TO: AASHE STARS

FROM: Dr. Majid Rashidi

DATE: February 14, 2011

RE: Letter of Affirmation for uniqueness and usefulness of the innovative Wind Tower system invented at CSU.

This is a brief description of the credential of the inventor, and the features of the innovative wind tower system invented at CSU by Dr. Majid Rashidi who is the Betty L. Gordon distinguished Professor of Fenn College of Engineering at Cleveland State University.

1. Inventors Credentials/Background:

Dr. Majid Rashidi, an alumnus of Case Western Reserve University, received his Ph.D. in 1986, MS in 1983, and BSME in 1981 from CWRU. Following to his graduation in 1986, Dr. Rashidi worked at NASA for the Institute of Computational Mechanic in Propulsion (ICOMP). Dr. Rashidi has 22 years of machine design experience related to real-world engineering problem solving for industry. Dr. Rashidi's research work has resulted in several publications in referred technical journals as well as 5 patents in print. Dr. Rashidi has 2 additional patents pending in the area of wind power harnessing systems. Dr. Rashidi's latest patents (**US7, 540,706** and **US7, 676,209)** have been reduced to a fully functional wind harnessing system that is installed on the rooftop of the Plant Service Building at Cleveland State University. Dr. Rashidi has received $1.1 million from the US Department of Energy, and additional $400 thousand from the State of Ohio for his research and design efforts in the area of innovative wind harnessing systems. Dr. Rashidi's innovative wind harnessing system has been featured in many national and international journals, including New York Times, Business Week, Reuters, and Wind Tech-International

2. Project description and its uniqueness/innovative aspects:

Dr. Rashidi's wind power research has focused on the use of round structures for increasing wind speed as the wind approaches the turbines. According to the Bernoulli principle, round structures increase wind speed near their boundaries. Therefore, if a turbine is installed near a round structure, higher wind power is generated by a standard turbine. This is also results in lowering of the cut-in wind speed for the turbine. Dr. Rashidi has envisioned a number of such structures that increase the wind speed, from a spiral shaped structure to one that resembles a silo or a water tower.

Dr. Rashidi's wind tower system is aligned with the ***small distributed wind energy systems*** initiative of ***Energy Efficiency and Renewable Energy*** of the DOE that is aimed for conversion of wind energy into electricity at geographic sites where the wind speed is relatively low. One of the particular aims of Rashid's work at CSU is to reduce the cost for generating electricity via reducing the cost of a suitable structure that amplifies the wind speed. As the result of the unique modular attributes of Dr. Rashidi's design, the system can be scaled up in a vertical direction, while keeping the footprint size and the size of its individual turbines the same for different targeted power ratings. Another unique feature of Dr. Rashidi's design is its flexibility to be constructed and put in use for example in farms where there are existing silo shaped structures that can be retrofitted with his design.

Figure 1 shows a fully functional prototype of Rashidi's wind tower design. The design has been fabricated and installed on the rooftop of the Physical Plant Building at Cleveland State University. Business Week Magazine of July 6th, 2009 has featured this working prototype with an article describing its principle of operation. Figure 1 shows a picture of the working prototype of Rashid's wind tower on the roof top of the Plant Service Building at Cleveland State University.

Figure 1- Functional CSU's Wind Tower Installed at Campus

Unique Features of Rashidi's Wind Tower Design:

- Adaptable as a retrofit to the existing cylindrical structures such as water towers and silos
- Applicable to urban areas with low wind speed regimes (5 to 6 miles per hour)
- Increase of the capacity factor of standard wind turbines; each turbine on Rashidi's design should produce an annual energy level that is equivalent to the energy produced by 3 or 4 similar turbines, under similar wind conditions.

3. Overall assessment of the project's innovative nature and its suitability to be a STAR Innovation Credit:

The experimental results obtained from the fully functional 1st prototype of the CSU wind tower has shown the usefulness and increased wind harnessing capability of the system compared to the same size conventional rooftop wind turbines under similar wind speed conditions. Recently two Ohio based companies are exploring licensing agreements with CSU to commercialize the technology.