U.S. Mid-Size Wind Turbine Development Workshop Minutes

The U.S. Mid-Size Wind Turbine Development Workshop was held on November 6, 2009 at the Cobo Center in Detroit, MI. The event took place immediately following the AWEA Small and Community Wind Conference and Exhibition and the co-located Supply Chain Workshop that was held at the Cobo Center November 3-5. Approximately 175 people attended the workshop; an additional 60 people registered but did not attend. The workshop was provided at no cost to attendees.

The purpose of the half-day workshop was to facilitate collaboration between wind turbine designers and U.S. manufacturers and to build awareness of the DOE-NREL Mid-Size Wind Turbine Development Project. Mid-Size turbines are defined as turbines that range in size from above 100 kW through 1 MW.

The event began with a brief presentation on the anatomy of a mid-size wind turbine and an overview of market assessment reports followed by five panels devoted to the following topics: Mid-Size Turbine Developers, Mid-Size Turbine Interests, Rotor Manufacturers and Wind Turbine Consultants, Drivetrain/Generators, and Other Manufacturers. The panels were made up of various turbine developers and manufacturers and included brief presentations by each of them. The remaining time was devoted to Q&A from the audience. The workshop also provided an opportunity for attendees to spend a small amount of time networking.

Over the course of the workshop, the following key themes emerged:

1. A market currently exists for mid-size turbines. Based on the ICF International market assessment, there is an estimated 220 GW of market potential for technologically improved mid-size turbines. Currently, there is insufficient product to meet the U.S. demand.
   ** An Analysis of the Technical and Economic Potential for Mid-Scale Distributed Wind* (PDF 1.6 MB) Download Adobe Reader and *Distributed Wind Market Applications* (PDF 1.5 MB) Download Adobe Reader.
2. Several U.S. manufacturers are currently engaged in or are becoming engaged in the mid-size turbine market. Although numerous component manufacturers believe they can provide what is needed, they currently do not know which components are needed.
3. Having more than one manufacturer will stimulate competitive pricing and the market. A likely requirement for machines this size is certification to IEC (International Electrotechnical Commission) standards.
4. National policies are needed to support mid-size turbine market development. Specifically, kilowatt-hours produced need to be valued at retail rates or higher, and a national net metering policy is needed. In addition, a Renewable Portfolio Standard (RPS)/Renewable Electricity Standard (RES) that includes a place for distributed turbines is needed, in parity with solar PV.
5. New (not refurbished) turbines are in the best interest of developing a viable, long-term industry sector. Refurbished turbines, if not completely rebuilt, tested, and certified, will likely result in problems for this industry as they fail due to operation and maintenance issues.

6. Turbine sizes need to match the capabilities of smaller cranes. Mid-size machines can deliver lower Cost of Energy because installation costs are less due to crane availability/size. Larger turbines (1.5 MW and greater) require larger, more expensive cranes to assemble.
7. Life-cycle costs are lower for a cluster of several mid-size turbines than a single larger turbine.
8. The Mid-Size Turbine Developer panelists were asked to identify their top two preferred turbine sizes. Their responses indicated a need for turbines that range from 100 kW to 900 kW as well as a range in rotor diameters. Interests are summarized below:
    - A 100-kW size is good for modularity; a 600-kW (48-m rotor) is light enough and small enough to erect with smaller cranes
    - From a manufacturing perspective, the 750-kW (w/ 50-m rotor) can be used to build a larger farm or can be good for Distributed Wind (regional role). Two 300-kW machines are more difficult to develop; would rather have a larger machine. Most machines are IEC Class 1, which isn't common; there is a need for three rotor options (IEC Class 1, 2 &3) for lower-windspeed sites. It's best to bring the technology to match the site. Stall-regulated, direct-drive 300-kw machines for the customer side of the meter is a huge market.
    - 50-kW to 100-kW turbines are a valuable tool for the irrigation market, which could be a mass market. Need larger rotor diameters. The 250-kW machine is also needed because it works with the megawatt-scale market.
9. Mid-Size turbines fit into the hub-communities concept (similar to village power concept), especially with group or aggregated net metering. Tilt-up towers would be a good solution for this approach but also for international installations (such as islands, Third World countries). Large turbines don't always fit into communities.
10. Cost of energy increases when turbines, or major components, have to be transported from Europe or Asia, thereby making them uneconomical, particularly in times of increasing transportation costs. In addition to the high costs of shipping from outside the United States, there is a need for short delivery times of spare parts.
11. Tower manufacturers are able to provide whatever towers the market needs for mid-size turbines; currently monopoles are the tower of choice. There appears to be a lack of blade manufacturing capabilities in the United States.
12. Maintenance schemes for mid-size turbines can be problematic. Outsourcing from Original Equipment Manufacturers and contractors may be the solution, but cost must be controlled. Energy Service Companies (ESCos) currently charge a 30% markup.) There is a need for turbine system maintainability, and integrating safety into the tower/nacelle design must be considered.