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POLICY ANALYSIS:

POLICY CHANGES NEEDED TO ENSURE A SUCCESSFUL WIND ENERGY FUTURE IN THE UNITED STATES

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Introduction

Wind power has a lot of potential to ensure a renewable energy future for the United States and there are many positive upsides to choosing wind energy over other technologies. The United States has abundant offshore and onshore wind resources, wind turbine technology is a proven technology that has already successfully been implemented in the U.S. and abroad, and there are already policy mechanisms in place in the U.S. that support wind generation. However, the impacts the policy mechanisms that are already in place have on wind capacity vary significantly, and recommendations can be made for improving wind energy usage and growth based on current U.S. policies as well policies from other nations. The paper unfolds as follows. First, the history of the United States wind industry and past policies are examined. Second, the importance of the federal production tax credit (PTC) to the past growth of the wind industry and to future growth needs is evaluated. Third, the role of state renewable portfolio standards (RPS) in the promotion of wind energy usage is analyzed. Fourth, the need for improved storage system policies and their increased usefulness when combined with wind energy is explained. Fifth, the difficulties offshore wind developers face with complex siting and permitting regulations is addressed as well as issues with connecting wind energy to the grid. Sixth, the idea of a national feed-in tariff (FIT) in the United States is analyzed. Lastly, the wind energy policies of other nations including China and Germany will be compared to U.S. policies and examined for any policies that can be implemented in the U.S.

History of the U.S. Wind Industry Policies

The U.S. wind industry started in California during the 1970s due to oil shortages in the U.S. that resulted in increasing the price of electricity generated from oil (NREL, 2008: 6).

Policy instruments that helped push the early growth of the California wind industry were both a federal and state investment tax credit (ITC) and "state-mandated standard utility contracts that guaranteed a satisfactory market price for wind power" (NREL, 2008: 6). The Federal Production Tax Credit (PTC) and Investment Tax Credit (ITC) drive development and deployment of renewable energy technologies in different ways. The PTC reduces the federal income taxes of qualified tax-paying owners of renewable energy projects based on the electrical output of renewable energy facilities. The ITC reduces federal income taxes for qualified tax-paying owners based on capital investment in renewable energy projects. An investment tax credit is especially useful for relatively unproven renewable energy technologies since it allows power generators to write off the costs of building generation on their income taxes, and, unlike a production tax credit, there is no need to worry about the actual kilowatt-hours of electricity that are being generated. Thus, ITCs are the best policy instrument in terms of giving a renewable technology that is economically unproven a chance to compete with more proven technology such as nuclear and coal-fired power plants. By 1986, California had more than 1.2 GW of wind energy installations representing almost 90% of the global wind energy at that time (NREL, 2008: 6). The United States, not Germany and not China, was 25 years ago the world's leading producer of wind energy. Yet, the growth of the U.S. wind industry halted in the mid-1980s with the expiration of the federal ITC in 1985 and the California tax credits in 1986 (NREL, 2008: 6). The price of oil became cheap again in the 1980s and the focus of subsidies shifted away from renewable technologies and back to traditional fossil fuel sources.

While the United States turned away from wind energy, Europe became the world leader due to strong renewable energy policies established between 1974 and 1985 (NREL, 2008: 6). European countries realized that renewable energy technologies are economically feasible with the right policies behind them and they capitalized on the potential of wind energy that was demonstrated in the United States. The global wind industry continued to grow in the 1990s pushed by improving wind turbine technology, and by 2000, Europe had more than 12,000 MW of wind energy generation compared to 2,500 MW in the U.S (NREL, 2008: 6). The U.S. wind industry had only approximately doubled in the amount of generation from 1986 to 2000. However, by this time there had been policy mechanisms in place that were supposed to have helped the growth of the wind industry.

The Energy Policy Act of 1992 introduced a production tax credit that gave wind energy producers 1.5 cents (adjusted annually for inflation) for every kilowatt-hour (kWh) of electricity generated from wind sources during their first 10 years of operation (NREL, 2008: 6). A production tax credit helps to promote the use of proven technologies that are going to generate large amounts of electricity. On the other hand, the low price for natural gas and the issue of industry restricting by U.S. utilities hindered the impact of the PTC on the wind industry until its expiration in June 1999 (NREL, 2008: 6). Cheap natural gas prices since the 1990s, just like cheaper oil prices during the 1980s, are going to prevent generators from installing more expensive wind generation even with policies such as a production tax credit in place. Also, with utility restructuring occupying the utilities' time they are more likely to install generation sources that they are more familiar with, such as combined-cycle natural gas turbine plants, which became more popular than coal fired power plants due to cheap natural gas and improved efficiencies during 1990s. During this period the largest amount of installations was 700 MW in the year before the PTC expired, and this represented more than any previous 12-month period since the federal ITC expired in 1995 (NREL, 2008: 6). Despite a subdued impact in the 1990s, the Production Tax Credit will become more useful in helping the U.S. become a wind industry leader again after the year 2000.

The PTC was extended for two short periods until 2003, and then reinstated in 2004 after being allowed to expire (NREL, 2008: 6). This intermittent policy support from the U.S. government has resulted in erratic growth, but "business inefficiencies inherent in serving this choppy market" have also "inhibited investment and restrained market growth" (NREL, 2008: 6). A stable policy environment is essential for the continued expansion of the wind industry, and other state level policies have been influential in this regard. Many states are promoting renewable energy technologies by requiring electricity providers to acquire a small percentage of their supply from renewable energy sources in the form of a renewable portfolio standard (RPS), and requiring that this percentage increase over time (NREL 2008: 6). Renewable portfolio standards are useful for escalating general renewable energy use, but they generally do not have specific requirements about whether a certain percentage of that energy must come from wind energy. The U.S. reestablished itself as the global leader in new wind energy in both 2005 and 2006 due to increased policy support and interest in renewable after lagging behind Germany and Spain for a decade (NREL, 2008: 6). Whether or not this trend will continue depends on if a commitment to renewable energy continues in these tough economic times, and if cheap natural gas prices play a part in stunting this growth just as they have done in past decades.

Extending the Production Tax Credit for Wind Energy

Currently, a production tax credit of 2.3 cents per kilowatt hour is available for electricity produced from utility-scale wind turbines for the first 10 years of production; however, this PTC expired for one day at the beginning of 2013. The Congress extended the PTC in the American

Taxpayer Relief Act. The legislation includes an extension of the PTC for wind projects on which construction is started prior to Jan. 1, 2014 (AWEA, 2013).

Moreover, Section 1603 of the American Recovery and Reinvestment Act of 2009 states that wind project developers have the option of choosing a 30% ITC instead of the PTC for projects that start generating in 2013, and whose construction starts before the end of 2011 (AWEA, April 2011: 1). The option to switch to an investment tax credit is useful especially for offshore wind because the construction costs are higher due to the added technical difficulties of installing a wind turbine offshore. An additional small wind investment tax credit for smaller turbines used for homes and small businesses is set to expire December 31, 2016 (AWEA, April 2011: 1). Smaller wind turbines could become more and more popular if the right policies are in place to make them more affordable to the consumer. They are especially useful in areas in the rural Midwest with its large wind resources, and they could help reduce a utility company's electricity demand by allowing a customer to go off-grid (UOCS, 2003).

The U.S. wind industry has had to deal with a lack and inconsistency of policies which have affected its growth, while older technologies such as coal have had a stable policy environment that has allowed them to operate, grow, and plan for nearly 100 years (AWEA, April 2011: 1). In Figure 1, the evidence of these unstable market signals is evident by the rising and falling of installed wind capacity from 1999-2004, and the potential 100% drop in installed wind capacity after 2011 if the PTC is allowed to expire (AWEA, 2011: 2).

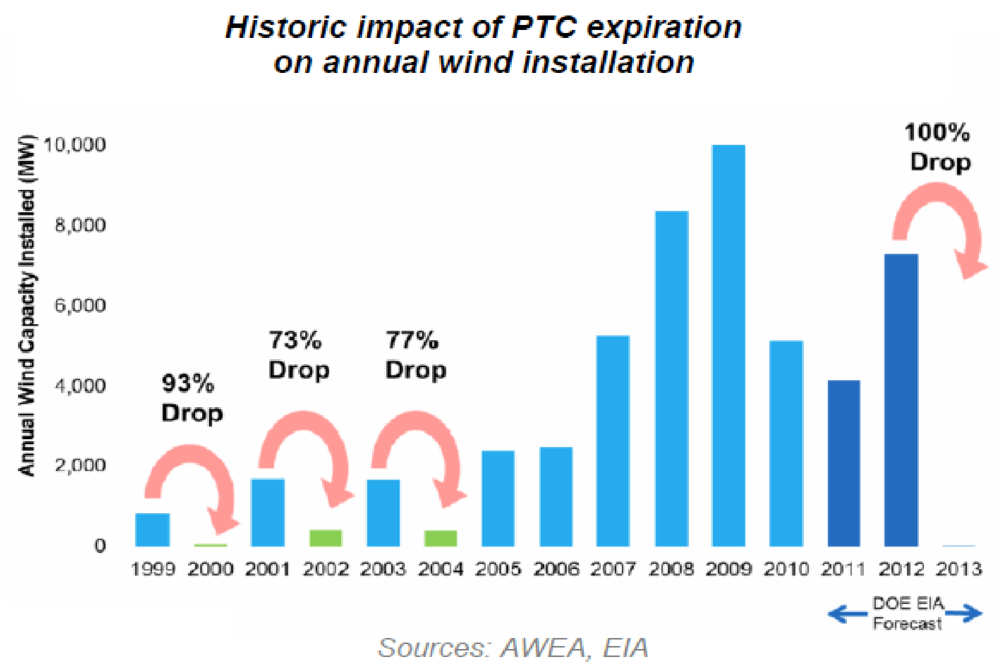

Figure 1. Effects of unstable policy environment on U.S. wind capacity (AWEA , 2013).

The unstable nature of the wind industry is the result of this "short-term and short-sided policy environment" (AWEA, 2011: 1). There is a need for continued renewable energy policies by the United States government that includes specific goals for wind energy if a stable market for wind energy in the United States is going to be created, and the Production Tax Credit should be the foundation of this policy for wind energy. According to the American Wind Energy Association, the American wind industry is looking for long-term policies that offer consistency and market certainty such as the long-term extension of the PTC at its current value (AWEA, 2011: 2). A long-term extension of the PTC along with the ITC option will ensure the steady growth by the U.S. wind industry that has been seen by other countries with stronger renewable energy policies. An extension of the PTC would also put an end to the cycle of short-term planning, nearly annual job layoffs, and higher project costs (AWEA, 2011: 2). Energy generators are reluctant to undergo any wind energy projects without a long-term PTC because of the higher initial capital costs, longer payback period, and lower internal rate of return on these projects. Because of the potential PTC expiration, wind project developers are not planning projects in the U.S., manufacturers are not receiving part orders, and job layoffs have already started (AWEA, 2013).

There are also negative consequences of last minute extensions by the U.S. Congress of the PTC that include hesitation by financial lenders in lending capital six to eight months before the tax credit expires, a stalling of wind development because of credit issues, and wind developers rushing to complete projects before the expiration deadline (AWEA, 2011: 2). When these wind energy projects are rushed they result in smaller, more costly projects with higher electricity prices (AWEA, 2011: 2). Thus, the costs of a lack of stable government policies for wind energy ultimately end up being the responsibility of consumers that are using that wind energy. There are several advantages to using a PTC as a policy instrument including helping developers raise capital in the marketplace, facilitating the completion of financing for wind generation projects, and helping to bring about the completion of these projects (AWEA, 2011: 2). Even more impressive than these advantages is the resulting benefits from PTC to the U.S. wind industry which include an annual average growth rate of 35%, the generation of a supply of electricity equal to the amount used by 10 million U.S. homes, utility-scale wind turbines in 38 states, 75,000 jobs supported by the wind industry in all 50 states, and manufacturing jobs in over 400 facilities as can be seen in Figure 2. (AWEA, 2011: 2). Additional benefits that the U.S. wind industry has received with the support of a production tax credit are that parts worth 65% of a wind turbines total cost are now produced in the U.S as opposed to 25% in 2005, that the price of wind power has dropped 80% since 1980, and that there has been more than $60 billion dollars of investment in wind energy since 2005 (AWEA, 2013: 2). Successful policy initiatives including a long-term PTC will ensure an increased generation of electricity from wind energy, and an increase in wind system installer and wind turbine manufacturer jobs.

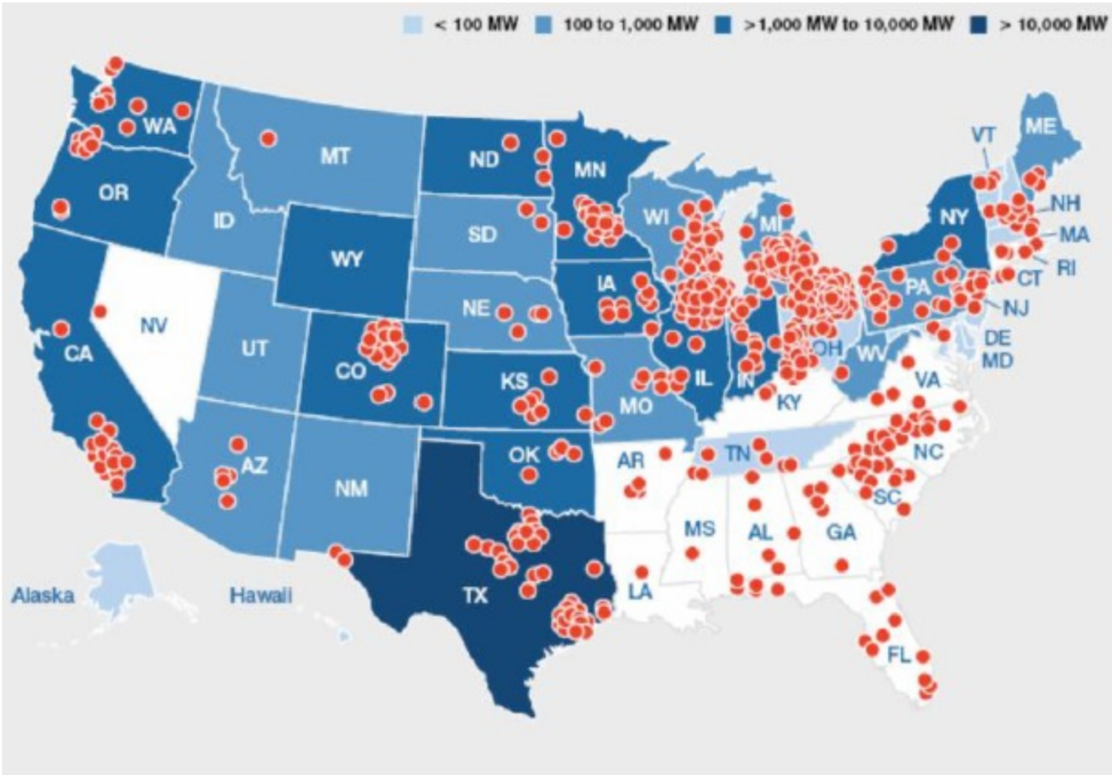

Figure 2. Manufacturing facilities for wind turbine parts (AWEA, 2013).

There are also further benefits, according to a Department of Energy report, associated with 20% wind energy usage by 2030, such as installing more wind power leading to increased rural development, job creation, and energy price stability from not using volatile fossil fuels and thus taking pressure off natural gas prices (AWEA, 2011: 2). In addition, the U.S. wind industry could support 500,000 jobs leading up to this 20% usage (AWEA, 2011: 2). The current number of wind energy jobs could be greatly increased if there is a stable market for wind energy given the right policy incentives, and they alone merit extending the production tax credit.

Renewable Portfolio Standards and Wind Energy

Renewable portfolio standards (RPS) are policies that require utilities to purchase renewable energy generation through renewable energy certificates (RECs). The RECs contribute towards accounting for utilities' retail sales and obligations, by setting time-specific generating capacity (NREL, 2009: 74). Some states have provisions within an RPS called a "carve-outs" that allow one renewable energy source to count for a certain percentage of electricity sales or generating capacity. In addition to these binding standards, in certain states there are renewable targets that are not legally binding (NREL, 2009: 74). While an RPS is useful for promoting renewable energy usage, that type of usage does not necessarily need to be wind energy. Different states are going to use the different renewable energy resources they have available, such as hydropower in Oregon and Washington, in order to meet their specific RPS. In fact, most of the carve-outs that are available are for solar energy (NREL, 2009: 74). There has been a lot of wind energy growth since states have started enacting renewable portfolio standards. According to Figure 3, 30 States and the District of Columbia had enforceable RPS or other mandated renewable capacity policies, as of January 2012. In addition, seven States had voluntary goals for renewable generation. These programs vary widely in terms of program structure, enforcement mechanisms, size, and application (EIA, 2012).

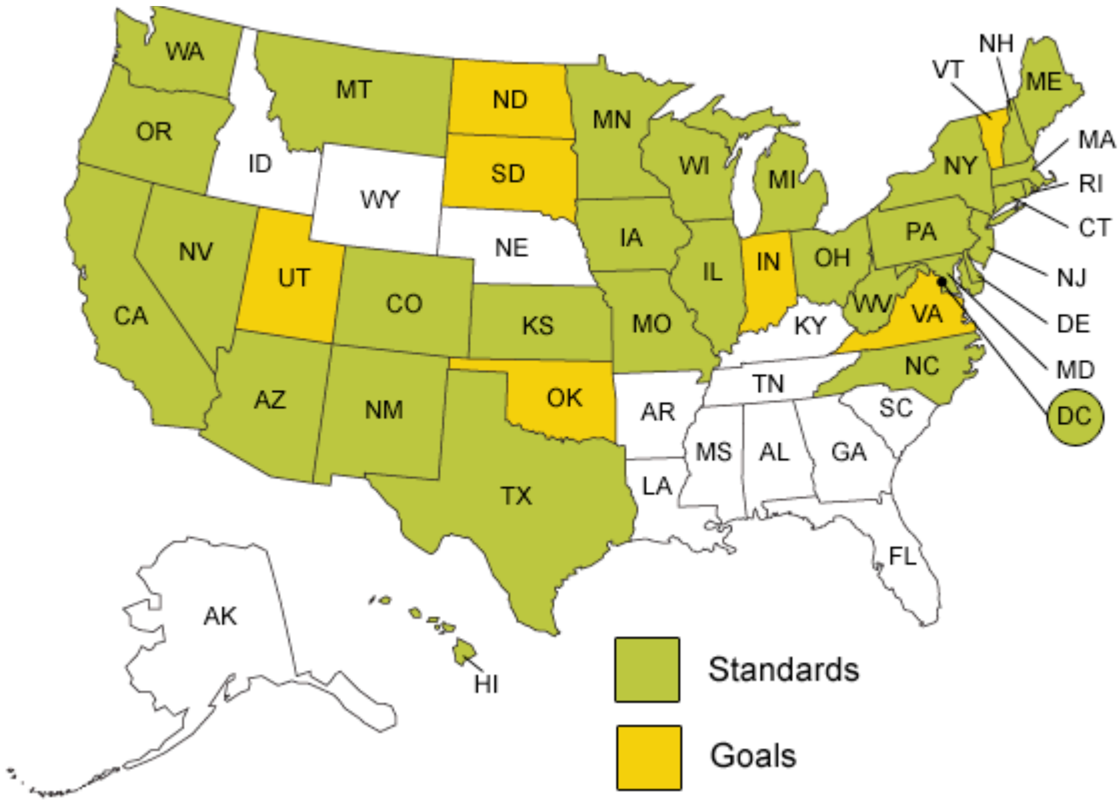

Figure 3. State Renewable Portfolio Standards and Goals (EIA, 2012).

Energy Storage Policies and Their Effect on the Use of Wind Energy

Some argue that the one of the main barriers that is holding back the use of wind energy is not the price of generating electricity but its intermittency (Schiermeier, 2008: 819). The place where intermittency becomes less of an issue is for offshore wind turbines, where there is more consistent wind the further out from shore you go. The lack of intermittency is one of the main reasons why utility companies use coal-fired and nuclear power plants to provide baseload generation (which means those generation facilities designed to run continuously at near capacity levels, to meet basic demand). Also, because of the intermittency issue utility and grid operators need to use extra measures to control the added variability from using wind energy (Schiermeier, 2008, 819). The electricity industry in the United States is one of the most heavily regulated in terms of reliability, and thus utilities are hesitant to add risky generators to the grid. Right now only a small percentage of our electricity is from wind, and the variability from these wind generators is absorbed by the variability that is already present in the electricity grid. Changing a larger portion of our energy mix to wind energy is going to require improved storage technologies that will help to reduce the additional variability and policy changes to ensure that the cost and technical feasibility of these storage systems are both improved.

The intermittency of renewable energy power plants such as wind farms can be mitigated by geographically connecting dispersed systems, by integrating renewable systems with one another, and by adding large-scale storage technologies (Sovacool, 2009: 97). Storage technologies are one of the ways that the intermittency issue is resolved in order to use renewable sources as baseload generation. An interconnected wind farm without backup can provide power more than 50 percent of the time, but with backup (including geographically interconnecting dispersed resources, integrating renewable systems together, utilizing smart meters and batteries in electric-powered vehicles, and/or coupling them to large-scale storage technologies.) this number increases to more than 90 percent of the time with an extra cost that is often less than an additional 1 cent/kWh for the electricity produced (Sovacool, 2009: 97). Some technologies that can currently be connected to a wind power system include pumped hydro storage facilities, compressed air storage, molten salt storage facilities, or connected to biomass generators to reduce intermittency (Sovacool, 2009: 97). The added costs for each of these potential storage options are only 0.7 to 5 cents/kWh (Sovacool, 2009: 97).

Currently, many of these storage technologies cannot contain all of the energy being generated by renewable energy sources and the amount they can hold is only for a short period of time. Policies such as increasing government research grants for storage technologies could help to ensure that the technical barriers faced today by storage technologies are overcome. In addition, there is the need for an economic incentive for wind energy generators to start adding these storage technologies to their systems since storage systems increase the cost of electricity to the consumer. Adding a PTC for the energy produced by the storage system would ensure that battery systems are added to the wind turbines. There is also the possibility of including a separate Investment Tax Credit of 30% of construction costs for the battery storage systems. The problem of intermittency can be solved by adding storage systems to wind turbines, but only if the policy mechanisms and technological improvements are available.

With storage capabilities attached renewable energy systems become just as reliable if not more so than traditional energy sources. Conventional baseload plants have reliability issues with the average coal plant out of service 10 to 15 percent of the time, and nuclear plants having unscheduled outages due to heat waves and long refueling times (Sovacool, 2009: 97). Meanwhile, the technical availability for wind is around 95 percent, and wind turbines have shorter lead times and use a renewable source of fuel (Sovacool, 2009: 97). Wind generation could become an attractive option for baseload generation if combined wind and storage systems can harness almost all the available wind potential.

Problems with Citing and Permitting Wind Turbines and Grid Connection

Wind energy projects have to deal with complex laws for permitting and siting that involve decisions being made at local, state, and federal levels (NREL, 2008: 118). This complex framework results in inconsistencies about responsibilities between different levels of government and even within the same agency (NREL, 2008: 118). In order to create a path for increased wind energy usage in the future the whole process needs to be simplified to save both time and money for developers. Local authorities make the decisions for siting at a county level, but sometimes their lack of experience causes them to be easily manipulated by opponents and proponents of wind projects using inaccurate information (NREL, 2008: 18). The situation then becomes even more complex when state agencies such as a wildlife agency can establish guidelines for siting wind projects on state controlled land, and if a state has an energy siting board they can review energy facilities with the state utility commission (NREL, 2008: 19). Therefore, there are already several levels of government and regulations that must be considered for siting a wind energy project, and that is not even including federal regulations.

Up until 2005 the siting of offshore wind projects was more complex than onshore siting due to "unclear and overlapping legal and jurisdictional authorities" (NREL, 2008: 124). However, the Energy Policy Act of 2005 delegated authority to the Minerals Management Service (MMS) -which since then has been renamed as the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE)- to grant easements, leases, and right-of-way in coastal waters (NREL, 2008: 124). This authority has simplified some of the burden of siting regulations but there are still other regulations such as environmental permitting that need to be considered. The Federal Government can participate in regulating wind energy projects on federal land through several different agencies including the FAA, the Bureau of Land Management (BLM), The U.S. Fish and Wildlife Service (USFWS), the Bureau of Ocean Energy Management, Regulation and Enforcement, and The U.S. Department of Energy (DOE) (NREL, 2008: 29). Some examples of the permits required by these agencies include developers having to submit an application for each individual turbine over 60m to the FAA, the BOEMRE overseeing permitting for offshore wind projects, and the Department of Energy creating an interagency project siting team (NREL, 2008: 29). Depending on what type of land the project is sitting on and any potential environmental risks such as increased bird mortality rates there are even more organizations that might need to be involved in permitting applications and environmental studies.

Offshore wind siting is an especially long and difficult process for wind developers given all the necessary permits and regulations and the process seems to be only getting more difficult for future projects. The duties of the BOEMRE have been split into three separate agencies, with the Bureau of Ocean Energy Management overseeing operations planning and leasing, with the Bureau of Safety and Environmental Enforcement overseeing safety and environmental issues, and with the Office of Natural Resources Revenue overseeing royalty and revenue management of offshore wind projects (Salazar, 2010: 1-2). While splitting up the BOEMRE might have simplified the work that each individual agency has to do, it has created a nightmare of permitting applications and environmental studies that will delay offshore wind projects even further then they already are. Moreover, future delays in offshore wind project deployment will occur because of the uncertain potential impacts of offshore wind projects and lack of long-term technological knowledge about their deployment in the U.S. A simplified framework for siting and permitting will not only save the developer's time and money but it will also save time for government agencies and allow their money to be used elsewhere. One of the reasons that European countries have developed their wind energy projects so quickly is a clearer and simpler regulatory framework.

Three solutions that will address environmental and sitting challenges faced by wind energy projects are expanding public-private partnerships such as research collaboratives to study environmental issues, expanding public outreach and education to inform local communities of the benefits of wind projects, and most importantly coordinating land-use planning among different government agencies (NREL, 2008: 121-123). The first two solutions are designed to get public involvement in environmental and sitting issues in order to save time and address any concerns ahead of time, while the last solution is designed to reduce confusion between different federal and state agencies on siting projects. Addressing the various inconsistencies in permitting and regulations will require government agencies and industry stakeholders to review current policies being undertaken and create a sustainable growth planning effort and currently several states and federal agencies have sitting guidelines that need to be made consistent with one another to reduce time and cost considerations (NREL, 2008: 123).

There will be future issues with the grid connection of wind resources that can be fixed by preparing now. For grid integration, planning and design processes are needed that contain sufficient connection points for future large-scale wind power generation as well as strategies to ensure that wind farms are fully grid compatible in terms of maintaining grid stability (Hohmeyer and Trittin, 2008: 117). This means that transmission and grid infrastructure will need to be upgraded in order to use large amounts of wind energy and this is an even bigger problem for offshore wind. The big questions in grid infrastructure development are determining who is going pay for these upgrades and how will upgrades be planned. In the United States, one change that has been made that might improve this issue is Federal Energy Regulatory Commission (FERC) Order No. 1000, which requires utilities to participate in regional and interregional planning processes in order to develop cost allocation and planning requirements on a regional level for regional transmission facilities as well an interregional level for interregional transmission facilities (FERC, 2011: 1). While Order No. 1000 does state that utility companies must have plans in place and work together with one another on transmission planning, this order does not state how FERC will deal with disputes that will still surely arise despite these cost allocation and development plans. Whether or not utility companies can work together in the future to construct the necessary infrastructure needed for large-scale onshore and especially for large-scale offshore remains to be seen.

Creation of a National Feed-In Tariff and Analysis of Current Feed-In Tariff Programs

A feed-in tariff (FIT) would pay wind energy producers a fixed, premium rate for every kWh of electricity generated that is fed into the grid and then obligate utility companies to purchase all of the electricity from eligible producers in their service area, through contracts that usually last 15 to 20 years (Sovacool, 2009: 105). Feed-in tariffs have been proven to be the most cost-effective pathway for the rapid expansion of large amounts of renewable energy generation, and they usually reduce electricity prices despite the initial upfront cost to customers (Sovacool, 2009: 105). A potential national feed-in tariff would promote the increased use of wind generation in the United States, but traditionally the U.S. government has not adopted any national level renewable energy policies other than the PTC. As previously mentioned renewable energy policies have been more effective at a state and local level with policies such as Renewable Portfolio Standards. Given that it is unlikely that the U.S. will pass a national level RPS, it seems even more unlikely that the U.S. would adopt a policy that is even less proven here such as a national feed-in tariff, though there has been a proposal for a national FIT advanced to the federal level by U.S. Representative Jay Inslee (D-WA) in 2008 (NREL, 2010: 16).. There is the possibility, however, that state and local governments will choose to create a feed-in tariff and there are already a few instances where feed-in tariffs policies have been enacted or proposed in the U.S.

Figure 4 shows the enacted and proposed feed-in tariff policies in the United States, demonstrating that so far 7 states have enacted FIT policies (EIA, 2013). Several of the implemented feed-in tariffs are specifically for solar, and there is no feed-in tariff that is specifically for wind.

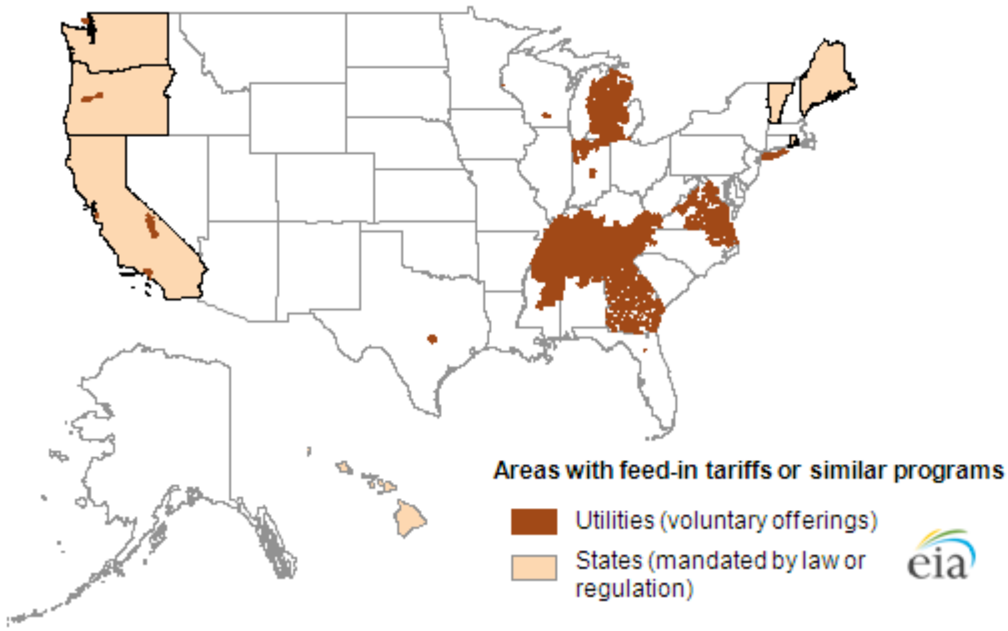

Figure 4. Feed-in tariff policies for renewable energy in the United States (EIA, 2013).

The reason that feed-in tariffs are not as commonly implemented in the United States as in Europe are legal and regulatory precedents from the U.S. Federal Power Act (FPA) and the Public Utilities Regulatory Act (PURPA) that prohibit states from establishing European-style FIT policies (NREL, 2010: 17). The limited examples of where a cost-based FIT is allowed in the U.S. without any approvals and regulations are municipal utility jurisdictions, regions whose electric systems are not connected to the U.S. grid like Alaska and Hawaii, and regions that have a weak connection like Texas (NREL, 2010: 17). This reason is why Hawaii and San Antonio are two regions that have enacted a feed-in tariff.

Moreover, the areas that are exceptions are not subject to the FPA and regulation by FERC, and there are also exceptions in non-exception regions under PURPA that allow feed-in tariffs for avoided costs regulated by FERC (NREL, 2010:17). However, avoided cost are not enough to make renewable energy projects financially viable, and thus feed-in tariffs for cost-based incentives not regulated by FERC are allowed using other sources of revenue such as production-based incentives, state tax credits, and renewable energy certificates (NREL, 2010:17). While technically cost-based feed-in tariffs are still illegal under PURPA, these revenue based exceptions allow a way to circumvent this restriction. Furthermore, several utilities chose the option to no longer be subject to PURPA with the Energy Policy Act of 2005, so they must use state laws to establish FITs that are subject to the FPA and approval by FERC on a contract-by-contract basis or with blank approval by a developer (NREL, 2010: 17). Thus, there are going to be regulations that will make it difficult to create a feed-in tariff for any regions that are not exempt, but state-level FITs are more likely to pass than a federal level FIT. The best course of action to ensure the adoption of feed-in tariffs at either a national level or state level is to remove the restrictions against cost-based feed-in tariffs and adopt a system similar to the European feed-in tariff model.

Comparison of U.S. Wind Energy Policies to Other Countries

China was the world leader in new capacity added in 2010 with 18.9 GW of wind energy resources added and with this added capacity China surpassed the United States to become the world leader in global wind capacity with 44,733 MW compared to the 40,180 MW in the United States (GWEC, 2011: 10-11). The Chinese market almost trebled its capacity from 25.8 GW in 2009 to reach 75.3 GW by the end of 2012, allowing China to continue maintaining its lead in terms of global cumulative installed wind power capacity (GWEC, 2012: 8). The growth of wind capacity in China can be attributed to aggressive renewable energy policies such as the Renewable Energy Law that requires grid operators to purchase certain amounts of renewable energy, subsidies from the Renewable Energy Fund to cover any extra costs due to the integration of renewable sources, and a 20 year feed-in tariff for wind generation which started in 2009 (GWEC, 2011: 32). The U.S. has state renewable portfolio standards which are similar to China's Renewable Energy law requirements. although they are not at a national level and given the current gridlock in Congress it will likely be a while before the United States enacts national level renewable energy policies such as China's Renewable Energy law and national feed-in tariff. In addition, the subsidies given to the renewable energy fund are similar to the subsidies currently enjoyed by fossil fuels in the U.S., and these need to be shifted over to renewable energy technologies if growth is to be facilitated. Even though there are many positive policies in place China has problems with grid infrastructure and wind projects having to wait for months before they are connected to the national grid (GWEC, 2011: 32). The United States should learn from China's grid infrastructure issues and make sure it has the necessary policies and procedures in place so that when new generation is available it can be easily integrated to the grid.

Germany faces a very different situation than China with a European leading 29,071 MW of wind power capacity existing at the end of 2011, but only 2,415 MW of capacity added in 2012 (GWEC, 2012: 9). Germany's high level of wind capacity is due to a five to twenty year feed-in tariff policy existing since 1991, with an additional tariff for offshore wind introduced in 2009, as well as tariffs for replacing old wind turbines and improved grid compatibility (GWEC, 2011: 41-42). This cost-based feed-in tariff policy is currently prohibited for legal reasons in the United States except for exemptions using other financial incentives, and unless there are new laws enacted that removes these restrictions it is unlikely that a feed-in tariff policy will be enacted in the United States. Other relevant polices for wind energy usage include the German

Building Code setting aside special preferential zones for wind energy development (GWEC, 2011: 42). Compared to the United States problems with siting wind energy projects, the German solution is much simpler and requires less government management. German wind energy policies may not be currently applicable in the United States but their commitment to the promotion of wind energy is admirable, much more consistent, and better thought out.

Concluding Remarks

The United States does not currently have a national-level renewable energy policy such as a federal FIT or RPS, nor will the U.S. likely develop one for quite a long time. What the United States can do to promote wind energy is to enact a long-term extension of the production tax credit, which is the main policy mechanism that currently supports the wind industry. Furthermore, the United States can simplify its permitting and siting process and invest research money in developing better energy storage technologies to fix intermittency issues. These policy mechanisms at a federal level along with continued use of state-level renewable portfolio standards will be enough to ensure that the United States is a future leader in wind generation capacity. Eventually when enough damage has been done to our environment the United States will adopt a comprehensive renewable energy policy, but in the meantime these steps will ensure that at least some of the damage is mitigated.

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Bio

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