

Wind Power: Friend or Foe?



A primer for those involved in wind decisions and/or affected by industrial wind power

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Any solution is not better than no solution if it's the wrong solution.

Wind energy has been touted as the panacea for global warming and energy independence. Promoters tell us it's renewable and wind is free. Yes, wind is free. But wind does not convert itself to electricity. Therein lies the failure of the promise of wind.

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This paper addresses the most common complaints about wind. Bottom line, however, is wind able in every way to bring clean, inexpensive, environmentally friendly energy to the world? Even if many of the issues presented here were addressed, actual production and cost would have to be addressed before the industry continues.

Job Creation:

Green energy will add jobs to the economy. This statement is based on the idea “any job is good job”. That is not true, depending on the economic model used. In communism, a job is assigned you and you work it. In socialism, any job is a good job (shared income will cover any industries losing money) or no job is okay because the government will cover unemployment indefinitely. In capitalism, a job that produces goods or services independent of any government assistance is a good job. So, based on these definitions, adding “any job” and requiring government subsidies and taxes breaks to maintain the industry, clearly drops wind energy into the socialist definition of a good job. In a real sense, wind is just another extension of the government and its employment. Take out the government, and the jobs disappear.

Research indicates most jobs in wind would be in the “dirty” job sectors—mining, refining, manufacturing and construction. Turbines require considerable maintenance and may require updating. While figures are very difficult to find on how much carbon this creates, the original outlay of land, CO2 production, etc are massive. Since thousands of turbines will be required to produce small amounts of electricity and transmission lines will have to be built, etc, the math needs to be done. It needs to be done in detail and not just “turbines save CO2 output”. How much carbon comes from mining, refining and so forth. How many “dirty” jobs does it take to create and maintain one turbine?

Environmentally speaking, simply mailing checks to the workers who would have been involved in building turbines would be far better than actually putting in the turbines. Less fuel would be used in mining, construction, employees driving to work, etc. Less electricity would be required for manufacturing and maintenance. And those who were not working on a projects that have yet to prove their worth might actually come up with a solution to the energy problems. We could rename the “green jobs” from wind installation to “R & D” and pay people to sit home and think. Thinking is very environmentally friendly, as long as you don’t move into the action category too soon.

Land issues:

Wind itself is abundant and free. Land for turbines is not. Wind energy requires huge land expenditures to produce a relatively small amount of energy. Wind developers often push the "multiple use" concept--you can still farm, hunt, wildlife still has space, cattle can graze. Wind turbines can and do fail catastrophically as well as throw large chunks of ice in the winter. In some areas, an additional 300 feet or more is being fenced around the turbines even though farmers were told they could plow right up to

the turbines. This means the loss of grazing or farming land that was not part of the original deal. I have not seen pictures of wildlife under turbines and the turbines I do drive by regularly just went in. It takes a while for wildlife to come back to an area if it does come back. One thing turbines will cost is hunting areas. No way will bullets be flying among turbines. Archery might be allowed, though the liability issues would remain. Are there companies that would insure against such liability? I don't know but would suspect such coverage would not be cheap.

There is also the issue of forests being cleared, especially on ridges, to put in wind turbines. The wildlife loses the trees and the forest floor wherever this occurs. There are groups opposing coal mining on ridges yet support turbines going in. Cutting forest is cutting the forest. If coal mining on ridges is wrong due to habitat destruction, turbines are wrong. One could argue turbines do somewhat less damage than mines, so perhaps it's okay to just destroy some of the ridge but not over a certain amount? Who determines how much is too much?

Farming is not completely compatible with wind. Fields are divided, subsoil and top soil mixed, land lost to access roads. After installation, turbines require maintenance and repair, again disturbing the area. Turbines may interfere with aerial application of pesticides and herbicides. Out west, predator control may be affected. If these costs become too high, land owners may choose to sue the wind company for compensation, adding to the cost of wind energy. Or the farmers may lose their farms.

Mining and other “environmentally friendly” aspects of turbines:

Supporting wind energy means supporting mining of iron ore, bauxite and copper, plus rare earth metals, limestone quarries and gravel pits. Several tons of materials per turbine are needed and many industrial wind sites have 20, 30, and even 60 to 100 turbines. Environmentalists have generally opposed mining, yet supporting wind energy means supporting mining. Rainforests are being replaced by mining because mining is very lucrative. With the current push toward hybrid cars and wind turbines, not to mention electronics, "going green" may actually reduce the rainforest faster than any previous activities. Because it takes so much material per turbine and large numbers of turbines needed to produce small amounts of energy, wind energy will take a huge environmental toll through massive mining activities. This toll cannot be just dismissed as the "cost of saving the planet from fossil fuels". It must be factored in. Rarely do “carbon footprint” models address this, especially with real numbers. Generally, a statement such as “carbon used to construct the turbine is recouped in 2 to 5 years”. Let's have actual numbers involving how much carbon is produced by mining, manufacturing, transporting, etc and how much land and forest is lost to mining, roads, and manufacturing plants. Then we can decide how friendly turbines are.

Rare earth mining has often been opposed due to the probability of radioactivity included in the mine with the rare earth metals and the chemicals required to refine the minerals. China currently has a virtual monopoly on both mining and refining. If the US does not want to replace dependence on foreign oil for dependence on Chinese mining and refining of rare earth metals, mining will have to resume in the United States. Groups such as Greenpeace oppose mining but support turbines. You

cannot have turbines without mining. Natural law says so. Turbines require metals for construction. Metal requires mining and refining.



Photos by author

Turbines require access roads and concrete—tons of these. Expect to see more mountains cut down for gravel needs, and more mining equipment, open pit mines, etc. (Illustrations are coal mines, but equipment is basically the same as other mining.)

Blades are constructed of fiberglass and epoxy in many cases. What environmental impact does this process have?

Reports say Japan is perfecting methods to recycle rare earth magnets. This is good, but until an excess of magnets occurs, mining will continue. With China and India increasing their energy needs dramatically, it seems probable that a huge amount of mining will be needed to make these “earth friendly” turbines before recycling can have a significant impact on demands.

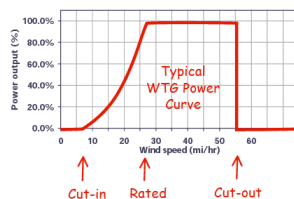
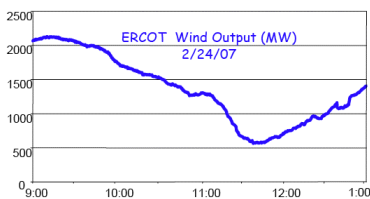
Too much wind:

People often look out on a windy day, see turbines turning and say "At least we're using the wind". What is not often understood is the narrow window of wind speeds that actually produce significant amounts of electricity. Less than 7 to 9 miles per hour and no electricity is made. Over 55 to 65 mph, no electricity is made. In between is a gradient--maximum production occurs around 25 to 30 mph. Keep in mind, the turbines experience the wind speed 200 to 400 feet above the ground. Standing near the turbines won't necessarily indicate what is happening above with the turbine. Additionally, a turning turbine does not indicate electricity is being produced. In high wind speed, the turbines "clutch out" meaning they turn but don't produce electricity. Watching turbines turn does not tell you anything about the electricity produced. It just tells you the blades are turning.

Loss of generation due to high wind

A recent example from Texas

- ERCOT wind event, February 24, 2007
 - High winds in central TX caused wind generation tripping
 - Wind production fell 73% (1.5 GW) in 2 hr
 - 750 MW/hr generation drop off combined with 1000 MW/hr load pick up was difficult to deal with



From National Wind Watch Web Site

Bird deaths

It was interesting to discover that the Audubon Society is completely OK with raptors and owls being whacked into pieces by wind turbines. The society also appears to have the same philosophy concerning bats, though since bats are mammals, perhaps that could explain the indifference in this case. The "reasoning" behind this is global warming is very serious and a few thousand dead birds is the necessary price of stopping AGW. Plus, cars kill birds all the time. This is true and as a point of fact, stopping the use of automobiles would both cut CO2 emissions and save birds. Of course, that battle is not winnable. So turbines are designated acceptable since no one really knows if the turbines are working and turbines seem to make people feel as if they are helping the planet with little visible sacrifice. However, before condemning thousands of birds to horrible deaths, one should first be sure that the instrument of death is actually worth the cost. CO2 emissions must be shown to be cut significantly through turbine use, on a widespread basis. Today, birds appear to be being killed for no verifiable CO2 reductions and very little energy production. Some recognition of this problem is out there. The concern over bird deaths has led to Altamont Pass in California being ordered to put in new turbines so not so many birds are brutally killed. Fewer dead birds is good. In addition, the BLM stopped issuing permits on BLM land due to eagle deaths. It's not just the NIMBY's asking if the killing of raptors and bats is justifiable.

Also, if turbines are allowed to kill birds without being fined, power plants and other companies must be allowed the same practice. No fining conventional power plants and other industries for dead raptors if turbines get a pass. (Some places do apparently fine turbine owners for such deaths, though I'm not sure how widespread this is.)

Noise

The subject of noise is a difficult one. An acceptable level of noise varies from person to person. One person may find living next to train tracks acceptable while another person would be miserable. One of the major problems with turbines is that they are often allowed in rural residential areas--where people moved to get away from industry. By calling the turbine sites "farms" the industry attempts to get people to believe turbines are something other than huge industrial electrical generation plants. Farms are fairly quiet--with predictable sounds. Turbines are not. One of the interesting articles about wind energy in England concerned a developer that did not want to situate their turbines near a public park because of the noise. Even though the developer had stated the noise level would be below the legally mandated maximum, the fear existed that the turbine noise would be too loud for such a public area.

According to Capenews.net, Falmouth, MA has been shutting down their turbines when the wind is over 22 mph to help decrease noise complaints. Most graphs indicate that this speed is around the point where turbines produce the most electricity. So the turbines are being shut down as they start to really make electricity. Millions of dollars to produce little electricity and irritate the citizens who helped pay for the turbines. That does not seem like a sound way to produce something as vital as electricity.

Property values

Property located next to wind turbines would logically be affected to the same degree as homes where a railroad runs close, homes next to refineries, power plants, airports, etc. There are individuals who will buy in such locations. It's doubtful, however, the property will fetch top dollar. The major drawback to selling property next to turbines is the small number of people willing to pay to live in these areas. People often say they would be happy living next to a wind farm, but few ever actually back this assertion up with buying a house next to turbines. Thus, the house will stay on the market longer than real estate in other more conventional areas. The fewer the number of potential buyers, the longer the house takes to sell. Meanwhile, the homeowner is stuck living next to an industrial area which may be loud to him/her, dealing with shadow flicker and huge metal towers close to his home.

Recently, a town back east wrote proposed legislation that would require developers to pay for any lost equity/value in a home next to the wind plant and to buy out persons who did not want to live there. The developers were furious—even though they insisted property values won't drop, they refused to come in with a turbine group if they had to pay for any loss in property values. Seems perhaps the developers are not quite truthful about what happens after the turbines are up.



Photos by author

The first photo makes the turbines look like they are not in a residential area. Probably a good selling point if you want to install a wind power plant. The other photos show the actual area where the turbines are and the crane required to install the turbines.

The wildlife section (below) shows a photo with turbines in the background. Would you buy a house in this area? How close is the house to the turbines?

I would note that power plants do have to go somewhere. The best placement is close to where the power is used so massive amounts of transmission lines are not needed in addition to the plant. Before forever altering someone's life and property, much research and planning needs to go into the placement of plants. Wind turbines do not allow placement in the area needing electricity, except by

chance. Planning and research are on wind speed first, not the housing or people in the area or the number of costly transmission lines that will be needed. This is a serious drawback.

Light

Rea blinking light atop turbines are often mentioned as problematic. This may be a valid complaint but one that would seem to be easily remedied. A company in Norway (Obstacle Collision Avoidance Systems) is working on lights that only come on if a plane is within a certain distance of the tower. If this technology pans out, the problem would be greatly diminished.

(On the down side, larger turbines and more turbines could be installed if this system works, thus encouraging more environmental damage and wasted spending on an energy source that seems marginal at best. Actual performance is the most important criteria, not aesthetics.)

Wildlife

As stated earlier, many anti-wind sources say wildlife leaves the vicinity of the turbines. Undoubtedly, during the construction phase, the wildlife does leave. This is also true with oil drilling, where it is often cited by environmentalists as a reason not to drill. If one accepts that wildlife leaving the area is a reason not to drill, then the same standard must be applied to turbines

It's difficult to get hard data on wildlife and turbines. The VP of the Wyoming conservation league stated in the Casper Star-Tribune that wildlife does live under the turbines. When asked to supply a photo, none of the photos showed animals verifiably under the turbines. Photography allows a person make a distant object appear close or more distant. Without a photo of an animal next to a turbine base, I could not consider the photo proof (I am not saying the photo was deliberately vague, only that it did not prove definitively that wildlife was under the turbine.) The photo below illustrates this.

How far away from the houses are the turbines?

While most wildlife may return after construction, there remains the question of sage grouse living under the

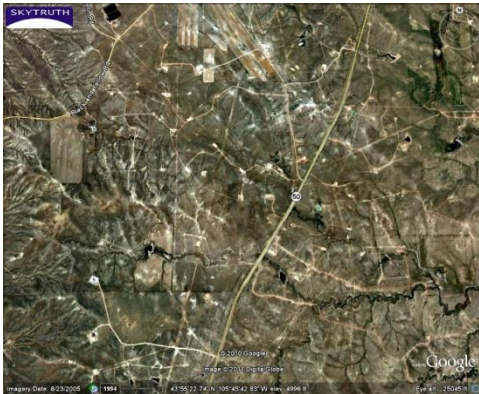
turbines. The only photos I found show them outside of the turbines or in a location that cannot be verified as inside the turbine group. The most important point in the wildlife discussion is that environmental groups have stopped drilling activities in oil and gas to protect wildlife. Until



Photo by author

independent scientific evidence is produced showing turbines do not harm wildlife, turbines must be subject to the same restrictions as oil/gas drilling is. There are not two standards. If one activity is wrong because it potentially harms wildlife, any activity that potentially harms wildlife is wrong.

Visual impacts



The pictures on the left show oilfields (the Jonah field in southwestern Wyoming and gas wells in the Powder River Basin) from the air. The top right is the Tahachapi Wind turbines in California and the Gorgonio wind turbines in California. Visual and land impacts look quite similar. Note that in the oilfield, the drill rigs are replaced with much smaller pump jacks or natural gas piping after drilling is complete. Turbines remain 400 ft tall for their lifespan.

Intermittent nature

Some wind proponents say wind will help with peak times. Actual experience says it may or may not. The graph on the right is actual data from a wind farm in Texas. During peak demand, the wind was at its lowest. This may not always be the case, but we need a large quantity of actual output and demand numbers before it can be shown to be true or false.

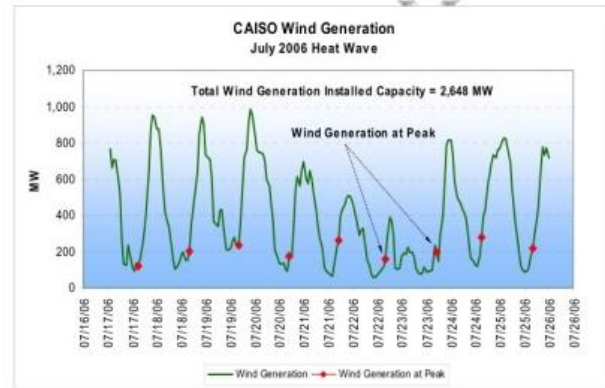


Figure 2: CAISO Wind Generation during the 2006 Heat Wave

In researching the intermittent nature of wind, the following statement from the Renewable Energy Research Laboratory, University of Massachusetts at Amherst attributed to Utility Wind Interest Group, 2003, was the most disturbing:

The need for back-up generation

Wind power plants have been installed in the United States for long enough that detailed studies have been completed on the impacts and costs of its intermittency. A recent study concluded that, "...the results to date also lay to rest one of the major concerns often expressed about wind power: that a wind plant would need to be backed up with an equal amount of dispatchable generation. It is now clear that, even at moderate wind penetrations, the need for additional generation to compensate for wind variations is substantially less than one-for-one and is often closer to zero."

- Utility Wind Interest Group (UWIG) "Wind Power Impacts on Electric-Power-System Operating Costs, Summary and Perspective on Work Done to Date, November 2003"

Okay, it's time to demand that those who make such claims to back up their beliefs with action. Wyoming has 1101 mwh of wind energy installed as of 9/30/2010 (AWEA database). The Dave Johnson power plant produces about 810 to 820 mwh of power annually. So, prove the value of wind and shut the plant down. If Wyoming isn't windy enough to have turbines supply 100% of the power all of the time, nowhere is. Okay, let's let the wind advocates fudge a bit and just shut down one quarter or one half of the power plant. Do the same in Texas. Anywhere—find a state that has sufficient wind according to the advocates of wind and shut down a coal fired power or any conventional plant replacing it with only turbines. If the wind energy people are completely honest, this will not be a problem. If this cannot or will not be done, it does appear that money for wind energy would be better burned for electrical generation. If wind cannot replace fossil fuel power plants, then it fails at its primary goal, that of reducing CO2 in the atmosphere. Construction, mining and installation are actually making the situation worse if the turbines are not cutting CO2. It's time to make sure of what is actually happening and shutting down a coal plant with no replacement except wind should show us if those turbines are saviors or demons.

Actual results:

There are many arguments that wind brought us to America and was good enough for our grandfathers. That would be the grandfathers that walked or took a horse for transportation, had no electricity, no running water and tiny houses on the prairie. Not the ones now with lights, A/C, freezers, computers..... The argument simply does not apply unless the goal is to return to a society without electricity.

Using wind is using a technology that was first just mechanical (pumping water, etc) then individual power sources (ranches, etc outside the grid) and now applying it to a fully electrical society based on instant on, A/C current. This is a huge leap and one that does not seem to have actually been researched. Money was thrown in by the government and turbines became the new savior of the planet. But designating something as a solution does not make it so. Most claims are that wind can produce maybe 10% of our energy—and then only intermittently. Pouring money into this idea before actual performance could be verified was not a good thing. Left on its own, wind energy may have faded away as impractical and been replaced by something that was far more efficient.

One part of wind energy that is difficult, if not impossible, to verify is the stated potential of wind power plants versus the actual output. All wind plants should be required to publish this information. A day by day, hour by hour listing of wind plants and the actual output, plus the original stated generation factor, which is generally the number used to sell wind energy (as in “Wind farm of “x” mwh capacity that can supply “y” number of homes—note the word can, not does). As it stands, wind energy has a license to claim anything it wishes. This is the same thing as say Ford or GM testing the mileage of their cars on a clear, calm day, in no traffic on a flat road. People were angry when they discovered that the car company’s estimated mileage was nothing like real mileage achieved. Changes were made and the mileage numbers were required to be more realistic. Wind power should be subject to the same standards. Taxpayers and consumers should know what their money is producing or not producing.

Wind may be a friend, it may be foe. It’s time to require proof of which adjective applies in scientific, verifiable numbers and studies. No more saying “Wind does.....” Show the carbon savings in clear numbers and not statistics. Show the carbon dioxide output in Denmark before and after wind installation. Make sure this is due to turbines and not outsourcing, conservation ,etc. Show where wind has survived without turbines. Require independent verification from other than governments that subsidize wind and wind turbine sellers. Shut down a coal plant and replace it with only wind. Shut the turbines down for a month and see if anyone notices. Do the same with the coal powered plant. Wind may be the answer, but no more spending, no more building until proof of effectiveness is given.

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Dave Johnson power plant photo

water usage

any little bit helps, wind can stand alone

turbine repairs

graph of energy output

new warning lights

developers pay for lost property value

English developer says his turbines are loud

BLM stops leasing due to eagle deaths

General information sites

Photos not identified as the authors were included according to the "fair use" doctrine of copyright law for non-commercial news reporting, education and discussion purposes.

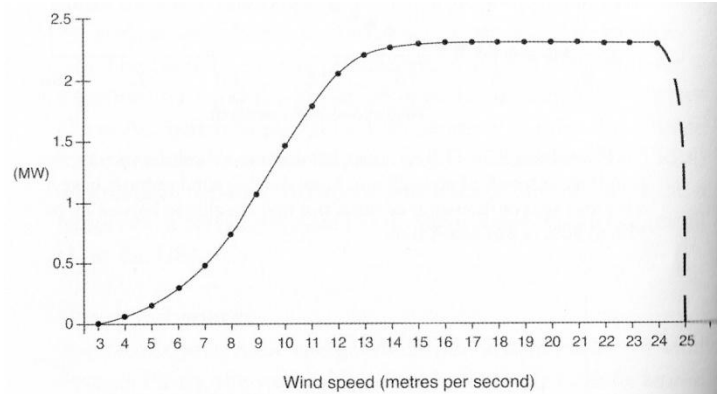
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I will provide additional research and answer questions you may have. Feel free to email or to phone if you want additional information.

A Pictorial Look at Turbines



A turning turbine is not necessarily a productive turbine. There's a curve of power produced, a cut-in speed and a cut-out speed. All a turning turbine means is that at least a tiny amount of electricity. It does not speak to the actual output.



1.4 Typical power curve relating wind speed to electrical output. Data for a Bonus turbine (broken section at and above cut-out speed inserted by author). There is negligible generation below 5 m/s; peak output is not reached until 15 m/s (Beaufort 7 – Near Gale) and at 25 m/s the turbine is shut down for safety.

CO2 Savings



Increased mining, etc are incurred in building and maintaining turbines. Conventional power plants remain open and running. Where are the savings?

Property values:



Would you pay \$200,000 for this house?



How about now?



Home on the range—now with shadow flicker, noise, 400 ft towers. The turbines produce marginal, intermittent energy. For this, a homeowner goes from country home to living next to a power plant. In an area designated rural residential.

Visual impact:



Drill rig

Oil workover rig—similar in height to a drill rig. The actual pump jack seen at the bottom of the rig is much smaller. This is what is left in the oilfield after drilling.

If drill rigs must be kept out to preserve the view, so must turbines.



Is this better than a pump jack or oil rig? These are forever 200 to 400 feet tall.

Multiuse



Security gate to wind power plant. In over 25 years, the oilfield on the same road never had a gate, just a sign to stay out. So this is eco-friendly, multiuse?

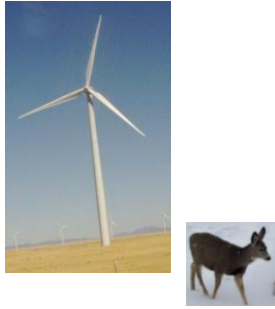


Cattle that appear to be grazing either very near or under turbines. This would constitute multiuse.

Wildlife



Deer and other wildlife stay and forage



Deer leave the area, either temporarily or permanently

There does not seem to be enough information to know on this. However, if wildlife do leave, even during construction, turbines need the same regulations as oil rigs.

Free Fuel (example to illustrate problem)



House #1 gets water from a well. The water is free. To get it to the house, it takes \$10,000 in construction cost, a pump and maintenance costs. The water is free.



House #2 buys water from a municipal source. Cost is approximately \$35 per month, or in 20 years, the homeowner pays \$8400.

Looking at the water as a “free fuel”, which is the best deal? Same applies to wind turbines, when arguing the fuel is “free”.

Every little bit helps to save the planet

Fred

Buys cars, house boats

Believes “any savings is better than no savings” so saves pennies in coffee cans for retirement

At retirement, he receive \$1200/mo from Social Security and a can of pennies per year

(turbine savings are better than no savings)

Mark

Buys cars, house boats

Saves nothing for retirement

At retirement, he receive \$1200/mo from Social Security

(no savings)

Eric

Buys cars, house boats

Cuts spending, makes wise investments

At retirement, he receive \$1200/mo from Social Security and \$700/mo from his investments

(finding a truly cost effective, consistent energy source)

Or does it?

Any solution is not better than no solution if it's the wrong solution.