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Gone With the Wind? Understanding the Problems of Wind Energy Policy in the United States Through the Successes of Denmark and Germany

by Alex Bandza

Editors' Summary: The United States saw a phenomenal period of wind installation in 2006, with over 3,000 megawatts of installed capacity added. Is this just another upswing in the boom-bust cycle of wind power in the United States? Alex Bandza offers an answer based on the histories of wind power and energy policy in three different countries. In this Article, he compares wind policies in Denmark, Germany, and the United States. Pulling from lessons learned from successes in the European countries, he suggests how future U.S. legislative decisions might be shaped to prevent the recurrence of policy mistakes that hindered wind development.

I. Introduction

The recent history of wind power stands as a remarkable testament to the leverage of well-designed policies. In the last 20 years, the price of wind power has fallen from $0.8 per kilowatt hour (kWh) to $0.045 per kWh, and in the past 10 years, the total net installation of wind in the world has increased tenfold.[1] With the rising cost of fossil fuels and increasing concerns over foreign energy dependence, wind continues to offer a cost-competitive and domestic energy source for many countries.

After the explosion of wind power in California in the early 1980s, U.S. wind energy entered a period of stagnation that lasted over a decade. Even today, wind expansion in the United States continues to follow a "boom-bust" cycle that correlates to whatever federal tax credit is currently in place. However, there are many other issues to address that can help explain why wind in the United States has not seen the stability and success of wind in Europe.

In this Article, I will look at wind policies that facilitate or have facilitated wind energy expansion in the United States, and I will compare those policies to similar policies in Denmark and Germany. Germany was chosen because it has the highest net installed capacity in the world.[2] Denmark was chosen because it has the highest proportional installed capacity in the world.[3]

To begin, I will look at the historical impetus for wind in each country to better understand the rationale behind the implementation of policies. Then, I will examine several categories of policy that have accounted for varying degrees of success in each country. Following that, I will look at the specific problems of the U.S. tax code that impede our own wind expansion. I will conclude with brief policy recommendations.

By breaking down these policy categories and comparing them at a national level, I hope I can offer policy reasons for the stronger success of wind expansion in Denmark and Germany. In addition, the interaction between policies in one country poses a difficult problem in itself that this categorization aims to address. With a clear understanding of what has worked in Europe and what has not worked in the United States, legislative decisions can be better shaped in the future to prevent the U.S. policy mistakes of the past.

II. Background Information

While large-scale wind projects have similar benefits for any country, it is important to distinguish the particulars of why Denmark, Germany, and the United States each chose to pursue wind energy in the past 30 years. The Organization of the Petroleum Exporting Countries (OPEC) oil embargo

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1. Kathy O'Dell, Nat'l Renewable Energy Lab., *NREL—Keeping Up With the Rapidly Growing Wind Industry*, http://www.nrel.gov/features/02-06_wind_industry.html (last visited Jan. 18, 2007).

2. Global Wind Energy Council, *Record Year for Wind Energy: Global Wind Power Market Increased by 40.5% in 2005*, http://www.Gwec.Net/index.php?id=30&no_cache=1&tx_ttnews%5Btt_news%5D=21&tx_ttnews%5BbackPid%5D=4&cHash=d0118b8972 (last visited Jan. 18, 2007).

3. *Danish Wind Industry Association—Did You Know?*, http://www.windpower.org/composite-53.htm (last visited Aug. 25, 2006).

of 1973 and the following fossil fuel-price instability can be thought of as the "wake-up call" for renewable, more diversified energy sources, including wind energy. However, Denmark, Germany, and the United States each had a unique response (and subsequent variation in the pursuit of wind energy) that can be partially explained by politics and domestic energy resources. How each country reacted with wind as the answer to the energy dependence problem greatly depends on how it perceived the threat of future oil shocks.

A. The Stimulus for Wind in the United States

After the economic crisis of the 1973 oil embargo and the subsequent oil crisis, the Carter Administration responded with the National Energy Act in 1978. During his famous "crisis of confidence" speech, President Jimmy E. Carter vowed that, "this nation will never use more foreign oil than we did in 1977—never. From now on, every new addition to our demand for energy will be met from our own production and our own conservation."[4] While appearing to be a call for renewable energy, President Carter mentioned the need to develop oil shale in order to assuage our dependence on foreign oil with our own petroleum resources. Attacking utilities specifically, President Carter mandated that utilities cut oil consumption by 50% over the next decade, while simultaneously switching to coal.[5]

From the period between 1978 and 2005, coal's share in the electricity fuel mix has grown from 49% to 51%, while oil's share has shrunk from 16% to less than 3%. However, nuclear energy made up most of the difference, increasing from 12% to 20% over the same time span.[6]

President Carter's goal to reduce utility oil consumption was a success, but oil never constituted a large portion of the fuel mix for electricity generation in the first place. Coal held the dominant share of the fuel mix when the oil embargo struck, and its continued expansion is a reflection of abundant, relatively clean, and cheaply extractable U.S. coal reserves. President Carter (and subsequent Administrations) could appear to solve the foreign petroleum dependency problem by passing subsidies toward renewable energy, but in fact, the utility sector was weaned off oil with a painless transition to more coal power and the implementation of nuclear power.

B. The Stimulus for Wind in Germany

Germany could have no national response to the oil embargo in 1973, as the country was not reunified until October 3, 1990. However, there was a West German (Federal Republic of Germany) policy response to the embargo. In the following section, I use the term "Germany" to indicate any area of the Federal Republic of Germany, both pre- and post-unification. Germany did not immediately need to develop a renewable energy policy to decrease petroleum utility energy consumption, but choices made soon after the embargo would strongly encourage the later development of wind energy.

First, Germany survived the oil embargo because of ample coal resources and the later implementation of nuclear energy. Nevertheless, a quick look at the numbers explains why Germany both withstood the embargo but needed to make several large energy choices shortly thereafter. Between 1980 and 2001, domestic coal production fell from 87 million tonnes to 21.[7] Even after this considerable decline in production because of the very high costs of extraction, the ambiguity over future subsidies, and the closure of several mines in East Germany for questionable safety records, Germany is currently the seventh largest coal producer in the world.[8] The net use of coal for power generation has remained relatively constant in the last 30 years, but the proportional use of coal for electricity generation is noticeably declining.[9] As such, Germany needed to supplement the quickly declining role of coal power in the electricity fuel mix.

An interesting development in Germany has been its stance on nuclear power over the last 30 years. The country's strongest response to the 1973 oil embargo was the quick deployment of nuclear energy (although oddly enough, in light of the need for domestic energy security, Germany imports all of its uranium). By the end of the decade, five new power plants had been commissioned within the entire German territory.[10] By 1989, 17 nuclear power plants had been built.[11]

Reunification closed a few plants for safety reasons, but politics ensured the end of nuclear power in Germany within the next two decades. The coalition government *Bündnis 90/Die Grünen* (Alliance 90/The Greens), with strong anti-nuclear leanings from the Green Party portion of the coalition, passed legislation in 1998 to decommission all nuclear plants by 2022. Opposition leaders have vowed to reverse the decision, but the transformation has already started—two plants were decommissioned in 2003, and one was decommissioned in 2005.[12] However, the message is clear that future energy choices in Germany must consider the political instability and probable demise of domestic nuclear power.

Coupled with the increasing difficulty and cost of extracting coal, energy security becomes a more dire issue when almost one-third of electricity generation capacity (nuclear power, at 28% to 30%) is resisted by the reigning political party. As such, Germany has a strong incentive to look outside both coal and nuclear. In light of these developments, wind energy may provide the most secure investment in the future of electricity generation for Germany, and its policies reflect it.

4. Jimmy Carter, President of the United States, The "Crisis of Confidence" Speech (July 15, 1979), *available at* http://www.pbs.org/wgbh/amex/carter/filmmore/ps_crisis.html.

5. *Id*.

6. Energy Info. Admin., Annual Energy Review 2005 (2005), at 229, *available at* http://www.eia.doe.gov/emeu/aer/pdf/pages/sec8_9.pdf.

7. Federal Environmental Agency (Umweltbundesamt), Reduction of Coal Subsidies: The Results of Model-Based Analysis (2003), *available at* http://www.gws-os.de/Downloads/ZIII6357-04eneugesamt.pdf.

8. Energy Info. Admin., Country Analysis Briefs: Germany (2005), *available at* http://www.eia.doe.gov/emeu/cabs/Germany/pdf.pdf.

9. Evolution of Electricity Generation by Fuel From 1971 to 2004, Germany, *available at* http://www.iea.org/textbase/stats/pdf_graphs/DEELEC.pdf.

10. Uranium Info. Centre Ltd., *Nuclear Power in Germany*, http://www.uic.com.au/nip46.htm (last visited Jan. 7, 2007).

11. *Id*.

12. *Id.*

C. The Stimulus for Wind in Denmark

The oil embargo of 1973 was particularly brutal on Denmark—in 1973, Denmark relied on petroleum for almost 90% of its total energy needs, and the majority of it was imported.[13] In addition, Denmark has very poor coal reserves, forcing it to import almost all of its coal for its energy needs. When the oil shock hit in 1973, the utility sector in Denmark was exposed for what it was—an unstable reliance on foreign energy sources.

The lack of cheap and easily extractable coal reserves coupled with strong anti-nuclear sentiment forced Denmark to look into renewable energy around the same time as the United States. However, Denmark responded with a greater fervor stimulated by its large foreign energy dependency and lack of traditional alternatives. In 1985, the Danish government passed a resolution that nuclear power was never to be used in Denmark and all future energy decisions were to be made on the assumption that there never will be nuclear power in Denmark.[14]

The answer for Denmark was to pursue an active role in conservation, self-sufficiency in energy sources, and diversification of energy sources that lasted until the mid-1980s. However, the push toward renewable energy, especially wind, did not stagnate there. In an ambitious goal titled "Energy 21" passed in 1996, the planning horizon for energy security was extended out to 2030, at which time Denmark aims to produce 50% of their electricity from wind.[15]

D. Conclusions

In the utility sector, Germany and the United States were lucky to have a more diversified fuel mix than Denmark when the 1973 oil embargo hit. Both Germany and the United States relied almost marginally on oil for electricity production, and at the time, both Germany and the United States could easily reduce oil consumption by increasing coal and nuclear power. However, Germany has faced the reality of decreasing and more expensive coal production for years. Beyond the problem of coal use, Germany also faces the simultaneous phaseout of nuclear power. Therefore, Germany must create policies for renewable energy that mitigate the gradual decline of the two largest energy sources in its utility fuel mix.

Denmark's ambitious renewable energy goals are a result of the intense economic crunch the utility sector felt after the 1973 oil embargo. With no coal resources to develop and a history of heavy dependence on oil imports, Denmark's policies toward renewable energy reflect the need to build a domestic energy supply from almost nothing while simultaneously adhering to the promise of no nuclear power.

The United States has escaped the more dire energy supply situations of both Denmark and Germany for a number of years, but signs may be pointing toward recent (albeit small) change. While our coal reserves are still plentiful and easily extractable, our domestic natural gas supply is decreasing. As Frank Wolak, Professor of Economics at Stanford University, explains, the United States has very recently started importing natural gas, something that Europe had to confront years ago.[16] This development may be a hidden opportunity for renewable energy to gradually supplement U.S. natural gas power generation.

III. What Has Worked in Denmark and Germany, and Why Not Here?

A. Feed-In Tariffs

I begin by looking at feed-in tariffs because feed-in tariffs bring significant investment stability to wind projects. Feed-in tariffs are guaranteed contract terms that a wind producer receives. They also require that a utility connect with the wind power project, bringing further stability into the market and eliminating contractual ambiguity in the connection between the utility and the wind power producer.

All three countries began their respective feed-in tariff program with a variable-rate tariff. However, both Denmark and the United States have phased out the feed-in tariff program in place of renewable portfolio standards (RPS).[17] Germany continues to use the feed-in tariff, although it is now a fixed-rate tariff with a built-in annual reduction.

1. The Feed-In Tariff in the United States

The true large-scale development of wind in America began with the passage of the National Energy Act in 1978 in response to oil embargo in 1973. The most significant act within the National Energy Act was the Public Utility Regulatory Policies Act of 1978 (PURPA). In order to stimulate the development of alternative energy, PURPA required that utilities purchase the electricity generated by "qualifying facilities" at a certain cost. A qualifying facility was either a small-scale producer of renewable energy that had a surplus useable to the grid, or incidental producers that can generate

13. Int'l Energy Agency, Org. for Econ. Co-Operation & Dev., Energy Policies of IEA Countries: Denmark 2002, Rev. (2002).

14. Nuclear Energy Agency, Org. for Econ. Co-operation and Dev., Regulatory and Institutional Framework for Nuclear Activities: Denmark (1999), *available at* http://www.nea.fr/html/law/legislation/denmark.pdf.

15. Anna Johnson & Staffan Jacobsson, The Emergence of a Growth Industry: A Comparative Analysis of the German, Dutch, and Swedish Wind Turbine Industries, *available at* http://www.druid.dk/conferences/winter2002/gallery/jacobsson.pdf.

16. E-mail from Frank Wolak, Professor of Econ. at Stanford Univ. and Senior Fellow, by courtesy, at the Stanford Institute for Economic Policy Research, to Alex Bandza (July 13, 2006) (on file with author).

17. An RPS is a market-based policy that requires all utilities to provide a certain proportion of their power from renewable energy sources. The utility can contract with renewable energy sources, build their own sources, or purchase an equivalent amount of "renewable energy credits" to meet the proportion by the time specified. By the same token, renewable generators can sell these credits in the state marketplace, generating additional revenue. The cost of noncompliance is typically a multiplier compounded on the difference of renewable credit that you owe, purposefully more expensive than just buying the certificates in the marketplace. This encourages compliance through economic rationality and not costly administrative oversight. The goal is that economic efficiency is created and renewable energy sources are given additional revenue without financially burdening the state. For more information, see *The Mechanics of a Renewables Portfolio Standard Applied at the State Level*, http://www.awea.org/policy/rpsmechste.html (last visited Jan. 18, 2007).

electricity as a side-benefit of some other process.[18] This certain cost came to be known as the "avoided cost" of not purchasing power from a traditional source, which was generally the price of fuel that would be needed to produce the same amount of electricity.

PURPA had several features that made it initially successful. The avoided cost contract was negotiated for the fixed cost of fuel at a specific point, not pegged to the current market price of fuel for the duration of the contract. Therefore, after the price of fossil fuels fell in the mid-1980s, wind producers were enjoying revenues that far exceeded the competitive price of electricity generated from fossil fuels. In addition, the qualifying facilities under PURPA were also exempt from some of the state and federal regulations that applied to utilities.[19] Some have attributed nearly 12,000 megawatts (MW) of non-hydro renewable energy directly to the creation of PURPA.[20] Randall Swisher, Executive Director of the American Wind Energy Association, has called PURPA a "foundation stone for the modern renewable energy industry."[21]

However, PURPA has faced a slow decline since its inception. After the price of fossil fuels dropped in the 1980s, the revenues guaranteed under the avoided cost contract also fell, making the wording of PURPA its own barrier to wind expansion. In addition, implementation of PURPA was left to the states, and many gradually switched to competitive bidding for contracts. Finally, because wind was becoming more competitive with traditional sources of electricity, many policymakers sought a more competitive incentive for wind energy.

The Energy Policy Act of 2005 signaled the figurative end of PURPA. The Act exempted utilities from the obligation to enter into contracts with qualifying facilities if it was found that the qualifying facility had nondiscriminatory access to a competitive market.[22] In addition, policymakers were looking for a "post-PURPA" incentive for wind energy since the mid-1990s, as wind was gaining a strong competitive advantage against traditional fossil fuels. The gradual phaseout of PURPA coincided with the rise of the RPS passed in various states across the United States.

2. The Feed-In Tariff in Germany

Germany had little wind capacity going into the 1990s, but that all changed with the passage of the *Stromeinspeisungsgesetz*[23] in 1990, better known as the Electricity Feed-in Law (EFL). The EFL guarantees the revenue of wind projects to be 90% of the residential rate charged by the utility.[24] The law was similar to PURPA in that it required local utilities to connect nearby renewable energy projects.[25] However, the difference is that the revenues from the EFL were pegged to the price of output (the retail price of electricity), whereas revenues under PURPA contracts were adjusted to the price of inputs (the avoided cost of alternate power production).

Passed in 2000, the *Erneuerbare-Energien-Gesetz*,[26] or Renewable Energy Sources Act (RESA), replaced the Electricity Feed-in Law of 1990. According to the German Federal Environment Minister Jürgen Trittin, the law was needed to bring increased investment security in renewable energy and also to comply with European Union directives. Under the law, utilities are still required to connect with renewable energy facilities. However, RESA is a fixed feed-in tariff as opposed to a variable feed-in tariff under the EFL. Under RESA, wind power operators are guaranteed 0.0836 euros (EUR)/kWh ($0.107/kWh) for at least five years, and 0.0528 EUR/kWh ($0.0677/kWh thereafter until a combined total of 20 years.[27] RESA is structured so that places with poorer wind receive the larger subsidy longer than places with better wind, ideally a step toward evening out the disparity of lower wind development occurring in southern versus northern Germany. Finally, to encourage manufacturing cost reductions through learning-by-doing, the remuneration payments are reduced by 2% every year.[28]

The law was amended in 2004 to include renewable energy targets, but the general framework from above remains the same. The updated version calls for 12.5% renewable energy by 2010 and 20% by 2020.[29]

3. The Feed-In Tariff in Denmark

Due to extensive abuses from utility companies charging varied and often outlandish connection fees for wind projects, the Danish Wind Turbine Owners' Association pressured the Danish legislature to introduce its own feed-in law. The 1992 Law on Wind Turbines pegged revenues to wind projects at 85% of the residential utility price.[30]

In 1999, the Danish feed-in law was phased out in place of an RPS with tradable green certificates, to be implemented by 2003. As part of the plan, the feed in was replaced with a fixed feed-in tariff of 0.33 Danish krone (DKK)/kWh

18. Energy Vortex, *Public Utility Regulatory Policies Act of 1978 (PURPA)*, http://www.energyvortex.com/energydictionary/public_utility_regulatory_policies_act_of_1978_(purpa).html (last visited Jan. 18, 2007).
19. Global Renewable Energy Policies and Measures Database, *PURPA*, http://www.iea.org/textbase/pamsdb/detail.aspx?mode=gr&id=1060 (last visited Jan. 18, 2007).
20. Union of Concerned Scientists, *Public Utility Regulatory Policies Act (PURPA)*, http://www.ucsusa.org/clean_energy/clean_energy_policies/public-utility-regulatory-policy-act-purpa.html (last visited Jan. 18, 2007).
21. E-mail from Randall Swisher, Executive Dir. of the American Wind Energy Ass'n, to Alex Bandza (July 31, 2006) (on file with author).
22. Energy Policy Act of 2005, 42 U.S.C. §15801.
23. Gesetz über die Einspeisung von Strom aus erneuerbaren Energien in das öffentliche Netz [Electricity Feed-in Law], Dec. 7, 1990, BGBl. I at 2633 (F.R.G.).
24. Renewable Energy Policy Project, *Germany's Encouragement of Renewable Energy*, http://www.repp.org/repp_pubs/articles/issuebr14/03German.htm (last visited Jan. 9, 2007).
25. Donald Aitkin, *Germany Launches Its Transition to All Renewables*, http://www.sustainablebusiness.com/features/feature_template.cfm?ID=1208 (last visited Jan. 18, 2007).
26. Gesetz für den Vorrang Erneuerbarer Energien [Act on Granting Priority to Renewable Energy Sources (Renewable Energy Sources Act)], Apr. 1, 2000, BGBl. I, at 305 (F.R.G.).
27. German Wind Energy Ass'n, A Clean Issue: Wind Energy in Germany (2006), *available at* http://www.wind-energie.de/fileadmin/dokumente/English/Broschueren/BWEImageEngl_2006.pdf.
28. Gesetz für den Vorrang Erneuerbarer Energien, *supra* note 26.
29. The Int'l Energy Agency, Global Renewable Energy Policies and Measures Database, Renewable Energy Sources Act (*Erneuerbare-Energien-Gesetz EEG*) (2004), *available at* http://www.iea.org/textbase/pamsdb/detail.aspx?mode=gr&id=2241.
30. Renewable Energy Policy, Renewable Electricity Fact Sheets, EU Countries 2003 (2005), *available at* http://www.renewable-energy-policy.info/relec/denmark/policy/feed-in.html (last visited Jan. 9, 2007).

($0.057/kWh) that reflected the average revenue previously enjoyed under the variable feed-in tariff.

4. Conclusions

While the early contracts under PURPA were often negotiated with very generous terms (due to the high cost of fossil fuels at the time), the erosion of oil prices in the mid-1980s ensured that the avoided cost revenues for wind energy were decreasing. The law unfortunately was trapped in its own language, although historically, PURPA's larger victory would be the mandatory purchase provisions. By giving renewable energy a high priority, uncertainty by utilities over the connection of wind facilities could end, bringing necessary stability for investment in wind energy in the United States.

However, the feed-in tariffs of Denmark and Germany have proven more successful. By pegging the price as a proportion of the retail price, the contracts generated in Denmark and Germany were tied to something inherently more stable than the avoided cost of fossil fuels in America. Typically, retail prices take time to absorb supply shocks, making the contracts in Denmark and Germany more predictable and less subject to instability when fossil fuel prices fluctuated.

B. Tax Incentives and Subsidies

There are two broad types of tax incentives that governments can offer renewable energy projects: investment subsidies and production subsidies. Because wind is very capital-intensive but low in operational costs, investment subsidies offer (in theory) the best way to mitigate the cost of the entire wind project. In addition, when factoring in the time-value of money, a lump sum of cash at the beginning of the project gives a larger net present value than the same amount dispersed on an annual basis. Finally, the administrative costs on investment subsidies are lower because there is one sum to consider per project, not a yearly allowance that must be calculated.

However, investment subsidies have been criticized for creating inefficient output. Critics contend that by not making the subsidy contingent on output, an inherent lack of performance accountability remains with the project. In addition, production subsidies encourage better siting of wind projects because the final tab of the project will vary significantly on how much wind energy you actually capture from each turbine.

Regardless of these differences, larger subsidies in Europe could explain the faster growth of European wind. However, there are several implications to consider, especially when looking to draw on the success of Europe to increase the expansion of U.S. wind.

1. A "Flash in the Pan"—Early U.S. Efforts at Wind Subsidies

The introduction of subsidies in the United States for wind power began under the same National Energy Act of 1978 that implemented PURPA. The Energy Tax Act created both residential and business investment tax credits for renewable energy. The business wind energy tax credit of 10% was compounded on top of a 10% investment tax credit already in place for renewable energy.[31] The program was slated to expire in December 1982. However, the Crude Oil Windfall Profits Tax Act, passed in 1980, increased the business investment tax credit from 10% to 15% and extended the credit program until December 1985.[32] Combined with the standard 10% investment tax credit, federal wind investment tax credits could now offset 25% of the cost of wind installation.

During the same time period, California also offered a 25% state energy credit, which totaled a 50% investment tax credit to offset the cost of installation when combined with all the federal incentives applicable at the time.[33] This would soon prove to be a paramount financial resource for the short-lived wind energy explosion in California in the early 1980s. Under these generous terms, Altamont Pass, the Tehachapi, and the San Gorgonio Pass wind farms were built, and proved crucial to giving the United States the lead in wind energy capacity until the 1990s.

These substantial offerings were short-lived. With oil prices sliding in the mid-1980s, the U.S. Congress viewed the many subsidies on renewable energy as too generous, and financial support for wind energy eroded under the Tax Reform Act of 1986. The Act eliminated the 10% investment tax credit.[34] Coupled with the expiration of the business investment tax credit for renewable energy under the Crude Oil Windfall Profits Tax Act just a year earlier, wind energy suddenly had no subsidies. As a result, wind energy expansion quickly died in America.

2. The Resurrection of Wind Energy Expansion in America

The Energy Policy Act of 1992 introduced the production tax credit (PTC) that stipulated a 10-year $0.015/kWh (adjusted for inflation) production subsidy for wind energy. The tax credit is a guaranteed 10 years in length, making it a significant source of revenue for any wind project. However, applications must be submitted when PTC eligibility is available and the wind facility is online.

This presents several problems for wind developers. The main frustration of the PTC is that it requires congressional renewal (typically at irregular times) for extension, leading to short and unreliable planning intervals. Because proposed wind projects may take anywhere from one to five years to properly site, plan, and secure funding for, a short PTC eligibility window makes it a difficult source of revenue for any wind developer to rely on. Already crippled by this short application period, the PTC has been plagued with more unreliability due to a historical failure of Congress to give it a seamless existence. Between the end of 2003 and October 4, 2004, the PTC was not available at all.[35]

Therefore, it is difficult to rely on the PTC when financing is decided, hurting both individual projects and the U.S.

31. Energy Info. Admin., *Legislation Affecting the Renewable Energy Marketplace*, http://www.eia.doe.gov/cneaf/solar.renewables/page/legislation/impact.html (last visited Jan. 24, 2007).

32. *Id.*

33. Energy Info. Admin., U.S. Department of Energy (DOE), Renewable Energy Annual 1995 (1995), *available at* http://tonto.eia.doe.gov/FTPROOT/renewables/060395.pdf.

34. *Supra* note 31.

35. DSIRE: Federal Incentives for Renewable Energy, http://www.Dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US13F&State=Federal&currentpageid=1 (last visited Jan. 9, 2007).

wind industry as a whole. Wind turbine manufacturers must face a "boom-bust cycle" of manufacture in sync with the uncertainty of the next PTC renewal. In doing so, they incur unnecessary costs that will naturally affect the bottom line of every wind project they supply. The American Wind Energy Association estimates that if the PTC were given a definite five-year lifetime, manufacturers might see production costs drop as much as 25%.[36] Considering that a very large portion of the cost of wind power comes from the turbine itself, this is a remarkable number.

Later, I will raise two problematic tax issues that further cripple the PTC, both of which weaken U.S. wind expansion in general.

3. The Success of the *Bundesländer* in Germany

At the federal level, Germany has never had a production subsidy for wind power, although it has had a brief federal investment subsidy under the 100/250 MW Wind Program. The 100 MW Wind Program was introduced in 1990 with, as the name implies, a target of reaching 100 MW of installed wind power. A subsidy was granted of up to 60% of the wind turbine investment cost, on top of the large revenues guaranteed under the EFL.[37] The project was so successful that it had to be extended to 250 MW in March of the following year.

The program expired in 1995 after creating results that had been "unimaginable."[38] In 1995, the total installed wind capacity of Germany was 1137 MW, up from less than 100 MW at the beginning of the 1990s.[39] There has been no federal investment subsidy in place since. Currently, federal support for wind power comes only from the feed-in tariff under the Renewable Energy Sources Act of 2000. Germany has left all other subsidized support to the German federal states, or *Bundesländer*.

Germany has a long history of powerful state control that resulted from the late unification of the country in the 19th century and the continued regional divisions after reunification. It therefore makes sense that the "purse strings" of wind energy were left to the federal states in Germany. The level of support varies in each of the 16 federal states, but overall the amount of money invested is significant: between 1991 and 2001, 259.6 million EUR ($332.96 million) has been invested in wind power alone.[40] Notably, the federal state of Schleswig-Holstein used state subsidies and its advantageous location on the windy northern coast of Germany to expand wind power to cover 25% of its utility fuel mix in 2002.[41]

4. The Danish Carbon Tax and Other Subsidies

In 1992, Denmark introduced a two-tiered tax on carbon dioxide (CO_2), $14.30 per ton for households and $7.15 for businesses.[42] For a period, Denmark refunded the entire CO_2 tax on electricity consumption back to wind producers, along with a portion of the energy tax, amounting to a total of 0.27 DKK/kWh ($0.046/kWh).[43]

However, in 1999, the Danish feed-in law was eliminated under the Electricity Reform Act in place of an RPS. Under the Act, the energy and CO_2 tax credits were phased out by 2003. Renewable energy also gained a new, market-driven means of financial support through tradable green certificates. These tradable green certificates could vary in price from a minimum of 0.10 DKK/kWh to a maximum of 0.27 DKK/kWh, reflecting the previous range of the fixed subsidy from taxes.

5. Conclusions

The history of tax credits and subsidies in the United States has been irregular, inconsistent, and tied too closely to the whim of the majority political party. The Reagan Administration killed wind power for more than one-half of a decade after the California wind explosion by eliminating investment subsidies. The current best offer to wind power in the United States, the PTC, is dependent on too-frequent congressional approvals, and has not had a strong track record of success.

Wind projects in the United States are thus caught in a problematic legislative cycle. State-level initiatives are limited and must be narrowly defined simply because a federal PTC exists. However, as we have seen, the federal PTC itself is unreliable and remains a weak stimulus for sustainable investment in wind projects. Therefore, the argument that Europe merely has larger subsidies does not fully grasp the reality that U.S. tax credits are poorly designed and operate in a tax structure unfriendly to renewable energy investment.

C. Avoiding the Not-in-My-Backyard Phenomenon

The not-in-my-backyard (NIMBY) issue is a difficult political problem to address in any country, particularly for wind energy because it is such a high-visibility undertaking. The problem of NIMBY with regard to wind is that it often hides behind the guise of "environmentalism," or the misunderstanding that wind turbines kill a significant number of birds. To immediately dismiss this concern, according to one study, wind turbines account for less than .01% of all avian mortality, whereas cats account for approximately 10%.[44]

This overwhelming fact does not prevent "environmentalists" from employing the argument of avian mortality to disguise their real concerns—typically worries over aes-

36. American Wind Energy Ass'n, The Economics of Wind Energy (2005), http://www.awea.org/pubs/factsheets/EconomicsOfWind-Feb2005.pdf (last visited Jan. 9, 2007).

37. Mark Bolinger, Community Wind Power Ownership Schemes in Europe and Their Relevance to the United States (2001), *available at* http://eetd.lbl.gov/ea/emp/reports/48357.pdf.

38. Johnson & Jacobsson, *supra* note 15.

39. *See* app. A.

40. Int'l Energy Agency, Support of the Federal States ("Länder"), http://www.iea.org/Textbase/pamsdb/renewable_table/table1.pdf.

41. Carsten Ender, *Wind Energy Use in Germany—Status 31.12.2001*, DEWI Magazine, Feb. 2002.

42. David Morris, Inst. for Local Self-Reliance, *Green Taxes*, http://www.ilsr.org/ecotax/greentax.html (last visited Jan. 24, 2007).

43. Bolinger, *supra* note 37.

44. Wallace P. Erickson et al., A Summary and Comparison of Bird Mortality From Anthropogenic Causes With an Emphasis on Collisions (2002), *available at* http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/1029-1042.pdf.

thetics that would lead to a reduction in their land valuation. This has become noticeably problematic in the ongoing political gridlock of Massachusetts' Cape Wind offshore wind project. The issue of avian mortality became so muddled in various agendas that the Massachusetts Audubon Society came out in full support of the controversial Cape Wind project.[45] In general, Massachusetts residents support the Cape Wind project six to one.[46] However, the NIMBY phenomenon can explain why projects supported in the abstract can arouse strong opposition when they materialize, especially in an area of significant wealth and strong political connections, like Cape Cod.[47]

A streamlined and cost-effective policy for wind energy expansion cannot exist if a wind project runs a real risk of inciting extended political gridlock and costly litigation. Both Denmark and Germany have countered this phenomenon particularly well with similar community-ownership schemes, but also with very different variations. The United States has made its own attempts to introduce community-ownership of wind, but it falls short as a solid way to counter NIMBY for wind projects.

1. Reducing the NIMBY Phenomenon in Germany

Germany has a substantial need to expand wind energy at a very rapid pace. Recognizing this, the German government amended the *Baugesetzbuch*, or the Federal Building Code, in 1998. Under the Federal Building Code, there is a general ban on building in the *Außenbereich*, or the undeveloped outskirts of Germany, except in a limited number of special circumstances. The 1998 amendment gave wind and hydroelectric power this exemption status under Article 35-1-6 of the code.[48]

Under the exemption, wind power now had the same priority siting status that nuclear power had and could previously enjoy (before strong anti-nuclear sentiment swept the country). If a wind energy proposal is sited in a particular municipality, the wind farm will be built in that municipality. In practice, this means that individual municipalities may contest a proposed wind farm, but they must have a plan of alternate placement within the municipality. A wind farm cannot be contested on any grounds if no alternate municipal site plan for a potential wind farm exists.[49]

On paper, the 1998 Federal Building Code amendment sounds particularly onerous for the citizens of rural Germany. However, remember that the 1991 EFL gave any wind project across Germany a stable and profitable market along with a guaranteed connection to the utility. Rural citizens were the ones who actually took advantage of both the new priority building status and the large revenues guaranteed under the EFL—as of 2001, approximately 75% of wind power was community-owned. Germany also offers soft loans through its *Deutsche Ausgleichsbank*, a state-owned bank, at 1% to 2% below market rates. The rates are fixed for the duration of the loan, which can cover up to 100% of the cost of the project and includes a five-year grace period. With financing this simplified and generous, it is very easy for small community entities to secure financing for their wind projects.[50]

However, in the last decade, there has been a noticeable shift toward corporate ownership as wind becomes more "commercialized."[51] Even with this proportional increase in commercial development, research conducted by the European Wind Energy Association indicates the German populace is very pleased with wind development. As long as affected landowners have some say in the placement of the project and it is located a sufficient distance from their homes, German citizens strongly support wind power. A study conducted by the European Wind Energy Association in 2003 found that 88% of Germans actually want the construction of more wind power.[52]

2. Reducing the NIMBY Phenomenon in Denmark

Denmark confronted the NIMBY problem from an entirely different direction than Germany: The Danes formed a grass-roots movement that led to the explosion of "wind cooperatives" versus legislating from above, as in Germany. Flemming Tranæs, former chairman for the Danish Wind Turbine Owners' Association, contends that the Danes' century-old success with the cooperative scheme was revived again in the 1970s with the opportunity for small groups of people to benefit from collective wind turbine purchases.[53] The success of this program is apparent—over 75% of Denmark's wind energy is privately owned, with one-half of that owned by individuals and the other half by wind energy cooperatives.

Formally, the majority of these cooperatives are partnerships, but this is to ensure that loan interest on the wind turbine becomes tax deductible. The qualifications have also changed considerably since the 1970s. Originally, to qualify for a "wind guild partnership," all members had to live within three kilometers of the wind turbine. This "criterion of residence" was to promote the distribution of benefits only to those who would live with the turbine. In the 1980s, the criterion was expanded to 10 kilometers, but proportional ownership in the guild was tied to individual consumption—the greater of either 6,000 kWh or 135% of annual consumption. Consumption requirements would eventually ease until an individual could own up to 30,000 kWh of shares in a wind farm.[54] Recognizing that the wind-coop-

45. Associated Press, *Audubon Society Backs Controversial Wind Farm*, http://www.msnbc.msn.com/id/12066651/from/ET/ (last visited Jan 18, 2007).

46. Cape Wind, Background Information on the Amendment Attached to the Coast Guard Reauthorization Act Conference Committee (2006), *available at* http://www.capewind.org/background.pdf.

47. Steffen Damborg, Danish Wind Energy Ass'n, Public Attitudes Towards Wind Power (2006), *available at* http://www.Windpower.org/media(485,1033)/public_attitudes_towards_wind_power.pdf.

48. Int'l Energy Agency, Global Renewable Energy Policies and Measures Database, Federal Building Codes, http://www.iea.org/textbase/pamsdb/detail.aspx?mode=gr&id=1623 (last visited Jan. 18, 2007).

49. *Id.*

50. Louise Guey-Lee, Energy Info. Admin., *Wind Energy Developments: Incentives in Selected Countries*, http://www.eia.doe.gov/cneaf/solar.renewables/rea_issues/windart.html (last visited Jan. 24, 2007).

51. Bolinger, *supra* note 37.

52. European Wind Energy Ass'n, *Wind Energy: The Facts* (2003), http://www.ewea.org/index.php?id=91 (last visited Jan. 18, 2007).

53. Flemming Tranæs, Danish Wind Turbine Owners' Ass'n, Danish Wind Energy (1997), *available at* http://www.dkvind.dk/eng/publications/danish_wind_energy.pdf.

54. *Id.*

erative market was becoming saturated, the criterion of residence was eased in steps until 2000, when it was expanded to allow anyone in the European Union to own a wind turbine in Denmark.[55]

Due to extensive abuses from utility companies charging varied and often outlandish connection fees for wind projects, the Danish Wind Turbine Owners' Association pressured the Denmark legislature to introduce its own feed-in law, and the 1992 Law on Wind Turbines was passed as a result.[56] In 1997, the Danish legislature further assisted wind cooperatives by introducing a simplified taxation schedule for wind turbine guilds.[57]

3. Reducing the NIMBY Phenomenon in the United States

The United States has seen many cases of NIMBY nearly killing entire wind projects. Cape Wind is a notable example, although offshore wind farms pose novel difficulties that are as yet difficult to ascertain. However, NIMBY problems have surfaced for onshore wind projects as well. For the Altamont Pass Wind Resource Area, estimates run around $10 million in lost revenues for the red tape that the U.S. Fish and Wildlife Service erected around the project for issues of avian mortality.[58]

The United States has not mirrored the successful wind cooperatives in Denmark and Germany, despite modest attempt to move in that direction. The U.S. Department of Energy considers this a bountiful yet untapped resource: there are approximately 21 million U.S. homes with at least one acre of land, the amount required to operate a small wind system.[59]

Recent legislation reflects this potential with the addition of §9006 in the Farm Security and Rural Investment Act of 2002, which created the Renewable Energy Systems and Energy Efficiency Improvements Program. Under the program, farmers, ranchers, and rural small businesses are eligible for loans, loan guarantees, and grants from the U.S. Department of Agriculture for renewable energy and energy efficiency projects.[60] Grants and loans may be combined to absorb to up to 50% of the costs of the project (including many of the planning costs).[61] However, the program is slated to expire in 2007, and coupled with the expiration of the Production Tax Credit in 2007, we may see a significant collapse of rural wind projects within the next year. Even so, this will be viewed as only a minor setback in the overall development of rural wind in the United States. The plot of land required for a wind turbine can generate around $2,000 a year for a farmer, whereas the same plot would typically only produce $100 worth of corn.[62]

Another problem with the program is that the requirements to qualify for enhanced incentives appear to be much stricter than the Danish requirements for wind guilds. The story of farmer Larry Tjaden erecting his own wind turbine in Iowa hints at significant bureaucratic obstacles and overly stringent siting requirements.[63] Tjaden was the only receiver of the §9006 grant in Iowa for wind power in 2004, and he lost the ability to net meter the wind turbine because it was not located on his farm (although located nearby on his property, for grid connection reasons).

Other attempts to keep wind local in America have been directed at schools and have found moderate success. Iowa leads the way, with eight schools currently siting wind turbines.[64] This program holds several advantages: it gives rural schools an immediate influx in the tax base to spend on education, eliminates the cost of electricity from the budget, and can provide additional revue for the school. The program also provides local education on wind energy.

4. Conclusions

The benefits of wind cooperatives are significant. The goal of many small-wind policies is to encourage wind expansion among those who will be directly affected by it. Naturally, if the group of people living with a wind turbine is the group that owns it, sites it, and gains a tangible economic benefit from it, the threat of NIMBY recedes.

Denmark and Germany have confronted the issue of NIMBY successfully. We have seen that the United States has several current programs in place to encourage small-scale wind projects, but the numbers pale in comparison to the amount of small-scale wind in Denmark and Germany. The fact remains that the majority of new wind projects in America are in the hands of corporate owners that are often not even located in the same state as their proposed wind projects.[65]

Because U.S. distribution of ownership is skewed toward distant corporate ownership, there are naturally fewer opportunities to interact with local communities than a broad homegrown wind effort would have. Therefore, NIMBY issues are certain to occur more often when potential wind projects look like out-of-state big business invasion instead of a local effort to improve the town and help its residents.

On paper, U.S. policy toward small wind seems comparable to the treatment of small-wind projects in Denmark and

55. Bolinger, *supra* note 37.

56. *Supra* note 30.

57. Int'l Energy Agency, Global Renewable Energy Policies and Measures Database, Wind Energy Co-Operative Tax Incentive, http://www.iea.org/textbase/pamsdb/detail.aspx?mode=gr&id=77 (last visited Jan. 18, 2007).

58. Peter Asmus, Reaping the Wind: How Mechanical Wizards, Visionaries, and Profiteers Helped Shape Our Energy Future (2001).

59. U.S. DOE, Small Wind Electric Systems: A U.S. Consumer's Guide (2005), *available at* http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_guide.pdf.

60. U.S. Department of Agriculture, Rural Development, *What Is the Section 9006 Program?*, http://www.rurdev.usda.gov/rbs/farmbill/what_is.html (last visited Jan, 18, 2007).

61. U.S. DOE, Energy Efficiency and Renewable Energy, *Wind Energy Provisions in 2002 Farm Bill*, http://www.eere.energy.gov/windandhydro/windpoweringamerica/ag_farm_bill.asp (last visited Jan. 18, 2007).

62. Earth Policy Inst., *U.S. Farmers Double Cropping Corn and Wind Energy*, http://www.earth-policy.org/Alerts/Alert3.htm (last visited Jan. 18, 2007).

63. U.S. DOE, Wind Powering America, Can a Family Farm Benefit From Section 9006? (2005), *available at* http://www.Eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/37961_family_farm.pdf.

64. U.S. DOE, Wind Powering America, America's Schools Use Wind Energy to Further Their Goals (2004), *available at* http://www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/wpa/35512_schools.pdf.

65. Mark Bolinger & Ryan Wiser, Ernest Orlando Lawrence Berkeley Nat'l Lab., A Comparative Analysis of Business Structures Suitable for Farmer-Owned Wind Power Projects in the United States (2004), *available at* http://eetd.lbl.gov/ea/ems/reports/56703.pdf.

Germany. However, complications in the U.S. tax code provide further explanation for why these policies have not been as successful as predicted.

IV. How the U.S. Tax Code Stands in the Way of Successful Policies

A. The Alternative Minimum Tax

1. A Brief History and Specifics

When originally conceived under the Tax Reform Act of 1969, the alternative minimum tax (AMT) was introduced as a way to eliminate many of the loopholes that top-tier taxpayers were sliding through. The Tax Reform Act of 1986, the same Act that eliminated the 10% investment tax credit, applied the AMT to renewable energy projects.

If persons or institutions fall into the AMT bracket, they must compute their income taxes both in the traditional manner and using the AMT schedule, and then pay whichever total is greater. Under the traditional income tax calculation, wind projects can apply energy-related tax credits (the PTC) and use a more generous depreciation scheme (the five-year modified accelerated cost-recovery system). However, when calculating taxable income under the AMT, one must use a less generous depreciation schedule and energy-related credits cannot be applied.[66]

In order to escape the AMT, a company needs to generate a sufficient amount of taxable income. Because many renewable energy developers are typically dependent on energy subsidies and the more generous five-year depreciation schedule, they often do not have enough taxable income and thus, must pay the AMT. Therefore, they cannot apply the PTC and lose the more generous depreciation scheme.[67]

This presents an immediate financial problem. Many developers will not have sufficient income for the first years of the project to absorb the PTC, leading to dilution of the subsidy due to the time-value of money. Some developers may never generate enough income, and must either build a wind project with no PTC and a less generous depreciation schedule, or search for outside equity that will be able to absorb the PTC and the five-year accelerated depreciation scheme.[68]

Because wind project developers naturally want to take advantage of tax credits and better depreciation schedules, the search for financing begins. For many years, the U.S. lending community perceived wind as a riskier investment than fossil fuel power plants because expected revenues could easily fall short if wind output was overestimated. To mitigate this risk, lenders often charged much higher rates of interest than they would offer to traditional power plants. Because wind has relatively small operating costs, higher interest rates on the turbine investment had a tremendous effect on the final cost per kWh. A study found that if a wind farm were given the same financing terms as a natural-gas power plant, the cost of electricity would fall from $0.05/kWh to $0.0369/kWh.[69]

2. Recent Improvements

For many years, European-based lenders, who had more experience with wind projects throughout the 1980s and early 1990s, were financing many U.S. wind projects. However, this trend is changing with the recent (although irregular) influx of investment in the past five years. Lenders are gaining vital experience with many new wind projects, rapidly dropping the cost of equity 3% to 4% in the past 18 months.[70]

The passage of the Energy Policy Act of 2005 not only gave wind projects the current extension of the PTC but also waived the AMT for the first four years of turbine operation.[71] While this does not mean an end to the many of the problems of the PTC, it may mean that we will see much higher annual wind installation in the "boom" years of the tax credit thanks to better absorption of the PTC.

3. Implications for the Success of U.S. Wind

Historically, poor financing terms from U.S. lenders hurt expansion for many years, but with the recent explosion of wind power in the United States, the trend indicates that this will in all likelihood not return. However, the tax income requirements under the AMT remained until 2005, limiting the number of investors that could use both the PTC and the accelerated depreciation scheme.

Therefore, the people most likely to construct wind power projects were those who had significant taxable income, which were generally larger wind developers. Typically, this precluded smaller companies that might be more local and have a better connection with the community. The AMT effectively made local ownership in wind turbines financially unjustifiable. Thus, the AMT helped undermine local, community-led development in the United States that made wind expansion so successful in Europe.

B. "Anti-Double-Dipping" Provisions

If federal support for U.S. wind power remains weak and unreceptive to rectifying errors of their programs, one might expect the states to take a more active role in pursuing wind power. As I have mentioned previously, this is the essence of the German model, which has left most financial support of wind power to its federal states. However, this structure is particularly difficult to emulate in the United States because of federal "anti-double-dipping" rules (also colloquially referred to as "haircut provisions") that prohibit certain types of federal and state support from being combined. Even supplementary federal programs, such as the §9006 program under the Farm Security and Rural Investment Act of 2002, can render the PTC worthless if both are applied toward a project. It is not impossible to design an effective state pol-

66. Ryan Wiser & Steven Pickle, Financing Investments in Renewable Energy: The Role of Policy Design and Restructuring (1997), *available at* http://eetd.lbl.gov/ea/ems/reports/39826.pdf.

67. *Id.*

68. *Id.*

69. Ryan Wiser & Edward Kahn, Ernest Orlando Lawrence Berkeley Nat'l Lab., Alternative Windpower Ownership Structures: Financing Terms and Project Costs (2005), *available at* http://eetd.lbl.gov/ea/emp/reports/38921.pdf.

70. *Supra* note 21.

71. American Wind Energy Ass'n, *Legislative Affairs*, http://www.awea.org/legislative/policy_priorities.html (last visited Jan. 18, 2007).

icy for wind (or even a complementary federal policy), but there are several distinct pieces of legislation that do not combine well with the PTC.

1. A Brief Overview of "Anti-Double-Dipping" Provisions

The rationale behind the "anti-double-dipping" provisions is fairly obvious: Congress did not want investors in energy-related expenditures to merely stack government support and have little of their own money invested in a project. The provision is listed under §45 of the Internal Revenue Code and requires a proportional reduction of the PTC (up to 50%) should other grants (federal, state, or local) and/or subsidized financing also be applied to the project.[72] Various forms of support were inherently immune from the anti-double-dipping provisions, including renewable energy portfolio standards, net metering, and environmental regulations.[73] However, other forms of state support are not so clear. Grants typically are used to cover capital costs, which would cause a reduction in the PTC. However, grants earmarked for operational expenses or production-based tax credits are likely to slide through. The concern is that the language of the provision indicated that state-level incentives were eligible for possible PTC reductions, but incentives tied to production are not necessarily linked to a PTC reduction.[74]

The uncertainty surrounding what policies would fall under the anti-double-dipping provisions was, for the most part, eliminated at the beginning of 2006. The Internal Revenue Service (IRS) ruled in favor of wind facilities by explicitly stating that state and local subsidies of any sort would not trigger a reduction in the PTC.[75] However, the IRS did not include federal support of wind power in this definition, which still undermines the grants and subsidized loans created under any other federal program, including the §9006 program under the Farm Security and Rural Investment Act of 2002. One cost analysis of the interaction between the §9006 grant and the PTC found that up to 83% of the grant is lost to both the PTC reduction of accepting the grant and paying income tax on the grant itself.[76] Including the costs of applying and the bureaucratic obstacles in place,[77] the financial support provided by the §9006 program is marginal, at best.

2. Implications for the Success of U.S. Wind

The clarification of the IRS tax code is undoubtedly a step in the right direction. Regardless, the fact that federal subsidies were not addressed undermines a program that had great potential to stimulate the development of community-led small wind projects. However, it will take a few years to fully grasp the effect and to gauge if we do move toward the German model of significant state-specific support for wind power. Considering that many of the German subsidies were enacted in the 1990s, when wind was less competitive with traditional fossil fuel sources, it might be much less necessary to enact comparable subsidies now in the United States, as wind has become even more competitive since then.

In addition, the development of renewable energy portfolios in some U.S. states may actually prove to be a better, more efficient incentive for wind, and at much less cost for the issuing government. I believe that we will see increased state support and a much greater diversity of programs available at the state level, but I think that this may have had a much greater effect 10 to 15 years ago.

V. Where Do We Go From Here?

A. Policy Recommendations

At the federal level, the U.S. government has done little to encourage wind expansion in the past decade. The best effort was the §9006 program, but it is so wrought with extensive tax interference from the PTC that the financial support is significantly reduced. The remaining U.S. policy efforts for wind will, in all likelihood, be best administered through the states.

1. Advance Production-Based Payments

If U.S. states wish to encourage wind through subsidies (now even more secure under the recent clarification of §45 of the Internal Revenue Code), this is the best-structured option that captures the advantages of both investment and production subsidies. Also called "advance supplemental production payments." these are structured to give a lump sum at the beginning of the project, but the lump sum is contingent upon the lifetime output of the wind project. If the wind project fails to meet output expectations over the lifetime of the project, the appropriate amount of the lump sum has to be returned.

Even before the clarification of the tax code this subsidy scheme would not cause a PTC reduction because the advance production-based payment is typically given after the project becomes operational, and as the name implies, it is dependent on production. Therefore, you can help offset a significant portion of the costs at the beginning of the project without losing any of the subsidy to the time-value of money. However, you also capture the accountability of a production subsidy, because the relevant portion of the subsidy has to be returned if the output did not meet expectations. The program also reduces administrative waste by not creating yearly oversight and fund disbursement costs.

There are two known success stories already for this program. The first is in Pennsylvania in 2000, where the private nonprofit community group Sustainable Development Fund awarded this type of subsidy to the Waymart Wind Farm. In 2002, the Illinois Department of Commerce and Economic Opportunity awarded this scheme to the Crescent Ridge Project, and the IRS, in a private

72. Mark Bolinger, Ernest Orlando Lawrence Berkeley Nat'l Lab., Avoiding the Haircut: Potential Ways to Enhance the Value of the USDA's Section 9006 Program (2006), *available at* http://eetd.lbl.gov/ea/ems/reports/61076.pdf.

73. Nancy Rader & Ryan Wiser, Strategies for Supporting Wind Energy: A Review and Analysis of State Policy Options, National Wind Coordinating Committee (1999), *available at* http://www.nationalwind.org/publications/statepolicy/strategies.pdf.

74. *Id.*

75. IRS, Internal Revenue Bulletin: 2006-9 (2006), *available at* http://www.irs.gov/irb/2006-09_IRB/ar06.html#d0e157.

76. Bolinger, *supra* note 72.

77. Returning to the story of Larry Tjaden's windmill under the Internal Revenue Service §9006 program, *supra* note 63.

ruling, upheld the full appropriation of the PTC under this type of subsidy.[78]

2. Renewable Portfolio Standards

There are currently 20 states including the District of Columbia with binding RPS in place, and Illinois and Vermont have set voluntary goals. There can be large variations in the eligibility and credit trading of the schemes, which implies that an RPS in one state does not necessarily guarantee it will be a successful impetus for wind. However, because wind is typically the most cost-competitive renewable energy source, most of the RPS requirements in each state will implicitly be met by wind expansion.

Even with the poor RPS design in some states, more than 1,000 MW of the 1,687 MW of wind brought online in 2003 were related to state RPS.[79] The Texas RPS is a good model because it employs simple legislative language and a sufficiently long-term horizon to stimulate significant investment in wind. During the summer of 2006, Texas had overtaken California's 25-year lead in net installed wind capacity by state.[80]

Although arguably biased toward more cost-competitive technologies, the RPS serves as a simple, market-based solution to increase wind power. Under an RPS, wind projects can receive additional revenues through green certificate trading instead of subsidies, providing an economically efficient method to stimulate a given level of renewable energy investment. Coupled with the rising cost of oil and natural gas, wind becomes even more competitive and therefore pairs easily with a competition-based incentive like the RPS and avoids further reliance on government subsidies.

B. Conclusions

Given all of the problems associated with wind expansion policies in the United States, we must grasp the reality that 2006 was a phenomenal period of wind installation, with over 3,000 MW of installed capacity that took place.[81] However, the "boom-bust" cycle continues and U.S. wind remains haunted by its past: a period of stagnation due to the collapse of tax credits and the return of cheap oil in the mid-1980s.

In all likelihood, wind energy has advanced beyond the need for a working feed-in tariff. The mandatory purchase provisions of PURPA were helpful in streamlining the connection process between utility and wind project, and the shortcomings of the contract language under PURPA did not in itself impede wind power development. However, a crippled PURPA left the country with a legacy of relatively little domestic wind manufacturing. While the feed-in tariffs of Denmark and Germany created a stable environment for investment and manufacturing throughout the 1990s, PURPA could offer wind projects little here and the U.S. wind industry suffered. Denmark, on the other hand, currently exports 90% of the wind turbines it makes, and many of these are installed in the United States.[82]

Without the PTC, wind power is currently more competitive than a natural gas power plant, although it requires the PTC to give it the competitive edge against coal.[83] Wind turbines are massive, and transportation costs to ship them from Denmark (or Germany, another large wind turbine exporter) to the United States can create large additional costs for the project that will hurt the bottom line.

Therefore, we should look at current and future policies as methods to foster stronger domestic production as opposed to subsidizing an uncompetitive technology. Wind is at the competitive cusp, and the United States can only begin appropriating the cost reductions of "learning by doing" by creating a stable environment for domestic wind turbine manufacturing.

Inevitably this all rests on the sources of wind investment instability in the United States. We are currently paying for the mistakes of a poorly worded PURPA and two large complications in our tax code that have only recently been addressed. Denmark taxes energy consumption and CO_2 and the coal in Germany has become increasingly expensive, while nuclear power has not recently been embraced in either country. Therefore, the alternatives in Europe are not as financially attractive (or even feasible) as coal is in the United States.

NIMBY presents its own acceptance problems but the United States has been blessed with significant wind resources in sparsely populated areas. Although this is not the best solution and much can be done to improve community-driven wind projects, it seems to be working for the time being.

RPS are introducing investment security in the states where they have been properly designed. However, improvement is needed in several states with an RPS and the standards do not exist in more than one-half of the states.

All of these problems compound in varying degrees to suppress the expansion of wind in America. Wind is currently expanding here at a rapid pace, but it is increasing in tandem with several glaring problems that need to be addressed. It is an oversimplification to blame any one action or category, as many problems are entangled within other, broader problems. It is also an oversimplification to believe that either Denmark or Germany has the perfect answer. In addition, the window of opportunity for emulating the more successful European policies may have passed (a working feed-in tariff, for example). After looking at this U.S. policy problem from these three different national perspectives, I believe that the best solution draws on European successes, but must also address the U.S. federal apathy toward wind, the increasing cost-competitiveness of wind, our cheap coal safety net, and the financial consequences of historic policies that have inhibited a robust wind industry in the United States.

78. Bolinger, *supra* note 72.

79. Randall Swisher, Electric Utility Consultants, Inc. Conference, Renewable Portfolio Standards (2005).

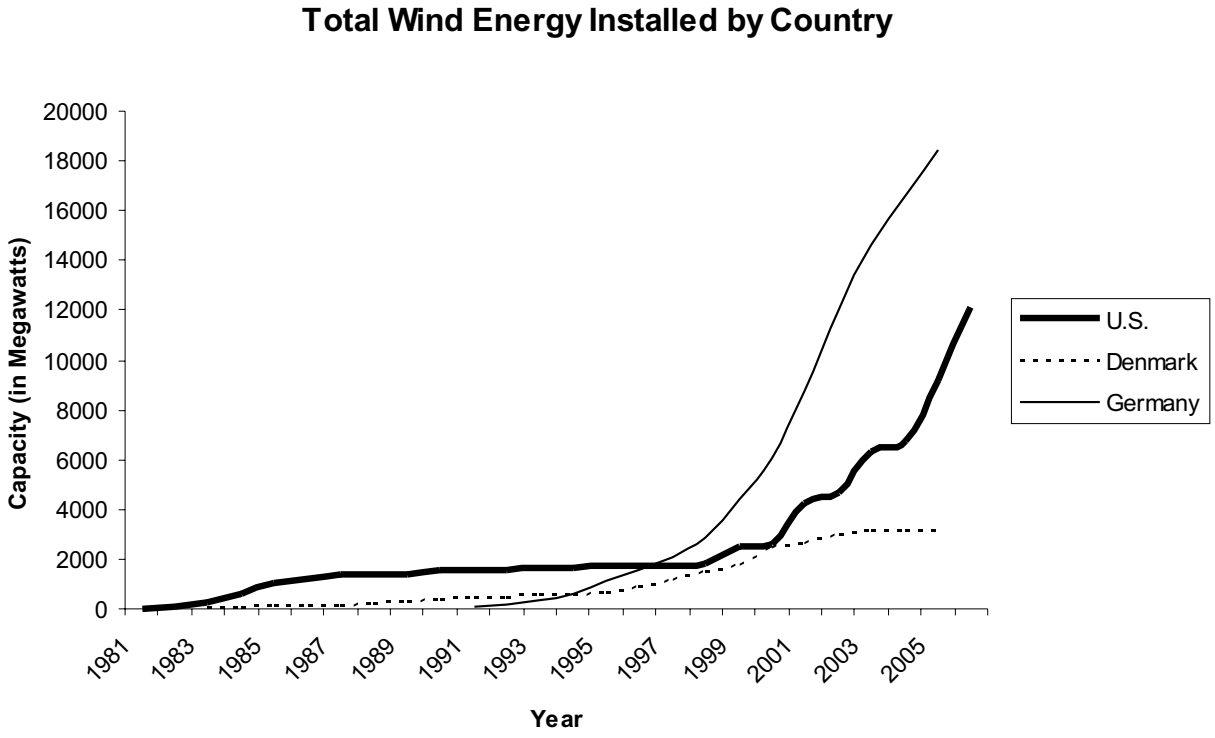
80. *Texas Tops California in Harnessing Wind Power*, Reuters, July 25, 2006, *available at* http://today.reuters.co.uk/news/articlenews.Aspx?type=scienceNews&storyID=2006-07-25T190320Z_01_N25297084_RTRIDST_0_SCIENCE-ENERGY-TEXAS-WIND-DC.XML&archived=False.

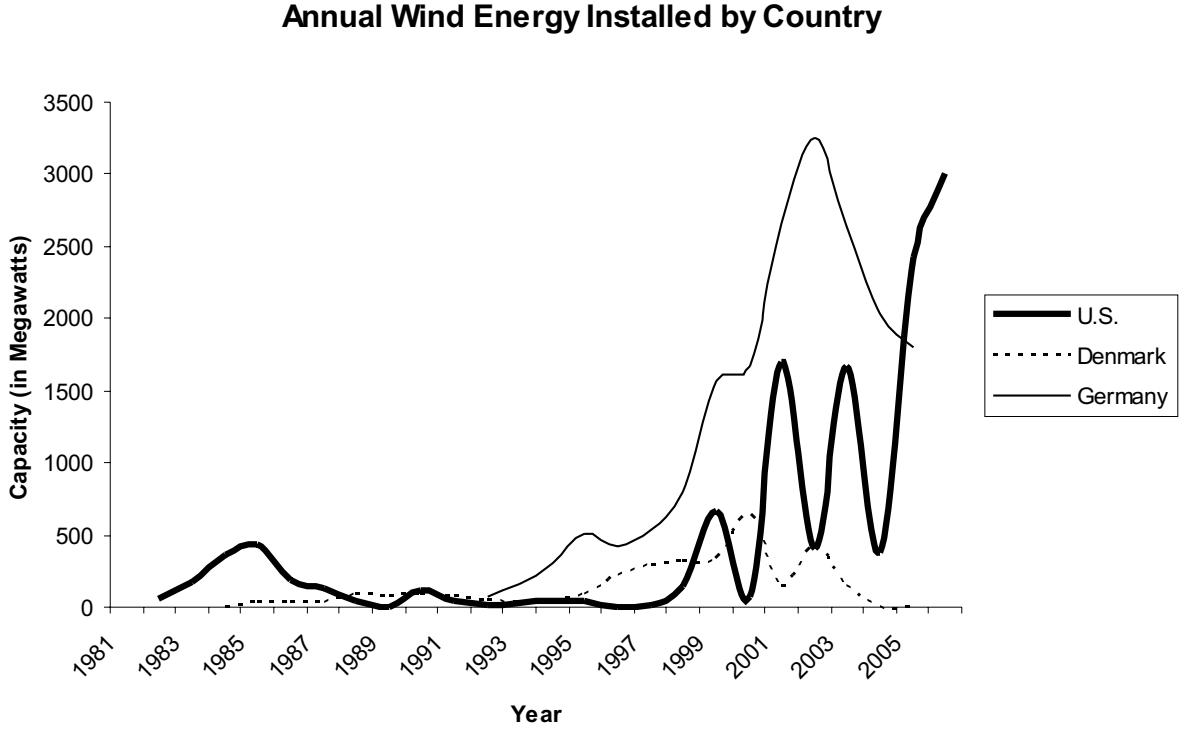
81. Press Release, American Wind Energy Ass'n, Annual Industry Rankings Demonstrate Continued Growth of Wind Energy in the United States (Mar. 15, 2006), http://www.awea.org/news/Annual_Industry_Rankings_Continued_Growth_031506.html (last visited Jan. 24, 2007).

82. Danish Wind Industry Ass'n, *Turnover*, http://www.windpower.org/en/stats/turnover.htm (last visited Jan. 18, 2007).

83. American Wind Energy Ass'n, Real Annualized Cost-of-Electricity (2004 $/MWh) (2004), *available at* http://www.awea.Org/resources/financing/documents/AWEAAnalysis8-9-046P1.pdf.

Appendix A: Wind Expansion by Country and Year, Cumulative and Annual





Sources: American Wind Energy Association, German Wind Energy Association, and Danish Wind Industry Association