U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Investigations and Oversight
Subcommittee on Energy and Environment

Impact of Tax Policies on the Commercial Application of Renewable Energy Technology

Testimony of Lisa C. Linowes

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I. Introduction

My name is Lisa Linowes. Since 2006, I've served as executive director and spokesperson for the Industrial Wind Action (IWA) Group, a national advocacy group focused on the impact/benefits analysis and policy issues associated with industrial-scale wind energy development. As publisher and editor of IWA's website (windaction.org), I track news and research pertaining to industrial wind, provide commentary, and facilitate information sharing on the issue. I hold a BS in Software Science from the Rochester Institute of Technology in Rochester, New York and a Masters in Business Administration from Southern New Hampshire University. A more complete biography is included with this testimony. The findings and opinions I am presenting here are entirely my own but reflect the official position of IWA.

II Background and Purpose

Energy policy in the United States calls for the aggressive deployment of renewable generation which has led to an explosion of expensive renewable resources that are variable, operating largely off-peak, off-season and are located in rural areas with limited transmission.

By the end of 2011, nearly 47,000 megawatts (MW) of on-shore wind was installed in the United States representing less than 3% of total electricity generation in the country. Based on the interconnection queues of each grid region in the US, industrial wind is the dominant renewable resource representing more than 90% of the proposed generating capacity of all renewable energy projects in the United States.

My testimony looks at recent trends in the US wind industry including the impacts of advancing significant wind resources. I also examine the effect of the production tax credit and Section 1603 in driving growth.

III Testimony

1. The Wind Mandate: 20% Wind Power By 2030

In 2008, the US Department of Energy (DOE) published *20% Wind Energy by 2030*[1], a report that examined the technical feasibility of using wind energy to generate 20% of the nation's electricity demand by 2030. The report, which called for the deployment of 305,000 MW of wind by the year 2030, including 54,000 MW offshore, has served as the foundation for ongoing advocacy of wind development in the US.

The American Wind Energy Association insists the industry is on track to meet the Department of Energy's goal of 20% wind but getting to a 20% scenario is neither realistic nor wise. The report's authors failed to accurately characterize the purpose and scale of such development, the technology challenges and staggering financial costs, and the fundamental changes to electricity infrastructure necessary to achieve the hoped-for 2030 levels.

This below excerpt from the report has gone largely unnoticed by most people but is essential in understanding the premise behind DOE's 20% wind scenario:

> *Wind power cannot replace the need for many 'capacity resources,' which are generators and dispatchable load that are available to be used when needed to meet peak load. If wind has some capacity value for reliability planning purposes, that should be viewed as a bonus, but not a necessity.*

DOE is well aware of the fact that wind energy is an unpredictable, variable resource that cannot be relied on to deliver electricity when needed. Claims by industry proponents that installed wind today powers, on average, over 12 million American homes misrepresents wind energy's purpose and limited contribution to our energy portfolio. For the authors of the report, satisfying the 20% wind energy goal is entirely <u>independent</u> of our need for reliable power plants meant to meet

[1] 20% Wind Power by 2030 - http://www1.eere.energy.gov/windandhydro/pdfs/41869.pdf

demand. In fact, no amount of wind installed in the US will result in an existing power plant being decommissioned nor will it negate the need to build new reliable generation.

So why build wind at all? Wind is being installed to generate low-emissions energy. Any opportunity beyond that is, as DOE correctly states, "a bonus, but not a necessity."

Nonetheless, the cost and impacts of achieving 20% wind in the United States are staggering. Assuming a start point of 47,000 MW of wind now operating in the US (with none offshore), over 13,000 MW of new wind would need to be installed *year after year* through to 2030 to reach 305,000 MW. In addition, average capacity factors would need to dramatically increase from a current nationwide average of 30%[2] to over 40%.

Even if the industry were able to overcome all manufacturing and construction barriers to meet this goal, other barriers still remain including a) the public's resistance to wind turbines sited near their homes or on publicly-owned lands, national forests and wilderness areas; b) sustained and substantial taxpayer-funded subsidies to ensure project economic viability; c) above-market energy prices for wind and increased capacity payments for reliable resources, and d) the requirement for expansive and expensive power lines to access remote areas of the country.

Moving Wind Offshore

In September 2010, the National Renewable Energy Laboratory (NREL) expanded on DOE's study with the release of its *Large-Scale Offshore Wind Power in the United States*,[3] a report that described the benefits and feasibility of building 54,000 MW of wind offshore along our eastern seaboard, the Gulf of Mexico, and the Great Lakes. Water depths on the Pacific Coast, according to NREL, posed a 'technology challenge'.

No operating offshore wind plants are sited anywhere in the US. The controversial Cape Wind (130 turbines, 468 MW) project proposed ten years ago is still under challenge. Property owners within the viewshed of the project were joined by Wal-Mart, the Associated Industries of

[2] Wiser R. and M. Bolinger. LBNL-4820E. June 2011, *2010 Wind Technologies Market Report*, http://eetd.lbl.gov/ea/emp/reports/lbnl-4820e.pdf

[3] *Large-Scale Offshore Wind Power in the United States*, September 2010 http://www.nrel.gov/docs/fy10osti/49229.pdf

Massachusetts, and wind developer TransCanada[4] among others in protesting the no-compete, high-priced power purchase agreement approved by the Commonwealth of Massachusetts. In Rhode Island, approval of Deepwater Wind's pilot project is under fire. In Delaware, NRG Bluewater Wind terminated its power purchase agreement with Delmarva[5] due to poor economics and growing public opposition to expensive renewable energy. A fight sparked in Michigan over a proposed 1000 MW wind facility in Lake Michigan packed hearing rooms[6] with angry protests. A similar response came from communities along northern New York after NYPA sought bids to build turbines in Lake Ontario and Lake Erie. Both the Michigan and NYPA plans were shelved[7].

None of these projects, in total, match the scale and cost of what NREL claims can be built offshore. Fifty-four thousand megawatts would mean 115 projects equivalent in size to Cape Wind, or 15,000 turbines located within 10-20 miles of our coastlines and spanning 3,000 square miles of open water. The eastern seaboard from Florida to Maine is 1,342 miles.

Obvious environmental and visual impacts are only a part of the issue. Problems with the technology are also very real[8].

And then there's the cost.

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[4] Providence Business News, *Cape Wind energy prices high, not competitive with other green projects* http://www.pbn.com/Cape-Wind-energy-prices-too-high-not-competitive-with-other-green-projects,52862

[5] North American Windpower, *NRG Bluewater officially ends contract for Delaware offshore wind project,* http://www.nawindpower.com/e107_plugins/content/content.php?content.9130

[6] Muskegon Chronicle, *Oceana County Board rejects Scandia Wind's Offshore proposal*, http://www.mlive.com/news/muskegon/index.ssf/2010/08/oceana_county_board_rejects_sc.html

[7] North America Windpower, *NYPA cancels 150MW Great Lakes offshore project*, http://www.windpowermonthly.com/news/1095655/NYPA-cancels-150MW-Great-Lakes-offshore-project/

[8] Turbine failures offshore are harder to repair and are often addressed on an aggregated basis. It's not unusual to wait as long as three months before turbines are fixed, leading to lower equipment availability. While wind conditions offshore might be better for energy generation, harsh environmental conditions could mean turbines are available for fewer hours in the year. In 2005, all eighty Vestas V90 turbines at Denmark's offshore Horns Rev facility had to be removed and repaired owing to the effect of salty water and air. A similar repair was reported on 30 Vestas turbines off the UK coast. In 2010 hundreds of European offshore wind turbines were found to have a design fault that caused the towers to slide on their bases. The problem was universal and not specific to any one project or turbine manufacturer.

The Cape Wind project will cost $2.5 billion for 468 megawatts ($5500/kw), an enormous expense for any individual power plant, especially one expected to deliver only 39% of the time with no guarantee the generation will arrive when most needed. With high upfront costs and fewer hours to spread the cost over, offshore wind is not economically viable without significant public support, above-market, long-term purchase agreements and constraints imposed on more reliable sources of generation.

NREL addresses some of the obstacles to building offshore wind in a very superficial manner. On visual effects, the authors acknowledge that coastal dwellers might object to the turbines and recommend added study to understand coastal communities and their ability to accept changes to the seascape. Regarding property values, NREL relies on the poorly defined Hoen/Wiser[9] study to claim no impact but admit more work is needed for offshore properties. On tourism, NREL concedes the evidence is ambiguous but still claims, "actual effects appear to be minimal". And finally, on marine safety they admit collisions may pose a potentially significant risk to the marine environment or to human safety but offer cold comfort that no incidents have occurred to date.

The true impact of a national renewable vision based on wind is in the public cost, both in dollars and in the impacts wrought by transforming our open spaces, on- and offshore into massive industrial power plants with associated transmission and other infrastructure. Wind proponents advocate for a national energy policy that mandates renewable energy, but public policy requires credible analysis with an objective eye on reality. To my knowledge, no such analysis has been undertaken by DOE.

2. Federal Subsidies Programs: PTC and Section 1603

a. The Production Tax Credit

The AWEA insists the industry is at risk of a slow-down if Congress does not act quickly to extend the production tax credit (PTC), the federal incentive most often credited for market growth in the wind sector. The PTC expires at the end of 2012.

[9] Wilson, Albert R., *Wind farms, residential property values, and rubber rulers*, http://www.arwilson.com/pdf/newpdfs/WindFarmsResidentialPropertyValuesandRubberRulers.pdf

But if the PTC were to expire, the damage would be less than what AWEA claims.

Attributing wind market activity to the PTC is overly simplistic and fails to consider other crucial factors driving development in the US.

The PTC was established by the Energy Policy Act of 1992 to stimulate use of renewable technologies for power generation by providing a production-based credit for the first 10 years of project operations. Initially set at 1.5¢/kWh, the credit is adjusted annually for inflation and today stands at 2.2¢/kWh.

When adopted, the House Ways and Means Committee insisted on an expiration date (June 30, 1999) to give Congress an opportunity to assess the effectiveness of the credit in meeting its goal. In each of the five years following the PTC's enactment wind capacity declined[10]. It wasn't until 1998 and 1999 before the trend drifted upward. (see Exhibit 2)

While it's possible the market needed time to respond to the new subsidy, other more significant factors likely stalled growth.

The US was awash in generation and oil prices were low and stable. Deregulation shifted plant ownership to independent power producers which led to improved plant management and increased efficiencies. This was particularly true for nuclear power where average capacity factors grew from 66% in 1990 to over 90% currently[11].

The demand for renewable energy largely didn't exist except in States with programs that encouraged renewable generation. It's no accident that the bulk of new wind built in 1998-99 occurred in four states[12] with renewable programs -- California, Iowa, Minnesota and Texas.

[10] http://www.eia.gov/totalenergy/data/annual/xls/stb0811a.xls

[11] http://www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/graphicsandcharts/usnuclearindustrycapacityfactors

[12] http://www.windpoweringamerica.gov/wind_installed_capacity.asp

When the Asian financial crisis hit in 1997, oil prices collapsed[13] taking with them any financial incentive to build new renewable generation. The PTC expired in 1999, the same year oil prices bottomed out, and new wind installations went bust the following year.

AWEA has complained for over ten years that expiration of the PTC in 1999 caused development to slow calling it the boom-bust cycle. Yet given available data, it's impossible to isolate the factors that contributed to the decline. Clearly other macroeconomic issues played a crucial role. Some energy experts maintain the PTC was largely irrelevant in those years.

After 2004, the PTC may have contributed to growth in the wind market, but so did State policies mandating renewables. Wind benefited from rising natural gas prices as well (over $5 per million BTU) making wind power contracts an attractive way to displace higher-cost natural gas generation.

By the middle of 2008 the US economy stumbled and energy prices dropped off quickly. With incomes falling, tax-based policy incentives lost much of their effectiveness as tax equity investors disappeared. Section 1603 cash grants created under the 2009 stimulus were designed to fill the void.

In press reports this month, AWEA CEO Denise Bode credited the industry's recent growth to the fact that the PTC has not expired for the past five years. This is not accurate. The vast majority, of the wind built since 2008 through to the end of 2012 is directly tied to Section 1603 grant funding.

But with 1603 now expired the wind industry has again turned its attention to extending the production tax credit (PTC). Ditlev Engel, chief executive officer of Vestas Wind Systems A/S complained that US turbine sales may "fall off a cliff"[14] unless lawmakers extend tax credits beyond 2012.

Turbine sales may decline but not because of the PTC.

[13] http://www.slideshare.net/FNian/asian-financial-crisis-presentation (Slide 26)

[14] Bloomberg News, US wind market set to 'Fall Off a Cliff,' Vestas CEO says, http://www.bloomberg.com/news/2011-11-09/u-s-wind-market-may-fall-off-a-cliff-in-2013-vestas-ceo-says.html

The 2008 recession slowed economic growth causing demand for electricity to drop. Many States, including California[15], are now signaling their renewable mandates are being met which will weaken demand for wind. Recent discoveries of abundant shale gas reserves are expected to keep gas prices low and stable through to 2020 and likely longer. Since natural gas is among the important elements in determining the competitiveness of wind, low gas prices will generally reduce wind's attractiveness as a 'fuel saver'. In fact, the Energy Information Administration is forecasting flat growth[16] in the wind sector for the next ten years regardless of what happens with the PTC.

The production tax credit largely benefits corporate investors and wind project owners. For investors like General Electric, the credit is an open-ended subsidy[17] offered for each kilowatt-hour of electricity produced. Because the PTC directly reduces the amount of federal income taxes paid, it should be thought of as providing 2.2¢/kWh of after-tax income (in 2011 dollars).

This represents a pre-tax value of approximately 3.7¢/kWh (assumes a 40% marginal tax rate). When measured relative to the price of wholesale power, the PTC is exceptionally generous.

Claims by AWEA of wind being at cost parity with non-renewable resources should not be taken on face value.

For consumers, the production tax credit disproportionately benefits ratepayers in States with renewable energy mandates by distributing the high cost of wind to taxpayers at large. And since the subsidy is uniform across the country it's highly inefficient, supporting poorly sited projects as well as projects that would have been built regardless of the credit. This is certainly true in Texas and the Pacific Northwest where wind exceeds transmission capacity, in New York where average annual capacity factors are under 25% and in New England where utilities routinely sign long-term power contracts at prices significantly above market.

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[15] Letter by Michael Picker, Senior Advisor to the Governor of California for renewable energy facilities, to the Western Electricity Coordinating Council, http://www.windaction.org/documents/33056

[16] EIA Table 16. *Renewable Energy Generating Capacity and Generation*, http://www.eia.gov/forecasts/aeo/er/tables_ref.cfm

[17] Congressional Joint Committee on Taxation, May 2005, *Present Law And Background Relating To Tax Credits For Electricity Production From Renewable Sources*, http://www.jct.gov/publications.html?func=startdown&id=1579

b. Section 1603 vs. PTC

The Section 1603 cash grant program enabled developers to secure direct monetary outlays from the Federal government to cover 30 percent of a project's qualifying cost. The criteria for receiving the grant were not onerous and the Treasury Department was prohibited by law from ranking the projects before distributing the funds.

Spanish energy giant Iberdrola Renewables, Inc. received over a billion dollars in cash grants alone. A preliminary evaluation[18] of the grant outlays published by Lawrence Berkeley National Laboratory (LBNL) in 2010 found that 61% of the grants distributed through to March 2010 "likely would have deployed under the PTC [production tax credit] if the grant did not exist." In many cases, money went to projects that were already under construction, and in some cases already producing electricity. Wind developers whose projects received Section 1603 money complained[19] that it was unfair to criticize them for taking the funds because their projects otherwise would have received the production tax credit. They insisted the cost to the taxpayers was not materially different.

Aside from the obvious intrinsic value of cash in hand versus tax credits earned over a period of ten years, I was prompted to look further into the numbers themselves to test the claim of equivalence.

I looked at two operating geothermal facilities, five operating onshore wind energy facilities and five approved, but not built wind projects including two offshore applications.

Exhibit 3 shows my findings. In all cases, cash grants that were (or will be) distributed exceeded anticipated production tax credit amounts in total by over one-half billion dollars. In general, projects with greater development costs (more than $2150/kw for wind) and/or lower average capacity factors (under 30% for wind) received substantially higher benefits from the cash grant

[18] Lawrence Berkeley National Laboratory Bolinger, M., Wiser, R., Darghouth, N., *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009,* http://eetd.lbl.gov/ea/emp/reports/lbnl-3188e.pdf

[19] The New York Times, *Stimulus Cash Flowed to Completed, Under-Way Renewable Energy Projects,* http://www.nytimes.com/gwire/2010/10/14/14greenwire-stimulus-cash-flowed-to-completed-under-way-re-95989.html?pagewanted=all

than the current PTC. To keep the table simple, I did not apply a 7.5% discount rate to the production tax credit. If I had, the monetary differences of the two programs would have been more stark since the cash grant is received at the start of the operational life of a renewable energy project.

With upfront cash grants developers have minimal incentive to negotiate lower prices with suppliers. In fact, the more expensive a project is to construct the better for vendors, contractors and developers.

There are other qualitative benefits under the cash program which shift the rewards to developers while laying project debt and risk at the feet of American taxpayers. Unlike the PTC, the cash grant is not dependent on project performance. If a project's capacity factor is marginal the public still grants the cash. Projects that would normally not meet financial threshold requirements are apt to get built anyway. The Section 1603 program substitutes government payments for private investments after which the government just walks away.

c. The high cost of subsidizing wind

Since the PTC was adopted in 1992, its annual cost has ballooned from $5 million a year in 1998 to over $1 billion annually today. Even if the PTC were to sunset, taxpayers are still obligated to cover nearly $8 billion in tax credits for wind projects built in the last decade. (Exhibit 4) This is in addition to the over $15 billion paid out or accruing for projects built under Section 1603.

Exhibit 4 compares yearly installations of wind under the PTC and 1603 and looks at the cost of each subsidy. If the goal of a subsidy is getting wind turbines erected in the US, Section 1603 is the more aggressive program for driving development. But the grants under 1603 are excessive.

The New York Times examined the government largess secured by Canadian investment giant Brookfield Asset Management for its Granite Reliable Wind park, a 99 MW facility now under construction in northern New Hampshire. According to the Times, the project "will receive so many subsidies for a New Hampshire wind farm that they are worth 46 percent to 80 percent of

the $229 million price of the project, when measured in today's dollars"[20]. Brookfield received subsidies under Section 1603, Section 1705 (partial loan guarantee), and the Modified Accelerated Cost-Recovery System (MACRS)

3. Wind energy and jobs claims

In 2007, the AWEA touted that the industry represented 50,000 direct and indirect jobs in the US, a figure that jumped to 85,000 in 2008 but by 2010 dropped to 75,000 with roughly 20,000 in the manufacturing sector.

AWEA's 2010 annual report lists pages of facilities it claims are US Wind Industry Manufacturing Facilities. Of the 450+ facilities listed, less than 75 represent plants dedicated to building turbine parts (blades, towers, nacelles) including Vestas and Gamesa plants in Colorado and Pennsylvania respectively. The rest build components for industrial uses. Many have been in business for decades and their sole business is not wind-specific. AWEA omits any details showing the percentage of each company's gross revenues tied to the wind industry so verifying job counts is not possible.

Wind construction jobs are not permanent so the industry would need to reach peak levels of development year after year just to maintain current job levels. When installations dropped in 2010, it was no surprise that jobs dropped as well. And since growing the manufacturing base is predicated on installing more wind turbines it's difficult to envision a scenario where job growth is sustainable.

This month, NREL released a report entitled *Preliminary Analysis of the Jobs and Economic Impacts of Renewable Energy Projects Supported by the §1603 Treasury Grant Program*[21]

[20] New York Times, Lipton, E. and Krauss, C., *A Gold Rush of Subsidies in Clean Energy Search*, http://www.nytimes.com/2011/11/12/business/energy-environment/a-cornucopia-of-help-for-renewable-energy.html?_r=1&pagewanted=all

The wide range reflects a disagreement between the experts on the future price of electricity in New Hampshire. Brookfield received subsidies under Section 1603, Section 1705 (partial loan guarantee), and Modified Accelerated Cost-Recovery System (MACRS) as well as state and local benefits.

[21] NREL April 2010, *Preliminary Analysis of the Jobs and Economic Impacts of Renewable Energy Projects Supported by the §1603 Treasury Grant Program* http://www.nrel.gov/docs/fy12osti/52739.pdf

which examined the impact Section 1603 had on job growth and development for the wind and PV solar industries.

Using a modified version of its JEDI model to enable modeling on a national level, NREL estimated that 1603 grants for *both* wind and PV solar projects supported between 52,000 and 75,000 direct and indirect jobs annually. For wind alone, average jobs per year were between 44,000 and 66,000. It's difficult to map NREL's results to AWEA's job numbers but it would appear that job growth in the wind industry since Section 1603 has declined.

But that's only part of the jobs tale.

In 2010, the State of Vermont published the results of its study[22] to evaluate the consequences of adding just 50 megawatts of renewable energy at prices that were higher than market-based alternatives.

The analysis found the *Feed in Tariff* program would increase Vermont capital investment and create jobs during its 26 year life cycle, however, the net gain in employment was found to be far less than conventionally thought. Following an initial increase in temporary construction-related jobs, long term employment would average thirteen full time jobs per year, including both direct and indirect employment in the energy sector as well as the job and income related effects of increased electricity costs. But other sectors, predominately service sectors, would suffer long term net job losses. In essence jobs would be created in one sector of the Vermont economy at the expense others.

But job transfer was not the only finding reported from the study. The model also showed that above-market energy costs due to higher electricity prices would have the deleterious effects of "reshuffling consumer spending and increasing the cost of production for Vermont businesses" and that "increased costs for households and employers would reduce the positive employment impacts of renewable energy capital investment and the annual repair and maintenance activities".

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[22] The Economic Impacts of Vermont Feed in Tariffs
http://publicservice.vermont.gov/planning/DPS%20White%20Paper%20Feed%20in%20Tariff.pdf

NREL's report makes clear (footnote 2) that its analysis omits any evaluation of job displacement or loses due to wind and PV solar development under Section 1603. In essence, NREL modeled benefit of 1603 without acknowledging any cost.

4. The hidden subsidies for wind power

Independent of the PTC and Section 1603, millions of public dollars have been spent supporting wind power development in the US. One example is the work undertaken by DOE, FAA and the DOD to evaluate and try to mitigate for the impacts of large-scale wind turbines on military and navigational radar in the US. By 2008, nearly 40% of our long-range radar systems were already compromised by wind turbines[23]. We've doubled our wind capacity since then but the problem of radar interference persists.

Our military services and federal agencies have conducted numerous studies on the radar question, as have multiple international military and private interests[24]. Not all studies agree on levels of severity and potential mitigations, but all agree that large scale industrial wind turbines have the potential to negatively affect military installations, radar, and navigation aids.

According to Raytheon lead radar engineer, Peter Drake[25], radar mitigation technology does not yet exist: ' …These things [wind turbines] inside of 20 miles, look like a 747 on final approach, the trick for us is to somehow make them disappear, while still being able to see a real 747…we have not figured that out yet.'

While most of the information pertaining to turbine interference is not readily available to the public, the below situations are known:

[23] Long Range Radar Joint Program Office Wind Farm Brief
http://www.windaction.org/?module=uploads&func=download&fileId=2178 (Slide 3)

[24] Report to the Congressional Defense Committees, *The Effect of Windmill Farms On Military Readiness 2006*,
http://www.defense.gov/pubs/pdfs/windfarmreport.pdf

[25] NAS Kingsville Wind Farm Effects on Air Traffic Control and Compatible Siting Collaboration
http://growinggreencommunities.com.ismmedia.com/ISM3/std-content/repos/Top/Text%20Blocks/Speakers/Presentations/AP/AP%20McLaughlin.pdf

a. **Travis AFB.** The Travis Midair Collision Avoidance (MACA) pamphlet[26] warns that wind farms southeast of the base interfere with primary radar. Pilots are urged to fly with their transponders on to be seen by the secondary radar system (SSR) installed at air traffic control facilities. But transponder-only airspace relies on pilots complying with the warning. Recreational pilots may not remember to comply or their aircraft might not be adequately equipped. SSR also assumes pilots want to be seen.

b. **Naval Air Station Kingsville, Texas (NASK).** Despite proposed technical mitigations, documents released by the Texas Comptroller's office recommended[27] that at least one school district near NASK deny special tax treatment for a wind project due to impacts at NASK radars. NASK trains 50% of our US naval aviators.

It is critical that Congress investigate this issue more closely and fully ascertain the costs in dollars and reduced radar surveillance occurring due to wind development. We can easily define and quantify the cost of subsidies like the PTC and 1603, subsidies meant to support renewable energy. Such hidden subsidies, however, are easily kept from public view but the risk to our national security and military readiness is far more impacting.

5. Summary

a. The Department of Energy's goal of 20% wind by 2030 is entirely independent of our need for reliable power plants. No amount of wind installed in the US will result in an existing power plant being decommissioned nor will it negate the need to build reliable generation. Wind is being installed to generate low-emissions energy.

b. The cost and impacts of achieving 20% wind in the United States, including 54,000 MW offshore are staggering and not realistic.

c. The production tax credit disproportionately benefits ratepayers in States with renewable energy mandates by distributing the high cost of wind to taxpayers at large. And since the

[26] Travis Midair Collision Avoidance (MACA) pamphlet, http://www.windaction.org/?module=uploads&func=download&fileId=2180 (Page 8)

[27] Economic impact evaluation of wind turbines in the vicinity of the Naval Air Station Kingsville http://www.windaction.org/documents/34352

subsidy is uniform across the country it's highly inefficient, supporting poorly sited projects as well as projects that would have been built regardless of the credit.

d. Section 1603 cash grants shift the rewards to developers while laying project debt and risk at the feet of American taxpayers. The cash grant is not dependent on project performance. Even project with marginal capacity factor still receive the cash. Projects that would normally not meet financial threshold requirements are apt to get built anyway.

e. Since the PTC was adopted in 1992, its annual cost has ballooned from $5 million a year in 1998 to over $1 billion annually today. Even if the PTC were to sunset, taxpayers are obligated to cover nearly $8 billion in tax credits for wind projects built in the last decade. This is in addition to the over $15 billion paid out or accruing for projects built under Section 1603.

f. In 2007, the AWEA claimed 50,000 direct and indirect jobs in the US, a figure that jumped to 85,000 in 2008. By 2010, jobs dropped to 75,000 with roughly 20,000 in the manufacturing sector.

g. Independent of the PTC and Section 1603, millions of public dollars have been spent evaluating and trying to mitigate for the impacts of large-scale wind turbines on military and navigational radar in the US. Developers have been asked to provide some funding but there are no clear rules for establishing funds and how costs can be shared between developers.

Exhibit 1: 20% Wind Power by 2030

Image: Elk River 150mw facility, Butler County Kansas

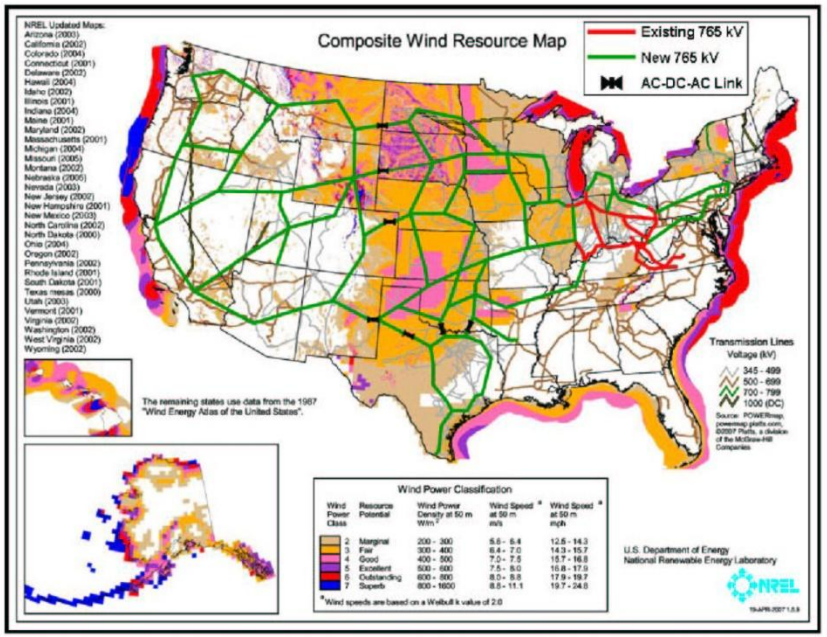

Exhibit 1: Conceptual 765 kV backbone system for wind resource integration (edited by AEP).

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"Wind power cannot replace the need for many 'capacity resources'…If wind has some capacity value that should be viewed as a bonus, but not a necessity."

-- US Department of Energy

Exhibit 2: Annual Wind Capacity Increases

Attributing wind market activity to the PTC is overly simplistic and fails to consider other crucial factors driving growth in the U.S.

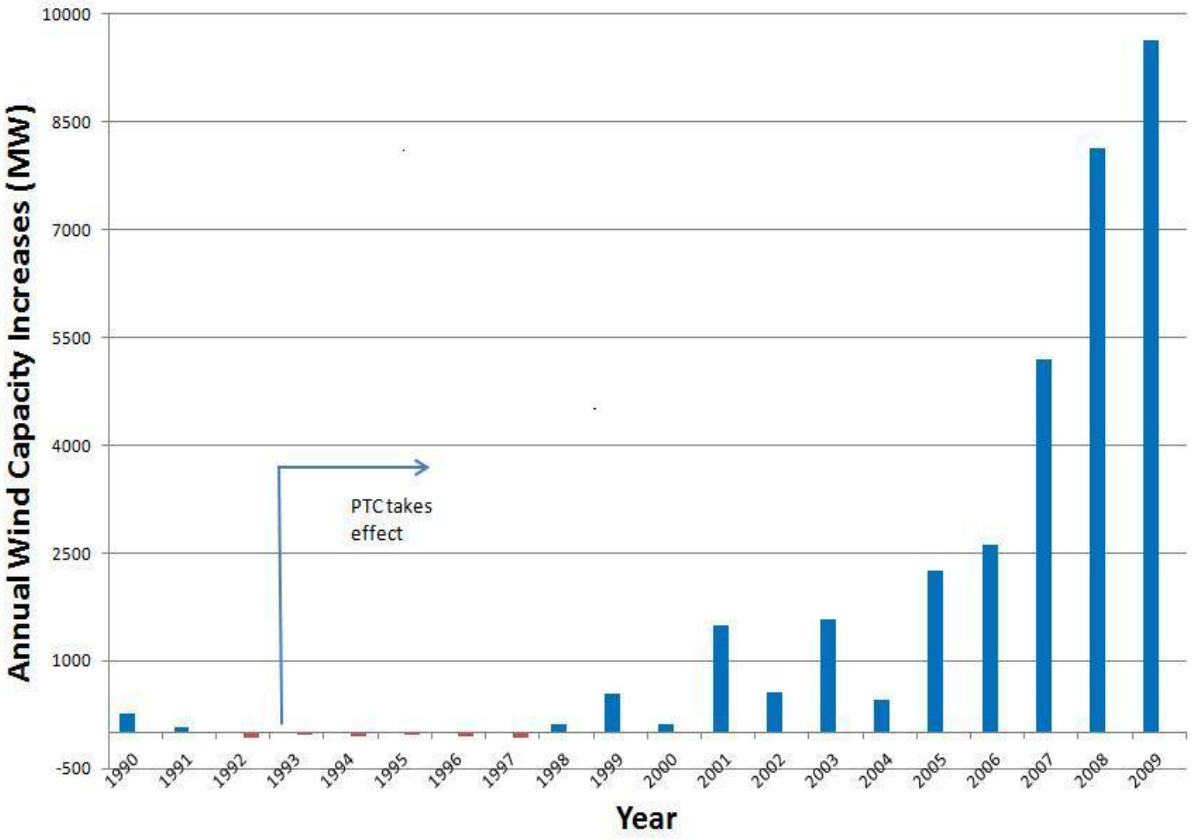

Exhibit 3: Section 1603 vs. the PTC

Project name	State	Fuel	1603 Grant	MW Installed	Capacity factor	PTC (note 1)	Overpayment	Percent overpaid	PTC Equivalent per MWh	Notes
Thermo No. 1 BE-01, LLC	UT	Geothermal	32,990,089	10	90%	$17,344,800	$15,645,289	**90%**	**$41.84**	6
ORNI 18 LLC	CA	Geothermal	108,285,626	50	60%	$57,700,368	$50,585,258	**88%**	**$41.29**	6
Noble Wethersfield	NY	Wind	81,776,684	126	22%	$53,421,984	$28,354,700	**53%**	**$33.68**	2
Canandaigua Power Partners, LLC	NY	Wind	52,352,334	88	20%	$33,726,000	$18,626,334	**55%**	**$34.15**	2
Canandaigua Power Partners II, LLC	NY	Wind	22,296,494	38	23%	$16,622,100	$5,674,394	**34%**	**$29.51**	2
Papalote Creek I	TX	Wind	116,784,666	180	30%	$104,010,984	$12,773,682	**12%**	**$24.70**	2
AES Armenia Mountain Wind, LLC	PA	Wind	69,460,892	101	29%	$55,587,193	$13,873,699	**25%**	**$27.49**	2
Libman Company	*IL*	*Wind*	*1,566,000*	*1.8*	*19%*	*$659,102*	*$906,898*	***138%***	***$52.27***	*3,5,7*
Granite Reliable Power	*NH*	*Wind*	*61,841,880*	*99*	*30%*	*$58,001,011*	*$3,840,869*	***7%***	***$23.46***	*3,5,7*
Caithness Energy Shepherds Flat	*OR*	*Wind*	*500,000,000*	*845*	*27%*	*$439,690,680*	*$60,309,320*	***14%***	***$25.02***	*3,5,7*
Deepwater Wind	*RI*	*Wind, offshore*	*55,350,000*	*30*	*40%*	*$23,126,400*	*$32,223,600*	***139%***	***$52.65***	*3,5,7*
Cape Wind	*MA*	*Wind, offshore*	*675,000,000*	*468*	*40%*	*$360,771,840*	*$314,228,160*	***87%***	***$41.16***	*3,4,5,7*
Totals			**1,777,704,665**	**2035**		**$1,220,662,463**	**$557,042,202**	**46%**	**$32.04**	

Notes:

1: PTC set at a non-discounted 2.2 cents per kwh.

2: Capacity factors determined from FERC EQR data. NY project capacity factors verified using NYISO Gold Book.

3: 1603 Grant amount based on published project costs less 10% estimated unqualified costs (ex: transmission costs).

4: Capital costs based on MA Attorney General analysis. Cape Wind Associates has not released project costs.

5: Capacity factors based on published reports for the project.

6: ORNI 18 CF based on published reports. Otherwise assumes 90% CF for geothermal.

7: Projects in italics are approved but not built.

Exhibit 4: Comparing Costs

Year	New Wind subject to PTC (MW)	Accumulated wind subject to PTC (MW)	Expired PTC - 10 years (MW)	PTC Tax Credit obligation[1,3]	New Wind subject to 1603 Grants (MW)[2]	1603 Cash grant obligation[4]	Accumulated wind Installed (MW)	PTC by year
Start-1997							1,610	$0.016
1998	110	110	0	$4,928,433			1,720	$0.017
1999	532	642	0	$28,687,085			2,252	$0.017
2000	125	767	0	$34,265,867			2,377	$0.017
2001	1,487	2,254	0	$100,697,336			3,864	$0.017
2002	553	2,807	0	$132,779,821			4,417	$0.018
2003	1,579	4,385	0	$207,451,550			5,995	$0.018
2004	461	4,846	0	$229,240,246			6,456	$0.018
2005	2,251	7,097	0	$354,353,273			8,706	$0.019
2006	2,622	9,719	0	$485,293,951			11,329	$0.019
2007	5,186	14,905	0	$783,428,192			16,515	$0.020
2008	8,136	23,042	110	$1,265,532,143			24,651	$0.021
2009	3,789	26,831	642	$1,445,290,552	6,200	$3,599,100,000	34,640	$0.021
2010	0	26,831	767	$1,506,894,312	5,021	$2,914,690,500	39,661	$0.022
2011	0	26,831	2,254	$1,420,924,175	6,810	$3,953,205,000	46,471	$0.022
2012	0	26,831	2,807	$1,388,951,927	8,000	$4,644,000,000	54,471	$0.022
2013	0	26,831	4,385	$1,297,686,480			54,471	$0.022
2014	0	26,831	4,846	$1,271,055,852			54,471	$0.022
2015	0	26,831	7,097	$1,192,795,247			54,471	$0.023
2016	0	26,831	9,719	$1,034,288,110			54,471	$0.023
2017	0	26,831	14,905	$720,806,789			54,471	$0.023
2018	0	26,831	23,042	$229,022,316			54,471	$0.023
2019	0	26,831	26,831	$0			54,471	$0.023
PTC obligation 2009-2018				**$11,507,715,759**		**$15,110,995,500**		
TOTAL CREDITS & GRANTS				**$26,618,711,259**				
Total PTC obligation 1998-2018				**$15,134,373,655**				

Assumptions:

1. PTC is permitted to expire, no new wind built after 2012.

2. All wind built 2010-2012 eligible for Section 1603 cash grants.

3. A 30% capacity factor assumed for in-service projects.

4. Estimated 1603 grants assume $2150/kw capital cost with 90% eligible under Section 1603.