Title: The Feasibility of Small-Scale Wind Power Generation at Kent School, Connecticut: An economic, environmental, and aesthetic analyses

Abstract: Carbon-based energy source in electricity generation has already been challenged, in multiple researches, not only for their scarcity [1] but also their negative impacts on earth’s environment. In face of severe environmental challenges such as global warming and its resulting problems such as extreme weathers [2] and dramatically increasing species extinction rate [3], a clean and environmentally-friendly energy source is in need. It is evidence through multiple researches that wind power has the potential of subsidizing, if not replacing, the role of power generation by those traditional energy sources. In light of the development of wind power worldwide, it is important for Kent School to also consider using wind power to fulfill parts of the electricity consumption on campus and hopefully reduce campus’ environmental footprint. This study specifically focuses on the feasibility of a small-scale wind farm on Kent School’s campus through economic, environmental and aesthetic perspectives.

Introduction – General

Kent School receives its electricity from the CT state grid [**CONFIRM**] (the solar power generated is sold back to the power company), which means that according to the energy sources profile of the CT state grid, 63.7% of the electricity that Kent School uses comes from natural gas and 31.2% comes from nuclear. Also, the data obtained from Kent School’s Maintenance Department shows that the annual power consumption is [**CONFIRM**] MWh. Calculating from the average commercial electricity rates in the state of Connecticut, which is 14.65 cents/kWh, the annual spending of Kent School on electricity consumption is roughly [**CONFIRM**]. Therefore, two incentives for the addition of wind power on campus becomes clear – environmental and economic.

Introduction subsection – environmental concerns

Though natural gas is a comparably cleaner energy source than traditional carbon-based sources such as coal or petroleum, the burning of natural gas nevertheless still releases carbon dioxide [4], one of the most notorious greenhouse gases that are causing the global warming [5]. Therefore, for environmental concerns, the burning of carbon-based energy source should be avoided as much as possible. Wind power, despite the carbon emission generated during the manufacturing processes of the turbines [6], release none, if not any does not release additional green house gases once the turbines become functional [6].

Several reviews have been done regarding the potential or achievement of wind power in reducing the overall carbon emission for electricity generation and reliance on fossil fuels. These studies, including Jan Abrell et. al.’s *Carbon abatement with renewables: Evaluating wind and solar subsidies in Germany and Spain [****CITE****]*, and Rajat Kanti Samal and M. Tripathy’s *Cost savings and emission reduction capability of wind-integrated power systems [****CITE****]* demonstrates the possibility and potential of reduction in Kent School’s carbon footprint if wind-power generating facilities are installed on campus, which will in turn further Kent’s path on making the school’s operations more environmentally sustainable.

Introduction subsection – economic concerns

It is evident that to provide students with quality education, Kent School needs to possess certain degree of financial affluency. However, according to various sources, including the Headmaster of the school, Fr. Shell, and the annual report of Kent School [**NEED**], there is a substantial gap existing between the tuition and cost for a student. Therefore, to make Kent education truly available to everyone, the operational cost gap for each student must be reduced. Using wind energy to subsidize the electricity consumption on campus might make the cost reduction possible.

Again, several studies, including Marı´a Isabel Blanco’s *The economics of wind energy [CITE]*, and *The Economics of Wind Energy: A report by the European Wind Energy Association [CITE]*, prove that the average cost of operating wind farm could be substantially lower compared to the cost of buying electricity from the regional power. Therefore, through the utilization of wind power on campus, Kent School can possibility reduce the operation cost for a single student become more financially self-sufficient, in turn providing future Kent students a better education.