U.S. Department of Energy
Categorical Exclusion Determination Form

Program or Field Office: Advanced Research Projects Agency - Energy (ARPA-E)

Project Title: 25A2756 - Breakthrough High Efficiency Shrouded Wind Turbine

Location: Massachusetts

Proposed Action or Project Description: American Recovery and Reinvestment Act: ☒

FloDesign Wind's Mixer Ejector Wind Turbine (MEWT) is a new, shrouded, axial-flow wind turbine capable of delivering significantly more energy per unit swept area with greatly reduced rotor loading as compared to existing horizontal axis wind turbines (HAWT) and current duct augmented wind turbines (DAWTs). The lower loads, smaller rotor and shrouded concept provide significant opportunity for mass production and other cost reduction manufacturing techniques. As a result, the new, MEWT design has the potential to be the next generation wind turbine by providing significantly lower first and life costs compared to traditional horizontal axis wind turbines. Moreover, the MEWT's size, cost and safety advantages enable distributed applications that have thus far proven challenging for traditional turbine designs to economically address. MEWT's benefits are an outgrowth of the device's high efficiency and unique operating configuration. Specifically, the MEWT delivers 3 or more times the power extraction efficiencyfor the same size rotor or the same power with 50% of the rotor size. Additionally, these efficiencies are reached while shifting 70% of the axial loads off the rotating components. This leads to an inherent robustness and opens the door for additional durability through integration of a gear train-free embedded generator in the shroud structure. The MEWT is a direct descendant of modern jet engine technology where aerodynamic optimization is achieved through sound design, analysis and testing. The turbine is of a shrouded

Categorical Exclusion(s) Applied:

X - B3.6 Siting/construction/operation/decommissioning of facilities for bench-scale research, conventional laboratory operations, small-scale research and development and pilot projects

*-For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, see Subpart D of 10 CFR10 21 Click Here

This action would not: threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, including DOE and/or Executive Orders; require siting, construction, or major expansion of waste storage, disposal, recovery, or treatment facilities, but may include such categorically excluded facilities; disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that pre-exist in the environment such that there would be uncontrolled or unpermitted releases; or adversely affect environmentally sensitive resources (including but not limited to those listed in paragraph B.(4)) of Appendix B to Subpart D of 10 CFR 1021). Furthermore, there are no extraordinary circumstances related to this action that may affect the significance of the environmental effects of the action; this action is not "connected" to other actions with potentially significant impacts, is not related to other proposed actions with cumulatively significant impacts, and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211.

Based on my review of information conveyed to me and in my possession (or attached) concerning the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: /s/ William J. Bierbower Digitally signed by William J. Bierbower DN: cn=William J. Bierbower, o, ou, email=william.bierbower@hq.doe.gov, c=US Date: 2010.01.14 12:14:55 -05'00' Date Determined: 01/14/2010

Comments: Webmaster:

modern jet engine technology where aerodynamic optimization is achieved through sound design, analysis and testing. The turbine is of a shrouded design with two high circulation ring airfoils encircling either an aggressively-designed traditional rotor or a high efficiency stator/rotor configuration. A mixer/ejector augmenter is the key component to high system performance. The mixer/ejector augmenter pumps more flow through the rotor while using bypass flow to energize the turbine exit wake flow, allowing more turbine power extraction. The proposed R&D program has three major technical objectives aimed at accelerating the MEWT technology from its current TRL-5 level to a TRL-8-Ready level, thereby positioning it for timely and early acceptance in a burgeoning but technologically mature marketplace. With ARPA-E's support, FloDesign Wind can bring forward within a short period, its 2nd generation design that will leap frog traditional HAWTs' performance. The 30 month program represents over 50 man years of engineering and professional effort coupled with an equal amount from vendors and contractors in the Central Massachusetts region. In conclusion, current technologies are close to their theoretical efficiency limits and as a result unlikely to meet the DOE's vision of 20% of electricity from wind by 2030 without significant infrastructure investments and subsidization or technological breakthroughs. The potential of MEWTs' high efficiency and manufacturability makes it a key candidate to help achieve that lofty but critical goal.