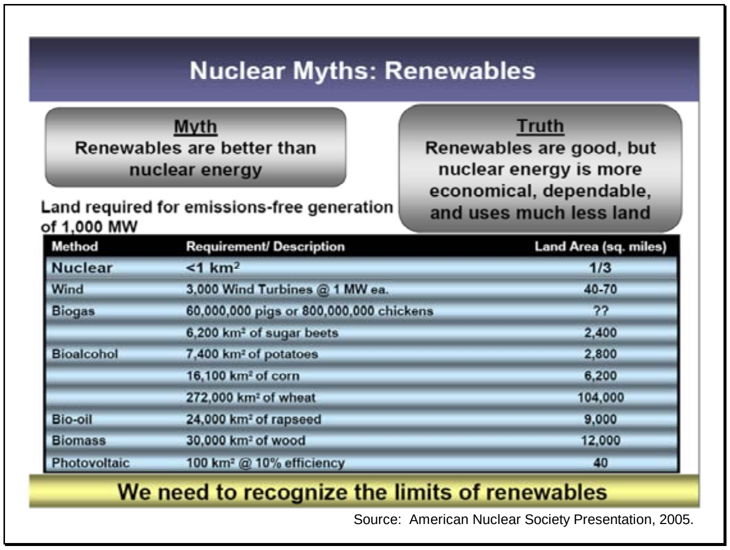
Slide 1

This comparison is intended to summarize a few basic concepts. It is not an all inclusive detailed disclosure of the technical detail required for independent validation.

Wind power is clean, green and has no fuel requirement. What could be wrong with that? the answer is straightforward: the economics, environmental and technical realities make it a born loser without the contrivances of modern political involvement.

Wind energy does require a fuel - a prime mover - wind currents. It is true that wind currents are not a finite resource over the long term, but their guaranteed availability in the immediate term is an overriding factor. On their own, these currents cannot be delivered and stored a just-in-time inventory system as a buffer to predicted demand. And storage schemes "in the pipeline" are, aside from hydro pumped storage, not close to being economically, technically or environmentally viable. Because of this, they have little or no net replacement value for the burning of fossil fuels in either transportation or electricity sectors.

Slide 2



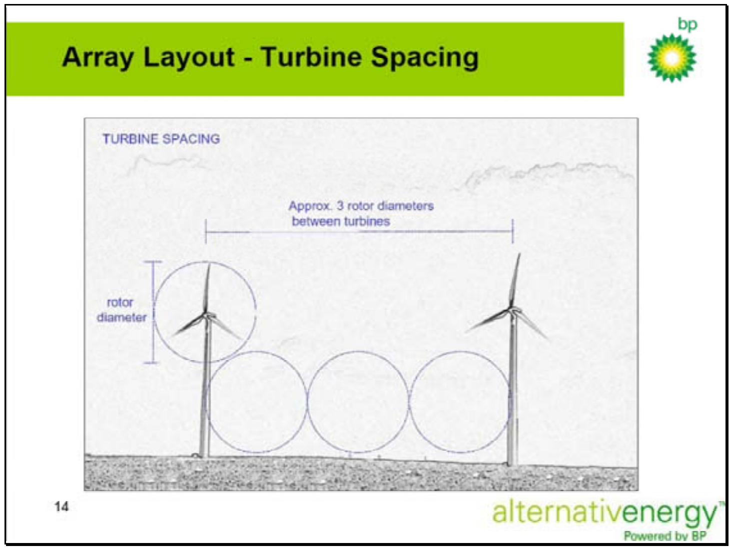
Method	Requirement/ Description	Land Area (sq. miles)
Nuclear	<1 km²	1/3
Wind	3,000 Wind Turbines @ 1 MW ea.	40-70
Biogas	60,000,000 pigs or 800,000,000 chickens	??
	6,200 km² of sugar beets	2,400
Bioalcohol	7,400 km² of potatoes	2,800
	16,100 km² of corn	6,200
	272,000 km² of wheat	104,000
Bio-oil	24,000 km² of rapseed	9,000
Biomass	30,000 km² of wood	12,000
Photovoltaic	100 km² @ 10% efficiency	40

This slide is borrowed from a 2005 presentation by the American Nuclear Society. It references 1MW wind turbines and offers a metric of square miles required to produce an average 1 gigawatt of power annually.
I did some follow up on my own and modified this slide to share what I discovered. The modified version will be shown in a later slide.

Here you can see that wind energy creates much more industrial sprawl than nuclear. Even based on the inappropriate metric of raw productivity irrespective of the intermittency problem or the inverse correlation between windy times and peak demand times, the chart shows wind power to be 120 to 210 times more sprawling than nuclear. Appropriately using reliable supply contribution as a measure of comparison, this disparity becomes much greater.

Industrial sprawl is not welcome by people, and areas without people are areas without demand for electricity. Generation's proximity to load has always been an economic, technical and environmental priority. Why has this changed?

Slide 3



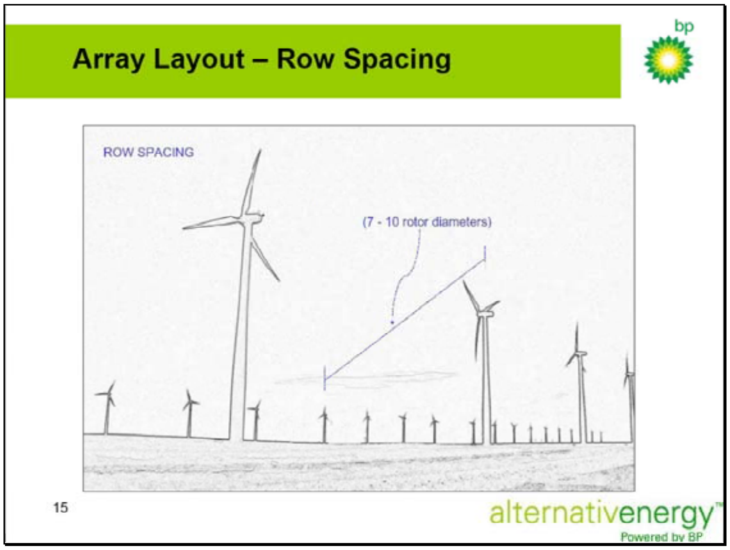
BP Alternative Energy showed these two slides at a recent conference held by the Nation Wind Collaborating Committee.

They show how close together industrial wind turbines can be placed in a row perpendicular to prevailing winds, and how close those rows can be to each other parallel to prevailing winds.

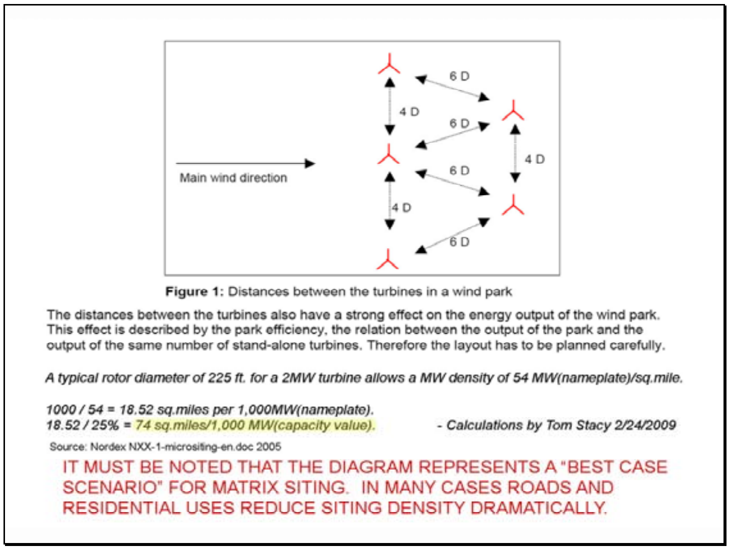
The model assumes, unobstructed prairie without roads or other incompatible land uses. The power-land density model may be appropriate for deserted areas such as portions of the great plains.

From the Ohio valley eastward, home densities and other incompatible rural land uses rise dramatically. In this more densely populated part of the country, the further from civilization, the higher the scenic and wildlife habitat value becomes.

Slide 4


Array Layout – Row Spacing
bp
ROW SPACING
(7 - 10 rotor diameters)
15
alternativenergy™
Powered by BP

Slide 5

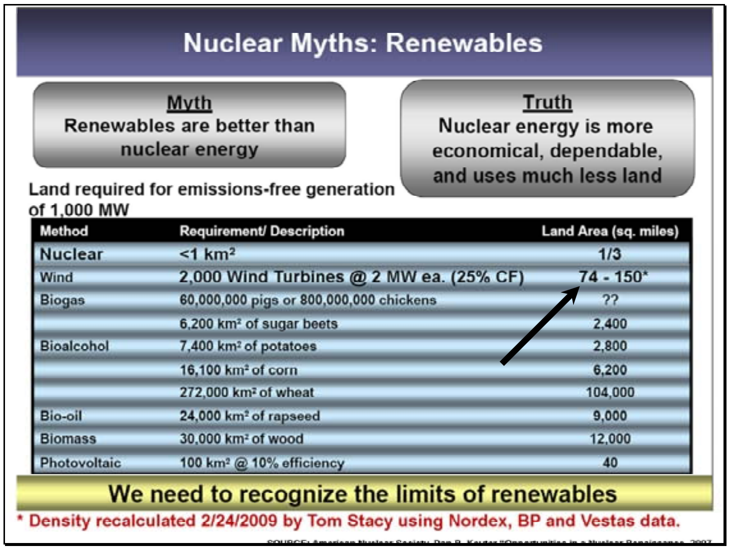


Turbine manufacturer Nordex, offers this overhead diagram showing their minimum recommended spacing between industrial wind turbines to maximize the efficiency of industrial wind turbines.

Today's typical 2MW devices have 270 ft. diameter swept blade circles. At this diameter and recommended spacing, power-land density without obstruction could reach 54 MW *NAME PLATE CAPACITY* per square mile, or about 75 square miles per GW.

In many regions, such as scenic, hilly portions of rural Ohio, home densities of 12 to 50 homes per square mile, developed road infrastructure, and less windy valleys could be expected to reduce the possible density by up to 90% on a project-by-project basis.

Slide 6

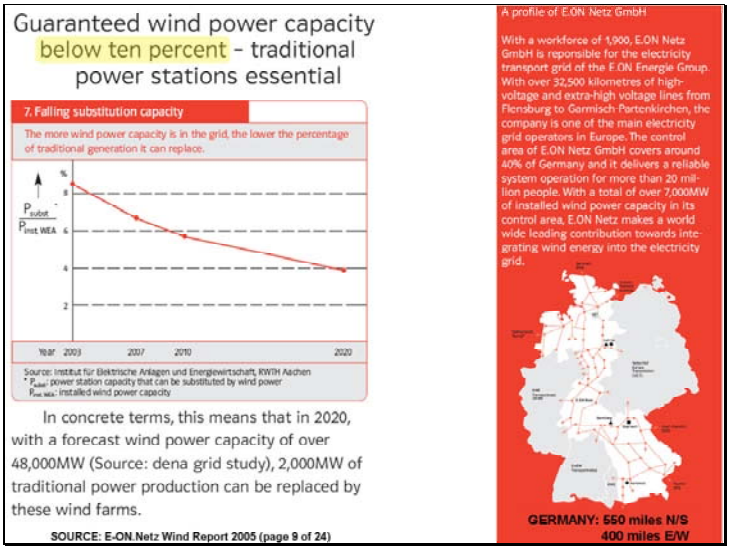


Based on the previous slides, and still using the theoretical maximum power density, here is the updated ANS chart.

It shows that wind energy necessitates 450 times the industrial sprawl of nuclear. Please note that I have used 25% for an annual capacity factor for wind, which would be typical for onshore facilities in Ohio and eastward, except for on top of prominent mountains and Appalachian ridge lines.
This 450 X sprawl factor seems remarkable on its own, but unfortunately the scenario becomes even more dramatic when comparing the generation "apples to apples." Reducing CO2 emissions from natural gas and coal burning generators is one policy goal. Reducing the depletion rate of fossil resources is theoretically another. A separate presentation covers the realities of trying to accomplish the latter goal with wind is under construction.

EON.Netz has done a fantastic job evaluating wind's contribution to reliable supply in their control region, globally the largest collection of wind turbines over a large land area and under one grid region.

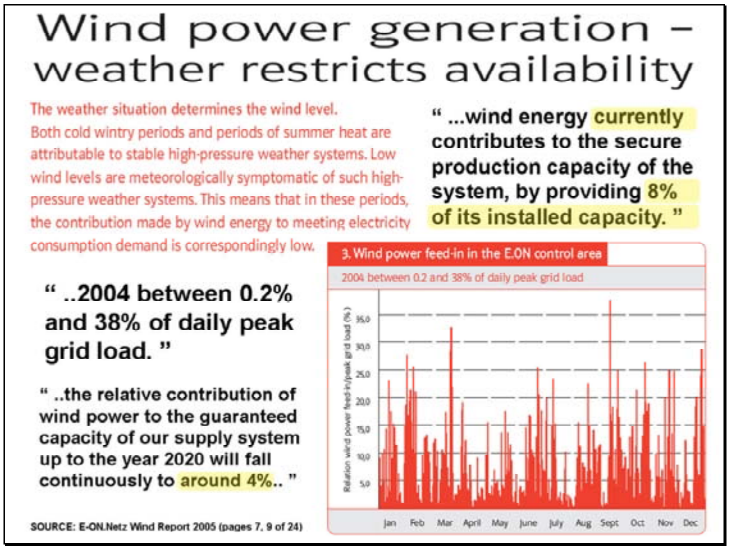
Slide 7



The geographical size and diversity of the EON.Netz region is impressive. The system ranges from coast line on the North Sea, through plains, foothills and finally into the Alps. It spans 550 miles north to south up to 180 miles west to east. Their control region is roughly the size of Ohio and Michigan combined, and their 2005 wind energy report clearly states that even with this land area and diversity integrated into one system, the guaranteed power capacity from thousands of fully integrated and averaged wind turbines is only 8% of nameplate capacity. The balance of the energy (about 2/3 of the total annual wind production) may or may not be useful at the times it is produced.

More troubling is the rate at which wind energy ramps up or down over short periods of time. This reality creates steep change rates between supply and demand that must be balanced by traditional supply/demand matching sources such as natural gas that can react as fast as wind facility output changes. As with automobiles, rapid acceleration and deceleration comes with higher fuel and maintenance costs, and lower fuel and emissions efficiencies.

Slide 8



As you can see, wind power at 48,000 MW in nameplate value would only contribute 4% of its name plate rating to guaranteed capacity.
Think about that: In our proposed "20% by 2030" wind scenario for the US, we should also expect to need 20 times the nameplate capacity in wind compared with reliable, dispatchable CO_2 free nuclear power.

20 times the capacity to replace base load coal burning!

Multiply this by the 500, 2 mW windmills required to reach a name plate rating of just 1GW of nuclear, and we find that it requires nearly 10,000 windmills to equal the guaranteed nuclear.

And all nuclear facilities avoid CO_2 emissions from coal burning generators on a one-to-one basis.

Using a projected 4% guaranteed capacity instead of the overall 25% capacity factor from the earlier chart, the land sprawl intensity is increased SIX FOLD to 2,700 times the sprawl of nuclear for guaranteed capacity contribution.

Slide 9

COST ANALYSIS:

Wind energy "all-in" gross costs (ignoring subsidy contributions) are at about

$2,500.00 per kW *nameplate.* 1.

Lifetime is expected to be 20 to 30 years

Nuclear Energy LWR "all in" cost is about

$5,300.00 per kW *nameplate.* 2.

HISTORY SHOWS NUCLEAR PLANTS ARE VIABLE FOR MUCH LONGER THAN 40 YEARS WHILE IMPROVING SAFETY AND PERFORMANCE!

So is wind cheaper than nuclear?

1.) Babcock & Brown at Public hearings 2008, Logan County, OH   2.) April 7, 2008 Linda G. Stuntz, Stuntz, Davis & Staffier, P.C. "EIA 30th birthday" presentation

In addition to land use and industrial sprawl, capital cost comparisons must be drawn. Bear in mind that capital costs for wind do not substantially reduce the need for capital costs for fossil generators. The investments are IN ADDITION TO investments in reliable and responsive generation facilities.

Both wind and nuclear energy have financial dynamics,caveats and complexities. This makes putting a final number on either one less meaningful, but still of value as an estimate in a "snapshot in time."

Fuel costs, including safe disposal costs for nuclear are not expected to increase dramatically. The raw material uranium is essentially infinite while the utilization efficiency has a proven record of improvement.

Again "mass energy storage" is neither "shovel ready", efficient or affordable. The best technologies lose 1/3 to 1/2 of the energy out compared to the energy in. With already high generation costs, wind energy is not a good candidate for this type of further inefficiency.

Slide 10

COST ANALYSIS:

Applying annual capacity factors, this translates into
wind at 25% ACF = $10,000/kW ACF
nuclear at 90% ACF = $5,900/kW ACF

For *guaranteed capacity* the translation is:
wind at 8% GCC = $33,000/kW
nuclear at 90% GCC = $5,900/kW

Bottom line: Coal CO_2 avoidance from wind costs over 5 times that of nuclear.

"Only guaranteed capacity replaces guaranteed capacity."

The bottom line: Only guaranteed capacity can replace guaranteed capacity, no strings attached.

A more technical recount fills that while a low single digit percentage coal burning may be avoided by the unpredictable portion of interconnected wind energy generation at some moments in time, this benefit comes with a potential risk to system stability at equal spinning reserves and/or a heat rate and cost recovery penalty to load following direct fired natural gas facilities. Furthermore, such benefit is almost impossible to accurately and verifiably measure.

The only true "apples to apples comparison" between wind and nuclear product entails requiring a tandem natural gas backup facility along with every wind energy facility, then recalculating the financial and environmental net benefit of the facility as a guaranteed capacity source.

Slide 11

SUMMARY

- ***Land Use*** and cost for guaranteed capacity and CO_2 avoidance for wind energy is - ***proposterous.***

- As more wind is added, this scenario worsens.

- In the final analysis wind is ***2,700 times as sprawl intensive*** and ***6 times the lifetime cost*** of nuclear for guaranteed capacity replacement and CO_2 avoidance from coal.

- **Only guaranteed capacity replaces guaranteed capacity!**

- Subsidy and Other Programs Intended For CO_2 Mitigation ***MUST REFLECT THESE FACTS!***

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