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Week 5 Report – Wind Turbine placements

Wind turbines cannot be placed anywhere. Wind resource varies greatly upon topography and general wind circulation around the Earth. Prime areas for ample wind resource generally occur on coastlines, large scale plains, mountain ridges and summits, and some valleys.

Besides finding locations that contain great wind potential, it is additionally important that turbines are in accessible areas. These accessible areas typically include the plains and coastlines. In the US, there is significant wind resource on the Atlantic and Pacific coastlines, the Texas Gulf Coast, and the shorelines of the Great lakes. In addition, most of the Great Plains provides excellent wind resource.

There may be many great locations to place turbines within the mountains since high level winds tend to blow harder all year round than those at lower altitudes. However, accessibility becomes an issue along since these areas are accessed by few roads and turbines can be surrounded by deep snow along with the possibility of the blades icing. In addition, given the topography of a mountainous region, several turbines in the same region receive uneven wind exposure.

There can also be high wind resource in lower altitude valleys if wind can be funneled through a narrow constriction to enhance wind speeds. Many of these valleys are already main transportation paths through mountains and already have great accessibility. Given their lower altitude, weather tends to be less extreme than at mountain ridges. However, small scale topographic features combined with large scale funneling effects lead to local wind variability and thus cause difficulty in the turbine placement process.

There is also some seasonal variability in wind resource. The winter months generate the greatest wind resource when upper wind speeds are at their greatest while the summer experiences the minimum in available wind resource.

Lastly, one has to consider all nearby obstacles when placing a turbine. Thus, plains tend to be most reliable and efficient to place turbines since there are few obstacles to change wind flow. Although mountains provide areas of high wind speeds, only a small percentage of the land will be well exposed.

Source - <http://rredc.nrel.gov/wind/pubs/atlas/chp2.html> - Wind Energy Resource Atlas of the United States, National Renewable Energy Laboratory