be game changing.

CEOCFO: What has been the challenge? Why do we want smaller?

Dr. McIntosh: Small wind turbines are a segment of the market. Formally, small wind turbines have been described as anything between about one kilowatt and one hundred kilowatts. This segment of the market has been around for a long time and is the space in which we operate. It is also within the distributed wind energy space. Distributed wind refers to wind turbines that produce electricity at the source of usage and what is called behind the meter. It is electricity that is produced on site, similar to roof top solar where the electricity is produced at the site of the user. The DOE recently came out with a report showing that small wind turbines do have the potential of meeting significant energy needs. We are using a new approach, which utilizes a low mass, low cost, low RPM generator that allows significantly longer blades at lower RPM to capture significantly more energy with the same rated power output. Some large wind turbines now use somewhat longer blades at the same output power for more energy within somewhat lower winds, but our patented generator allows us to take this to another level in terms of percent increase in blade length and percent decrease in RPM. Doing this without greatly increasing turbine mass and cost would have itself been a big challenge, but we are doing this while actually decreasing overall mass and cost, which is exciting.

CEOCFO: What is the interest in wind today?

Dr. McIntosh: For large wind turbines, say one megawatt or so; the interest has remained high. For instance, last year's DOE Wind Technologies Market Report list wind turbines as accounting for the largest addition of electrical generating capacity in the US, which is actually pretty incredible. Therefore, people have recognized the importance of wind and the interest there with large wind has just continued. Now, with small wind the interest has been a lot choppy; up and down. The interest in small wind was higher prior to 2011, and then it dropped even further in 2013. A couple of things happened. One is that the price of solar started coming really way down. Therefore, all of a sudden solar became more competitive in many more locations than small wind. Also, small wind kind of shot itself in the foot because you had manufacturers that came out with outlandish claims for their small turbines and once installed, performance was a lot less

than expected. Therefore, people started looking at small wind kind of suspiciously. I would say that these two factors as much as anything have caused small wind to be looked at less favorably over the past few years.

CEOCFO: *What are you working on today?*

Dr. McIntosh: We are working on improving our 3 kilowatt turbine prototype. We developed and patented our novel generator. We developed a wind turbine to use with that generator. We are currently testing it, but do see some issues that need correcting and we are in the process of working on the improvements for this turbine.

CEOCFO: *Are you funded? Do you have partnerships? How are you doing all of this from the business side?*

Dr. McIntosh: We have been funded by a number of grants from the USDA SBIR program, both Phase I and Phase II Grants. We are currently working on a Phase II. We are looking around for more funding to continue testing after this Phase II runs out.

CEOCFO: *Would you tell us about testing facilities? Do you have what you need space-wise as you are doing your development?*

Dr. McIntosh: As far as office and work space we are okay right now, at this level. We have space for the development work. We are actually testing our turbine up in Maryland. We are located in Georgia right now, but we used to be in Maryland, so our test space is there. However, we are going to need additional testing at a higher wind site. That is actually one of the things that we are looking at right now.

CEOCFO: *What was the reception at the Defense Energy Innovation Summit in December? Are people paying attention to what you are doing when you show the prototype and the idea?*

Dr. McIntosh: To some extent. We saw interest on two levels. There was interest in the turbine itself and the possibility of collaborating. That is, using our turbine with another technology. That is, combining it with another technology to provide added benefits. As a matter of fact there is a collaboration right now that resulted in a grant application that has been filed. However, there was also an interest in our generator technology. There is one company that was interested in using our generator design, with some modification, for micro hydro. That is generating power from ocean or river currents.

CEOCFO: *Would you consider licensing the technology? Might that be a way to go?*

Dr. McIntosh: Actually, I would. We have not actively pursued licensing, but only because we haven't gotten around to it.

CEOCFO: *Why pay attention to Sonsight Wind? Why is the company important?*

Dr. McIntosh: It is because our turbine will successfully compete with solar when you have at least a DOE Class III wind resource; that is when you operate within at least a moderate wind speed area. Also, even within lower winds such as DOE Class II, the turbine is projected to still outperform solar within some areas of the country with poor solar irradiance. It will provide a lower cost of energy. Our approach is unique in that we have a horizontal axis turbine that will operate at substantially lower RPM than current turbines on the market, thereby providing some rather significant benefits. What this translates to is that, once again, we can have longer blades since you need lower RPMs for longer blades. That is, longer blades require lower blade tip speeds and lower tip speeds require lower RPM, so there is that. However also, the low RPM means greater dependability and longevity and lower maintenance. Low RPM with good blade design also means essentially no noise. There has also been concern about bird and other flying wildlife like bats and so forth, which is really not a big concern, but of course the lower the RPM the less of a concern that is. Also, we can combine the low RPM with a blade design that decreases the thrust force. When you have a turbine that is up and is generating power there is a thrust force on the blade from the wind that is transferred to the support structure that supports the turbine, which is the tower and the foundation, which needs to be strong enough to resist this thrust force. When you have a lower thrust force then you have less cost for a foundation, you have less cost for the tower as well. All of this translates into a lower cost of energy, as well as greater dependability and lower noise. Therefore, we are poised to, I would say; make a big impact in small turbines.

