Student:

Professor:

Course:

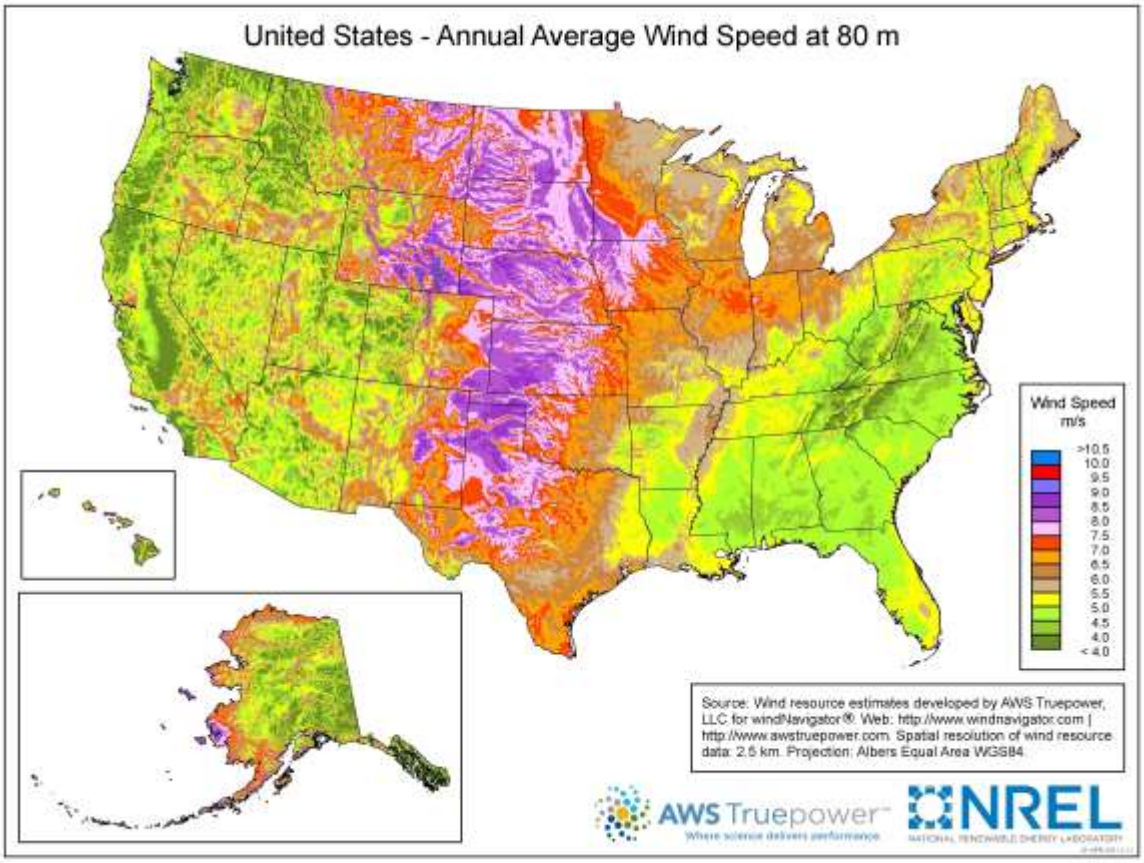
Date:

Decarbonizing Method Technology: Wind Power

With the world seeking to mitigate carbon emission through adoption of clean and renewable energy sources, wind power is increasingly becoming a popular option. The principle behind wind power is to harness the kinetic (wind) energy of fast moving winds that is used to rotate turbines. In turn, these turbines generate electricity which can be commercially viable depending on the velocity of the winds. Harnessing of this wind power sometimes is a challenge because winds are not constantly flowing and therefore at such times there is bound to be overloads and power surges. This has been one of the biggest challenges for wind power generating companies and consequently the basis for the rejection of the technology. In order to generate sizeable amounts of electricity from wind power, wind farms are designed and created with a large number of wind turbines. These wind farms usually feed their electricity to a power grid which is then transmitted to customers. It has been deduced that offshore wind farms are the more viable option for electricity generation as compared to onshore wind farms. This is because in offshore, there are high velocity winds that flow almost all the time. However, it is more expensive to build offshore turbines than building onshore ones. The viability of using wind power as a clean source of energy is that it involves the conversion of wind energy into electricity without intermittent conversion of energy into states that pollute the environment with green house gasses. It is a simple clear and direct way of converting free and renewable wind power into electrical power (Pratt, *et al.* 77).

Resource Analysis

Like with any other mode of energy production, wind power comes with its impacts on the environment and people living near the wind farms. The good thing is that the impacts may be minimized through proper design and siting of the turbines. One of the major impacts is the noise that is generated by the turbines as they rotate. People living near these firms have reported high frequency noise that is detrimental to their health. Another impact is modification of weather because wind turbines have to be located high above any nearby structures. As such, these turbines interfere with the microclimate of a place by impeding natural flow of elements of weather. It has been suspected that wind turbines interfere with communication especially in the use of radio frequencies. Their location near airports can cause interference to the navigation systems of aircrafts but this can be taken care of through counteracting their effects. Besides these impacts, the blades of the turbines have been reported to have a flickering effect which occurs when the sun is shining and the blades are rotating. This flickering can cause a blinding glare on people especially drivers which may lead to accidents (LGID 1).



The wind energy or power is available in the central plains of US which has the most potential to provide energy through generation of electricity. The states of Missouri, South Dakota, Nebraska, Indiana, and Montana are other high energy potentials for wind energy but they are undeveloped. However, plans are underway to institute more sustainable energy projects in terms of wind power generation (NREL 1).

Challenges of Scale

Scaling up of electricity generated from wind power is quite challenging given the unpredictability of the wind resources besides its steep ramp rates. This challenge can be overcome or compensated through the use of more conventional power plants that were in use

before the current technologies came into perspective. Old or traditional ways of generating electricity come with their own challenges of increasing generating costs due to frequent breakdown of equipment. The unpredictability of the wind resource necessitates the use of ancillary services such as load regulation which can only be possible by using smart grid technologies. These technologies are primarily based on communication which places a tight leash on the control of demand responses through a distributed generation. The communication should be fast so that variation can be done through varying generation from different sites which are necessitated by fluctuating wind resources. In the end, customers can be loaded into different grids so that overload problems associated with wind energy can be avoided. However, smart grid technologies require a highly distributed network of wind farms such that intermittent interconnections can be possible through random selection (Pratt, *et al*. 141)

Conclusion

With the world seeking to mitigate carbon emission through adoption of clean and renewable energy sources, wind power is increasingly becoming a popular option. Wind power is one of the most viable clean energy whereby it does not involve generation of green house gasses such as carbon dioxide in the generation of electricity. The underlying principle of generating electricity from wind power is quite simple because it involves the use of turbines that are rotated by wind to produce electricity. For commercially viable projects of wind power, large wind farms are set up that have many wind turbines with large generating capacities. The challenge of unpredictability of the wind resources besides its steep ramp rates can be overcome through using smart grid technologies.

Works Cited

Local Government Improvement and Development. *Benefits and potential impacts of wind energy*. Online 2001-2010. Accessed 17th April 2012 from http://www.idea.gov.uk/idk/core/page.do?pageId=25288108

National Renewable Energy Laboratories. *Dynamic Maps GIS Data, & Analysis Tools*. Online 2012. Accessed 17th April 2012 from http://www.nrel.gov/gis/wind.html

Pratt, R.G., Kintner-Meyer, M.C.W., Balducci, P.J., Sanquist, T.F., Gerkensmeyer, C., Schneider, K.P., Katipamula, S. and Secrest, T.J. *The Smart Grid: An Estimation of the Energy and CO2 Benefits*. Online 2010. Accessed 17th April 2012 from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CDsQFjAA&url=http%3A%2F%2Fenergyenvironment.pnnl.gov%2Fnews%2Fpdf%2FPNNL-19112_Revision_1_Final.pdf&ei=8B-NT4LeM8qxtAbEm4TBCQ&usg=AFQjCNE8vo0BctWdwCrF7_WRE05FKS_Qbg&sig2=ZUBglRu_t9SbtPiYWu-6ow