



Questions on Wind Power Integration

Judith Cardell - Picker Engineering Program
Astrid Harradan '15 Chelsea Hinds-Charles '15

Abstract:

Using the thought process of a consumer, our research steps through the possible issues with implementing wind power. To do this we compiled a list of questions that may hinder consumers from considering wind energy and the possible ways that wind can profit households and communities. Through a cost-benefit Analysis, the different avenues the consumers can take in order to reach an equilibrium of maximum benefit and minimum cost to maintain their living standards.

How does wind power affect daily routines?

A case study conducted on *Jiminy Peak* confirmed that the daily routine of people do not have to change when they switch to wind power if it is supplemented by grid power. They can supply to the grid when there is excess and take from the grid when there is a shortage.

Will wind power be enough?

The *island of Muck* is completely disconnected from the grid, the community runs on a wind power scheme with the back up of diesel generators. The occupants manage to live without a connection to the grid but it is difficult. All activities needing electricity are carefully scheduled and are not guaranteed.

How can energy be monitored?

There are many different monitoring systems on the market. They vary in the amount of information they give and the amount of installation they require.

What are the cost ?

The integration of wind energy is solving the problem of renewable energy. However, there are environmental cost and living standard inconveniences incurred with the use of wind power devices. Recent studies shows that the noise pollution created by a typical community 495 ft wind turbine is equivalent to 100Hz. This constant production of noise pollution leads to costly health issues. In addition to the noise pollution, another externality is the air pollution produced wind power devices are manufactures. The switch to another power source would cause a large demand of wind power production, causing a drastic increase of toxics in the atmosphere. With wind power as a clean energy producer and not a pollution reducer, society still bears the pollution cost. Other personal cost for consumers to consider include property value decrease, willingness to pay for wind turbine and willingness to accept wind power conditions.

References:

<http://www.jiminypeak.com/>
<http://www.isleofmuck.com/>

Cost-Benefit Analysis

There are many benefits of integrating wind power into the daily lives of consumers. These benefits range from clean air availability to less costly electric bills and sustained natural resources. In this cost-benefit analysis, the equilibrium of the marginal benefit and marginal cost of the integrating wind power is analyzed. This is the ideal point in which the consumer would gain the maximum benefit within their cost range. Spring Focus: what is the future value of integrating wind? Prove that consumers' benefits exceeds the cost per individual.

What other energy sources can be paired with wind?

The "hybrid" combination of solar and wind power is becoming more popular, with batteries added for storage capacity. It is more efficient than either one on its own but scale considerations play a big part in the success of such a system. One a large scale the shadow of the turbine does not affect the solar panels by much allowing the union to be more profitable. This may not be this issue on the household scale but the location of these hybrid systems also play an important part in how effective they will be.

<http://www.mass.gov/eea/energy>
<http://www.bccrwe.com/>