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POLICY SOLUTIONS FOR INCREASING ECONOMIC IMPACTS OF WIND DEVELOPMENT IN ARIZONA

Karin E. Wadsack
Northern Arizona University
School of Earth Sciences
& Environmental Sustainability
P.O. Box 15600
Flagstaff, Arizona 86011 USA
Karin.Wadsack@nau.edu

Dr. Tom Acker
Northern Arizona University
College of Engineering, Forestry,
& Natural Sciences
P.O. Box 15600
Flagstaff, Arizona 86011 USA
Tom.Acker@nau.edu

ABSTRACT

Arizona recently dedicated its first utility-scale wind plant, the 63-MW Dry Lake Wind Project on private, state and BLM land near Holbrook. While Arizona has developable wind resources and some available transmission capacity, wind power development has not taken off in the state, and this is often attributed to policy issues and resource quality. The National Renewable Energy Laboratory's Western Wind & Solar Integration Study quantified the wind capacity that should be built in Arizona under various wind development scenarios, including all-in-state development, least-cost wind resource across the western electric grid in the inter-mountain west, and a scenario providing some accounting for local economic impacts of wind development. In scenarios in which up to 20% of Arizona's electrical energy was served by wind resources developed within Arizona, the study found that in-state wind development actually resulted in a lower overall system operating cost of energy to state consumers than any other scenario (despite higher capacity factor sites being available outside of Arizona). In addition, the economic impacts of this potential development offer revitalization to many of the rural areas in the state. However, the state lacks coherent policies to attract wind power development and to bolster the services available in rural areas to meet the needs of developers during construction and operation of wind power plants.

This study presents and evaluates policy mechanisms for use by the state, county, or tribal governments to increase wind penetration, attract wind development through financial incentives, and increase the local economic impacts of the development once it takes place. Example policies from other states, counties, and tribal governments are evaluated with regard to their appropriateness in Arizona, and suggestions are made for changes to federal policy that would increase the viability and impact of wind development projects on tribal land nationwide.

INTRODUCTION

Arizona has a Renewable Energy Standard and Tariff requiring that 15% of the electrical energy served to loads in the state be supplied by renewable resources by 2025 [i], and has made a commitment to greenhouse gas (GHG) emissions reductions through the Arizona Climate Change Action Plan and its membership in the Western Climate Initiative, a developing regional cap-and-trade program. For nearly two decades prior to 2008, Arizona has been one of the fastest-growing states in the United States [ii], and electricity load has been predicted to double in the next 20 years [iii,iv]. The use of wind energy as part of a strategy for meeting these goals has been advocated by policy organizations including the Western Resource Advocates and the Western Governors' Association, but it has never been clear whether Arizona's wind resource is cost-effective to develop or whether the state's utilities would be better off importing wind energy from out of state. The relative benefits to Arizona of in-state wind development versus imported wind energy, in terms of cost of energy and local economic impacts, have been of interest to the state's policy-makers and utilities for some time, but no studies have evaluated the system operating and local economic impacts of in-state development in conjunction to determine the relative merits of pursuing wind development at a large scale in Arizona.

Arizona's total wind resource has been mapped and quantified using modeled wind resource data validated with measurements from anemometers on meteorological towers located throughout the state. The developable wind resource was quantified by applying exclusions to the 50-meter Arizona wind resource maps, and the total developable resource in the state was estimated at more than 23,000 MW in 2007 [v,vi]. Williams et al. [vii] also calculated the potential local economic

impacts, in terms of jobs, earnings, and additional economic activity, of varying levels of wind power development in the windy counties of Arizona. In addition, the utility integration impact of developing Arizona's wind resources, in differing geographic patterns and quantities, was examined by Acker et al. [viii] in a study performed for Arizona Public Service Company. The study quantified the integration costs, resulting from wind's variability and uncertainty, of introducing increasing levels of wind energy into APS' electricity grid, finding integration costs to be minimal modest and similar to those projected by other studies nationwide. Each of these studies focused on either the operational impact or local economic development potential of in-state wind development.

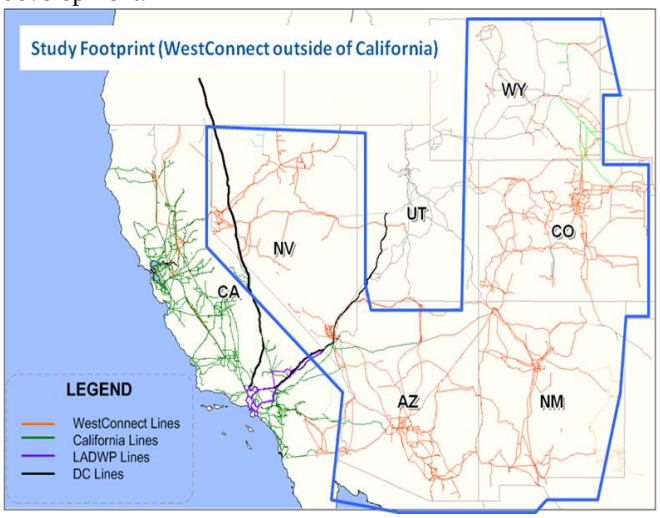

Figure 1. WWSIS FOOTPRINT (Source: GE).

In a study of the integration impacts of wind development on the western electric grid (in particular, the "WestConnect" region consisting of the states of Arizona, Colorado, Nevada, New Mexico, and Wyoming, shown in Figure 1), the National Renewable Energy Lab's (NREL) Western Wind and Solar Integration Study[1] (WWSIS) modeled wind penetration in Arizona of 10, 20 and 30%, under various wind development scenarios. These included all-in-state development (In Area), least-cost wind resource across the study footprint (Mega Project), and a scenario providing some accounting for local economic impacts of wind development (Local Priority). Results from this study, showing the total operating cost of energy for Arizona of each scenario relative to a no-wind scenario (represented as percentages, with the no-wind scenario as 100%) are shown in Figures 2 and 3.

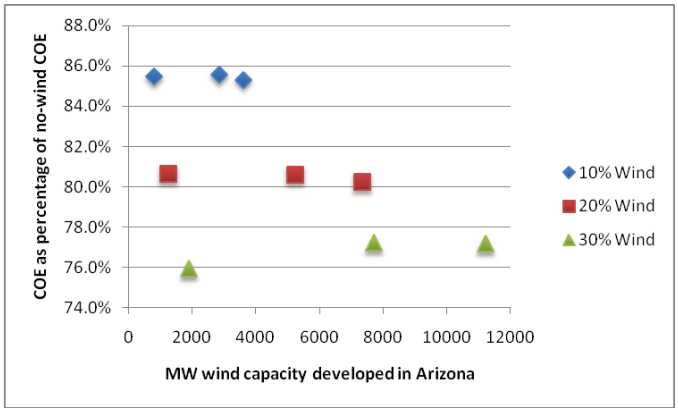

Figure 2. COST TO SERVE ARIZONA LOAD.

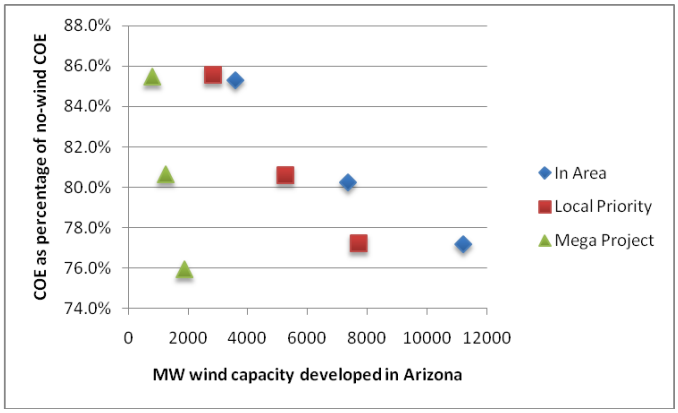

Figure 3. COST TO SERVE ARIZONA LOAD.

This study found that the use of in-state wind resources had more positive impacts on the overall system operation costs than the use of wind energy imported from out of state, up to 20% wind energy penetration [ix]. In this study, the electrical system operation and costs were analyzed by General Electric (GE) using their Multi Area Production Simulation (MAPS) software. MAPS is a transmission constrained, hourly cost production simulation model. The WWSIS modeled system operation costs without any fee for the use of transmission, which means that relative costs of imported energy in real system operation are likely to be higher than those in the study's results. Also of importance, the WWSIS assumed a significant level of cooperation between all the balancing authorities in the study region, beyond what currently exists today.

The WWSIS, in its site selection algorithm for deciding where to build out the wind power, modeled development scenarios using the capital costs of constructing wind ($2000/kW installed) and transmission capacity ($1600/MW-mile), and giving varying levels of priority to in-state development. The selection algorithm, as well as the MAPS modeling, relied on hourly wind power time series predicted using a detailed meso-scale weather model, performed by 3TIER[2]. The study found that, while Arizona's wind resource is not as strong as that in other states, at up to 20% wind penetration the in-state resources yield a lower total operating cost of energy. In addition, providing development incentives to reduce the initial capacity construction costs by 10%, to reflect an accounting for local economic impacts, can render the in-state resources more cost-effective to develop,

[1] See http://wind.nrel.gov/public/WWIS/

[2] See http://wind.nrel.gov/public/WWIS/01-Potter.pdf

when accounting for construction costs and relative capacity factor, than locations with better wind resources but out of state. Lastly, the development of in-state resources does not require the construction of large quantities of interstate transmission, which is likely to be problematic and time-consuming, requiring a long time horizon for any realistic plan to import large quantities of wind energy from other states.

In addition to the operating costs of in-state wind development that is computed by MAPS, the local and statewide economic impacts can be quantified using the NREL Jobs and Economic Development Impacts[3] (JEDI) model for wind development projects. This input/output model uses a series of multipliers for Arizona's counties to quantify the impacts on the state of specified investments in wind capacity construction, in terms of direct, indirect, and induced effects. Wind developments in Arizona have local economic impacts that increase in proportion to the availability of products and services needed for wind plant construction and operation, as well as the auxiliary services and other outlets for spending that are impacted by the indirect and induced effects of wind plant development [x].

These economic impacts are, of course, a function of the availability and use of local companies and services, as well as local and state incentive policy structures. If wind development does not take place in the state, due to high real or administrative costs or lack of incentives, wind then has no local economic development potential in the state. If a wind developer chooses to use non-local companies to provide direct services and materials, or if the needed services cannot be provided at the local level, the dollars paid for these portions of project completion will not stay in the local economy. Arizona's sole utility-scale wind plant, the 63 MW Dry Lake Wind Project, sits on private, state, and BLM land in Navajo County near the town of Holbrook. According to the developers, Iberdrola Renewables, the project generated 200 temporary construction jobs and 5-10 permanent operations jobs[4]. In addition, the project provides tax payments to Navajo County, and land lease payments to the private landowner, the BLM, and the state of Arizona. Questions about the true local economic impacts of wind power development are behind much of the public concern regarding wind energy development in Navajo County [xi]. The proportion of dollars invested in wind development projects that stay in the local economy can be impacted by a variety of policies, which are the focus of one part of this paper's policy analysis. The other three sections of this study's policy analysis focus on increasing wind energy development in the state, using financial incentives to attract developers, and finding ways to increase the viability and local economic impacts of wind projects on the state's tribal lands.

METHODS

Policy examples were gathered through a review of state policies collected in the North Carolina Solar Center's Database of State Incentives for Renewables and Efficiency (DSire)[5], and through conversations with wind developers, County, State, federal and Tribal government representatives, and experts on tribal renewable energy policy. Four types of policies were identified which would be most effective, individually or in concert, in increasing the local economic impact of wind energy development in Arizona. These include policies to: facilitate wind energy development in the state; provide financial incentives for in-state wind development; increase the local economic impact of wind development that takes place in the state; and increase the viability and local economic development potential of wind energy projects that take place on Tribal land. Each policy option was analyzed for its level of impact (regional/state/local), its applicability for implementation in the state of Arizona, and its impact in terms of who would benefit from it and who would bear any attendant costs.

RESULTS

Policy Options: Increasing Wind Power Penetration in the State

Several options exist to facilitate the development of wind power in the state resulting in increased wind penetration levels. These include:

- Creation of state or regional energy think-tanks and stakeholders' groups
- Facilitating local ordinances and permitting
- Participating in regional carbon markets
- Facilitating 'green choice' program participation
- Transmission capacity planning and build-out

State or Regional Energy Think-tanks and Stakeholders' Groups Energy policy institutes created at the state level provide a forum for the analysis and development of plans in collaboration with state utilities, transmission authorities, and the multiple levels of government involved in wind power permitting, regulation, and incentive structuring. New York Governor David Patterson in late 2009 announced the creation of the NY Energy Policy Institute, which will coordinate the work of all the state's energy research centers as a tool for policy-makers [xii]. The Colorado Renewable Energy Collaboratory in August 2009 established the Center for Research and Education in Wind, a partnership between multiple universities and industry members, which has as its goal accelerated technology research and development for wind power, as well as policy research and outreach programs for state landowners [xiii]. Similarly, the heads of six energy-related companies in Pennsylvania in 2009 formed the United States Center for Energy Leadership, which will investigate and advocate for policies to incent collaboration between industry sectors and to advance energy technologies and practices [xiv].

These types of alliances provide an additional resource for state energy officials, legislators, and Corporation Commissioners, by synthesizing and coordinating the work of state Universities, research institutes, think-tanks, and policy organizations. In addition, by making a concerted effort to coordinate the work of researchers, policymakers, and the wind industry, this type of organization advances the work of each party. Lastly, these organizations draw attention to the state as a location that is working to build sound policies for the development of renewable energy resources.

In a similar vein, also in 2009, Nebraska farm and agri-business associations joined forces with landowner groups and others to form the Nebraska Energy Export Association. This group's mission is to encourage partnerships between landowners, investors, and lenders, to provide these groups with engineering, environmental, legal and regulatory

[3] See http://www.nrel.gov/analysis/jedi/about_jedi.html
[4] See http://www.iberdrolarenewables.us/pdf/Dry-Lake-fact-sheet-final.pdf
[5] See http://www.dsireusa.org/

consulting resources, and to develop a plan and model for wind energy export, up to and including lobbying for legislative change at the state level [xv]. Arizona is an energy exporter now, and could develop wind and other renewable energy sources to continue to export electricity even as the generation of electricity from fossil fuels is reduced over the longer term. An organization such as the one in Nebraska could work to coordinate the many parties in Arizona, from utilities to Tribes, that would be involved in such an effort.

Facilitating Local Ordinances and Permitting From a permitting perspective, any changes in state or local law that make wind project permitting easier or faster will lower administrative and real costs for developers, creating an incentive for increased investment in wind development in the state. This hurdle clearly exists in Arizona, although it has begun to be addressed at some levels; representatives of Iberdrola, the developer of the first completed wind project in Arizona, felt that they had helped to blaze the trail for future wind development by painstakingly working through the permitting process with state and local governments, as well as the BLM [xvi]. County personnel are struggling with the development of wind ordinances for both large- and small-scale wind, attempting to establish realistic guidelines for development while adequately addressing legitimate public concerns [xvii].

State-level guidelines can assist local governments in developing the rules and regulations needed for wind development permitting. In California, Assembly Bill 45 provided guidance from the state level for county policy-makers, establishing maximum restrictions for any county small wind ordinance and providing information on the salient aspects of a typical wind ordinance [xviii]. Illinois House Bill 3746 also recently established maximum setback requirements, although it stopped short of writing a model wind ordinance for counties [xix]. Pennsylvania [xx], New York [xxi], and North Carolina [xxii] all have model wind ordinances that can be used by local communities in those states to guide the process of developing regulations that define the wind permitting process and protect the public health. A similar state-level model addressing issues relevant to both large and small wind would be useful to Arizona county, state and tribal officials, and a workshop on model wind ordinances for these officials would accelerate the ordinance development process.

Carbon Pricing It has been suggested that a gradually increasing tax on carbon emissions from power generation and industry would be an effective strategy for shifting to cleaner energy sources such as renewables, with the added benefit of potentially reducing other taxes [xxiii]. These taxes would, however, be difficult to apply to end users of carbon-implicated electricity flowing across state borders. This same fact holds true for cap-and-trade carbon permitting markets. Participation in a regional carbon permitting market program such as the Western Climate Initiative, or a national carbon market, would allow for a 'carbon equity' of sorts at the regional or national level, in which all power producers were subject to carbon permitting requirements and costs. While these programs do not explicitly support the development of wind or other renewable energy, their establishment of a limit and a price on carbon dioxide emissions create conditions favorable to increased investment in wind power. In order to provide a true incentive for wind development, particularly in Arizona, carbon prices must be high enough to offset the low cost of electricity from the state's fully amortized coal plants burning cheap coal. Market simulations have estimated that a carbon price upwards of $50/ton would be necessary to begin displacing the existing coal fleet [xxiv].

Green Power Choice Programs Utility programs that allow users to choose renewable electricity give consumers the power to create a market for renewable power. These programs allow users to create their own level of surcharge, choosing to cover all or part of their electricity use with renewable power. While these have not been overwhelmingly popular in the United States [xxv], they do increase demand for renewable energy and allow users to determine their own participation in creating it. Mandating the availability of such programs, and making them less expensive, helps to create a market for renewable energy projects. In addition, the Arizona Corporation Commission, which regulates investor-owned utilities in the state, could guide utilities to set the 'Green Choice' programs (which already exist in most of the state's utilities) as the *default* while informing customers of their option to opt out of the program. This would in essence set up a default, yet optional, additional system benefits charge to support the purchase of wind and other renewable energy. Despite the fact that a large percentage of the population would likely opt out, this option might generate an *overdemand* for renewable energy. Thus another option would be for the Arizona Corporation Commission to mandate that the 'Green Choice' programs be a simpler option for customers to select when paying their paper or online bills, such as a check box, rather than the arduous sign-up process that it is now.

Transmission planning and build-out In many regions, accelerated renewable energy development will require an investment in new transmission capacity. Cases exist in New York and Texas in which wind plants have had to "shut down" despite the fact that the wind was blowing, because there was no need for the electric resource at that time, or there was no transmission capacity to absorb the excess electricity [xxvi, xxvii]. In Arizona, the transmission interconnection queue includes thousands of megawatts of proposed wind development, but the available capacity of the lines could never accommodate all of it [xxviii]. The Renewable Energy Transmission Initiative (RETI) that Arizona's Corporation Commission is taking part in is a regional planning effort to identify and facilitate the construction of transmission lines specifically aimed at harnessing renewable capacity. Continued Legislative and Arizona Corporation Commission support for regional renewable energy transmission initiatives will help to accelerate the development of new transmission capacity. The allocation of transmission lines to renewable energy projects can be tricky; the renewable energy generators need to ensure that they will be able to use the capacity they are allotted, and this is not always guaranteed. These new transmission initiatives then, whether the RETI or part of the Western Governors' Association Western Renewable Energy Zones project, must be implemented in concert with other policies that incent renewable energy development and prevent these lines from being dominated by new or existing fossil fuel or nuclear power generation.

Policy Options: Financial Incentive Policies to Attract Wind Developers

Policy options exist to provide financial incentives to wind developers and attract wind development to Arizona. These include:

- Using System Benefits Charges and Production Tax Credits
- Providing sales and property tax incentives

System Benefits Charges and Production Tax Credits A System Benefits Charge (SBC) is a per-kWh surcharge to all electricity customers. SBCs are widely used by utilities and their governing bodies to support the development of renewable energy and energy efficiency programs available to residential and commercial utility customers. These funds could also be used to provide an incentive payment to utility-scale wind developers either through a percentage-of-cost rebate on construction or a production incentive per kWh, which would function similarly to the feed-in tariffs that are used to promote renewable energy development in Europe. The Hawaii Public Utilities Commission recently established a feed-in tariff for renewable energy systems up to 5 MW as part of the Hawaii Clean Energy Initiative [xxix]. Similar programs for large-scale renewable energy installations would certainly make them more financially viable, but would pass large costs on to the utility customers. Nevertheless, a $0.01/kWh incentive to renewable energy generators would not cost $0.01/kWh to consumers, as these incentives would still only apply to a small portion of total generation purchased by the utility; $0.01/kWh paid out to wind generation even at 20% wind penetration would cost customers $0.002/kWh. Such an incentive would make wind power developments much more financially viable and attract wind development that would have local economic impacts on the state. According to JEDI results for the total economic impacts during the (20-year) life of a wind project in Arizona, the average economic impact on the state for each MWh generated by that project would be around $30. An incentive of $0.01/kWh is $10/MWh.

SBC funds can also be used to promote wind energy exploration by providing incentives that ease the financial burden of the early stages of a wind power development; a program for commercial wind projects in Massachusetts providing up to $55,000 in grants for feasibility studies, and up to $250,000 in loans for pre-construction activities, taps into the state's clean energy fund [xxx].

The SBC would distribute the costs of the incentive for renewable energy investment among all electricity customers. The economic impacts of in-state wind development, however, would not be distributed evenly among electric customers, but would be concentrated at the local level. This would create a situation in which all electric customers would pay for the incentive to get wind power on the electric grid, while only certain parties would benefit from the local economic development impacts of the in-state wind construction. Thus an SBC could be considered a tool for increasing economic development investment in rural communities, if the costs of development are distributed to all utility customers statewide, the economic benefits are concentrated in traditionally poor, rural communities, and the environmental benefits are realized by all state residents.

A Production Tax Credit (PTC) is generally a per-kWh incentive that state or federal governments grant to qualifying renewable energy developers. The developer receives a corporate or personal income tax credit in the amount of the production incentive, and this tax credit can often be leveraged as a financing tool or traded from one entity to another. New Mexico has a state PTC of $0.01/kWh, which can make projects much more financially viable or lucrative in New Mexico than they are in Arizona [xxxi]. While this type of incentive naturally attracts wind development, it must pull funding from other state programs, which in turn means that all state citizens bear some of the burden of providing this incentive. The provision to developers of a PTC or an incentive through utilities funded by an SBC are two different mechanisms for essentially subsidizing the cost of wind development, with the understanding that the development will have local economic development impacts and will pay some state income taxes that would not have been received without the development. Thus these incentives can be structured into a win-win situation for the state and its citizens.

Sales and Property Tax Incentives These same issues regarding trade-offs in use of state revenue hold true for state sales tax exemptions and property tax reductions. Nevertheless, developments that take place in the state as a result of these incentives make sizable local property tax payments. Sales tax exemptions allow developers to purchase the materials for their projects tax-free, and this incentive exists in Arizona at the state level, but not at all local municipal levels. A property tax incentive would provide developers with reduced property taxes through accelerated depreciation, re-classification of property into a different tax rate, or a tax exemption. Arizona has a property tax exemption for small-scale, 'behind-the-meter' (non-commercial) renewable energy projects, and has an additional property tax incentive for utility-scale projects, in which property tax is assessed at 20 percent of the depreciated project cost. While these incentives reduce the revenue stream from wind developments going to state and local governments, in the case of sales tax the effect is fairly minimal in Arizona so far, and the developments still pay *some* property taxes, thus increasing the funding available local government to pay for items such as schools and emergency services. Unless tax credits or other financial incentives to developers *exceed* the developers' tax liability or other local payments, the local area or state would still come out ahead due to the overall increase in taxable property and economic activity.

Policy Options: Policies to Maximize Local Economic Impacts of Wind

A variety of policy options exist that would help to increase the proportion of dollars remaining in the state or local economies from investments in wind developments in Arizona. These could also be used to maximize the equitable distribution of economic benefits by focusing on increasing economic development in the most economically depressed areas of the state. Options for increasing the local economic development potential of wind energy projects include:

- Implementing workforce development programs
- Providing industrial or commercial development incentives to wind energy companies
- Increasing state research and development grants

Workforce Development Programs Workforce development would increase the local economic impact of wind development projects by providing a trained workforce available to be employed by the projects. This type

of program could have particular impact on some of Arizona's Native American reservations, which experience high unemployment and also contain some or Arizona's best wind resources. A workforce development program could function through community colleges and tribal colleges, funded by the state, with the goal of increasing the local share of wind-related businesses and services and attracting additional investment to the state. The state could grant funding to one college to develop and administer renewable-energy-specific training programs. This college would in turn offer trainings to other interested colleges to develop programs at their sites, and also offer students from other schools the opportunity to participate in online classes in conjunction with short-course in-person trainings for a certificate program. These programs could be designed as part of other practical skills programs, such as construction or electrician training programs. This would foment the skills development necessary to fulfill wind project requirements at many locations around the state without placing an undue cost burden on students or colleges. The effect of these programs would be to increase the equitable distribution of benefits within and among local communities, by allowing them to take maximum advantage of wind development project employment opportunities. The Iowa Lakes Community College Wind Energy and Turbine Technology program is designed to meet the growing demand for wind energy technicians in the Midwest. The Sauk Valley Community College Wind Energy program is a part of the Illinois Community College Sustainability Network. These programs are examples of local educational institutions working to harness the economic development potential of the rapidly growing wind industry for their students. The new Solar Installation Trainers and Resource Institute at Pima County Community College, which will function as a training hub for the community college districts in 9 other counties in Arizona, is an example of this type of program for the solar industry [xxxii]. Coconino Community College in Coconino County, Arizona, has developed a Renewable Energy Electrician program, which would be one step in improving students' preparedness for working in the wind industry [xxxiii].

In addition to these community college programs, several federally funded workforce-training programs have been established with stimulus funding through the Departments of Energy and Labor. Arizona's State Energy Office has several expanded programs for implementation of renewables and energy efficiency. These could potentially be expanded to take advantage of workforce-training dollars available through any of several recent federal legislative initiatives.

Industrial or Commercial Development Incentives Industrial development incentives are used to attract manufacturers to the state, allowing for the development of a local wind industry. In Ohio, the state energy office has initiated an effort to identify companies to retool, retrofit or replace existing manufacturing facilities, essentially providing an enormous discount to wind industry businesses that would otherwise construct facilities from the ground up [xxxiv]. Industrial development incentives for attracting manufacturers cost money; identifying opportunities for those same manufacturers to retrofit existing facilities creates a win-win situation. It also creates local jobs and a competitive advantage in providing products and services to local wind development, and increases the local economic impact from wind development nationwide, if wind projects outside the state purchase components from Arizona manufacturers. This is the goal of Arizona Senate Bill 1403, which provides income and property tax incentives to manufacturers of renewable energy system components, but requires that qualifying companies pay above-average wages and provide above-average benefits [xxxv]. Several companies in the solar supply chain have established new businesses in Arizona in the last year, and the same could be true for the wind industry. While large-scale manufacturing facilities may not end up located in every state in the U.S., it is likely that the industry would benefit from having manufacturers of turbines and towers in all regions of the country, and manufacturers of smaller components in each state. Recruitment incentives could accelerate this process for Arizona.

State Research & Development Grants Just as they can be used to increase renewable energy penetration in a state through policy and technology development, state-level institutes focused on wind energy can be used to increase the local share of economic impacts not only from in-state wind development, but potentially also from wind plants built around the country. State-sponsored research and development grants can be used to promote partnerships with companies in all aspects of wind development, from site selection to component design and manufacturing. State-funded programs involving universities working in partnership with industry can be found in Ohio [xxxvi] and Iowa [xxxvii]. The University Clean Energy Alliance of Ohio includes 15 institutions in the state working on the design, development and commercialization of renewable energy technologies and services. In Iowa, the state's Office of Energy Independence granted funding to the University of Iowa's 'Iowa Alliance for Wind Innovation and Novel Development,' which performs research, education and testing based on needs identified by wind industry professionals. These types of programs are essentially a new service for the wind industry, and provide the educational institution, and the state, with an opportunity to capitalize on the growth of the industry nationwide, rather than simply reaping the benefits of local development. Because the nation's largest manufacturer of small wind turbines, Southwest Windpower, is located in northern Arizona, an alliance with universities or research institutes focused on small wind turbine issues could have a multiplier effect in terms of economic impacts on the state and accelerated deployment of these turbines.

Policy Options: Polices to Increase the Viability and Impact of Wind Projects on Native American Nations

In Arizona, a large portion of developable windy land is on Tribal Nations or Reservations, where State and County governments have limited jurisdiction. Nevertheless, some state policies impact tribes' ability to attract wind power development, and limit the level of local economic impacts that wind power developments can have at the local tribal level. Wind power development can be an economic and community development tool for tribal governments, which have historically struggled to deliver employment and social services to their typically rural jurisdictions. The Rosebud Sioux and Spirit Lakes Sioux in the Great Plains region both have utility-scale wind projects providing power to their homes and businesses. In these examples, wind power generation provides local electrification, power for economic development including casino operations, and an opportunity

for the Tribes to sell the excess power and the associated "green tags" and generate additional revenue. In addition, the project allowed the Tribes to harness safe, clean energy, instead of developing expensive, dangerous, or polluting electricity generation from natural gas, nuclear power, or coal. While wind power can be used in situations like these to deliver local economic and autonomy benefits, a deliberate policy framework must be built in order to ensure that this takes place. The policy landscape at this point creates such disincentives for investment on tribal land that it is unlikely that developers would tap into tribal wind resources without creating partnerships that benefit the Tribe in question [xxxviii]. Nevertheless, policy options do exist that would encourage partnerships between developers and tribes and result in more viable wind projects with maximum economic impact at the local level:

- Making the Production Tax Credit and accelerated depreciation benefits transferable to tribes
- Streamlining county and tribal property tax structures
- Establishing an Open Purchase Order for tribal wind energy
- Providing Tribes with additional assistance in wind resource assessment and early project development

While some of these polices are not applicable only in Arizona, or have limited applicability in the state, they are mentioned to increase the general understanding of the issues involved in developing wind projects on tribal land. In addition, they are particularly relevant to Arizona because the state's greatest wind resources lie on Native American reservations. Arizona's Native American Tribes at the same time suffer from unemployment and lack of government revenue, both of which might be alleviated by the development of wind projects on their land or under their ownership.

Production Tax Credit (PTC) and Accelerated Depreciation for Tribes Tribal governments do not pay federal income taxes, and therefore cannot qualify for the PTC or the tax deductions associated with accelerated depreciation of property values. This puts tribes at a disadvantage because their ownership, in part or in whole, of a wind development project, precludes them from these incentives, which often make or break the financial viability of a project. Without these incentives, wind development projects are often a very long-term investment at best, and naturally offer a much lower rate of return on investment than they would with the incentives in place [xxxix]. If the federal government allowed transferability of the PTC and benefits from accelerated depreciation, Tribal wind projects would be more financially viable and Tribal individuals, businesses or governments would be much more likely to invest in wind development.

County Property Taxes and State Income Taxes Returned to Tribes In many states, Counties assess property taxes on property and investments that fall on Tribal land, including potential wind developments. This tax revenue is paid to the Counties, even though they do not provide county services to the area in which the project is located. In addition, the Tribal governments that *do* provide public, government and social services to the property do not receive property taxes to compensate them for the cost of providing these services. This is not true in Arizona, but is common in states around the country. Likewise, non-Tribal individuals who work or invest in projects on Tribal land pay income taxes to the State or Federal government, even though government services are being provided to the individual or project through the Tribal government. Returning these property and income tax revenues to the Tribes would provide them with additional revenue from the project, comparable to the revenue that a state or County government would receive, dramatically increasing the local economic impact of wind development projects within Tribal borders. In Arizona, there are several Tribes that do not have a property or income tax structure in place, such as the Hopi. While it might appear that this would benefit potential developers, streamlining property tax structures or allowing for some mechanism for Tribes to assess taxes on development projects on their land, if desired, would provide them the dual benefit of recouping some revenue from these projects and potentially offering additional incentives to developers.

Federal, State or Local Open Purchase Order (OPO) for Tribal Wind Energy A federal OPO designated for purchase of Tribal wind energy would create an instant market for tribal wind projects and alleviate the burden of securing a Power Purchase Agreement as part of the wind development project. This could be established with an upper price limit, but would guarantee the purchase of viable projects' energy production up to a certain level. State or local governments could implement similar programs or mandate that part of the Renewable Energy Standard and Tariff must be provided with energy from Tribal renewable projects.

Federal or State Assistance for Tribes Specifically for Wind Resource Assessment and Project Development Tribes often already have too many demands on their limited financial resources, and cannot justify reducing funding for existing programs to invest in projects like wind development which may have a long time frame for payback. The state of Massachusetts offers grants and loans to developers to assist with feasibility studies and pre-construction activities, as mentioned above. The Federal government or any State government could institute a similar program targeted at Tribal renewable energy projects. State-level grants and loans could be used to ease the financial burden for Tribes wishing to embark on renewable energy projects.

Tribal Ownership Options Tribal groups need a policy mechanism by which they can offer an incentive to developers that in turn gains them part ownership of any project developed in their jurisdiction, such as a tax incentive that is structured to allow the Tribe to purchase part of the project. While this might initially reduce the local benefit from the development, either in terms of reduced property or land use tax payments, it would facilitate continued economic development through profit-sharing and the receipt by the tribes of the revenue from the project. The initial discount for development, whether it be in negotiated reduction of property taxes or energy extraction taxes (such as those on the Navajo Nation), could be used to secure partial ownership for the tribe. The Tribal government, however, must have a tax system in place in order to negotiate with tax incentives, and this is not the case for some tribal nations. Thus, other mechanisms such as transferability of the Production Tax

Credit and accelerated depreciation should be available for tribes to use in leveraging ownership of wind development projects. Some the best wind resources in Arizona are on tribal land, and having these options would facilitate tribal governments' negotiations with investors eager to develop on their lands. The Campo Kumeyaay Nation in California is negotiating partial ownership of the second phase of a wind development project that is taking place on their land, but is struggling to raise funds. Any of the financial incentives listed in this section would help to accomplish the Tribe's goal of raising funds to assist in purchasing partial ownership of the project.

CONCLUSIONS

Wind energy development offers the state of Arizona significant potential local economic impacts, as well as sizable operating cost savings when compared to not developing wind energy or even importing it from out of state, up to a relatively high percentage wind penetration. There has not been a massive influx of wind developers, however, and the state does not have policies in place to facilitate, attract, or incent development, or to maximize the local economic impacts of developments that *do* take place. In addition, wind development in the state is complicated by the multiple jurisdictions including private, state, federal, and tribal land.

A variety of policy options exist that can be used to attract wind development to the state and maximize its economic impact on local communities. The most effective policies would be those that streamline the wind development process for local governments and for the wind developers, such as the establishment of local and tribal ordinances for wind development. Policies that facilitate development by tribal governments or on tribal land have large implications for Arizona's wind energy future, because much of the best wind resources lie on tribal lands. Financial incentives to developers do exist in Arizona, but could be significantly bolstered by a $0.01/kWh production incentive or tax credit. The most important factor to consider in evaluating these options is who would benefit from them and who would bear the costs. In most cases, however, including the granting of a production incentive, a relatively small price paid to implement these policies could attract much greater economic benefits to the state as a whole.

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