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Claremont McKenna College

Sustaining Rural Economies with Wind Development

SUBMITTED TO

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BY

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For
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Chapter 1: Introduction to Rural America and Rural Wind Potential

Introduction

Domestic interest in alternative energy projects has increased dramatically in the past decade. Projects ranging from solar, biodiesel, geothermal and wind have been taken shape across the nation. Both the federal government and the states have taken notice of growing tends and have enacted policies that promote massive alternative energy investments. Reductions of both dependence on foreign oil and greenhouse gas emissions, are often cited as leading reasons for greater alternative energy usage. Economic development—stabilization and diversification—however, are also major drivers for the renewable energy push. Across the nation, communities have been able to develop high tech high growth economic sectors related to alternative energy.

Historically, hydropower has been the leading source of the nation's renewable energy. The 2000s, however, witnessed rapid growth in national wind production and by the end of the decade wind generation had increased dramatically. In September 2010 wind only provided two percent of the US's energy needs, but this is a significant increase from 2000. Additionally, wind projects constitute large percentages of new electric generation capacity. Almost forty percent of energy projects in 2007 consisted of new wind installations and similar growth rates were achieved in subsequent years. Continued wind installed will potentially inject billions of dollars into local economies in the coming decades. Substantial portions of these investments will contribute to some of America's most vulnerable economies: rural agricultural areas.[1],[2]

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[1] Kate Galbraith. "Texas Clean Energy Hampered by Location," *The New York Times*, September 12, 2010, 1.
[2] American Wind Energy Association, Blue Green Alliance and United Steelworkers. *Winds of Change: A Manufacturing for the Wind Industry*, June, 2010, 8.

Almost no other American geographical area has more to gain from wind development than rural America. While the benefits of wind will not solely be felt in rural communities, the economic benefits will be especially pronounced. The economic and social woes of rural America have taken place over the past several decades. Traditional economic staples—notably agricultural production—have become less profitable—particularly among small-scale farmers and producers. Economic stagnation has considerably lowered the quality of life in these areas, resulting in increased outmigration, decreased medium incomes and social serves. For a significant time frame, rural areas have been unable to attract new economic industries and retain vital human capital.

The rapid growth of the wind sector and supporting activities has starkly changed the longer-term economic outlook for rural America. Wind projects contribute to economic growth in a multitude. First, the construction period provides a relatively large influx of short-term jobs, followed the by smaller—yet still significant—longer-term operational phase jobs. Since many large projects are concentrated in several rural geographic regions—West Texas, the Mountain West and Great Plains—wind turbine manufactures and related supply chains are drawn to rural communities. Manufacturing facilities boost and supplement local incomes, while helping sustain the historical rural industrial base. The influx of workers and higher incomes translates to increased spending in other rural sectors.

Furthermore, wind projects provide direct relief to the heart of rural America: small farmers. Developers are reliant upon farmers and rancher's large expanses of available land to erect large-scale turbine projects. Royalty payments from lease

agreements are quite generous and significantly boost incomes of some the nations poorest citizens. Additionally, farmers can capitalize on several state offered incentives and install small-scale turbines. This too generates substantial economic benefits. Large wind projects increase farm property values, which translate into increased municipal tax revenues. This can be spent on an array of local projects—ranging from education to roads—that boost the quality of live and appeal of small communities, while contributing to local longer-term economic viability.

The benefits of wind development are overwhelming positive in rural areas. In many cases, wind development solely provided economic opportunities in previously stagnate areas. The standard of living and economic performance of rural areas that embrace wind development differs substantially from areas where the industry has not taken root. Wind development provides economic hope to otherwise stagnant areas, allowing communities not only survive, but also thrive. It is in rural areas best interest to promote local development and encourage governments to aggressively pursue pro-wind development policies.

Economic State of Rural America

Rural America is often characterized as a Midwestern family farm and small prosperous communities, however, in reality twenty first century rural experience is markedly different. Making a living though agricultural has become increasingly difficult. In recent years, poor climate conditions have resulted in lower yields of corn, soybeans, wheat and other crops, greatly suppressing farmers incomes. These effects are coupled with lower commodity prices and increased operating costs, which have significantly decreased the profitability of farming and its role in rural America. By some

estimates as much as ninety four percent of farmers total net income is generated off farms from non-agricultural sources.[3]

Economically rural America is plagued by several factors. The first is lack of significant employment opportunities. Rural areas historically have had higher levels of unemployment than non-metro regions. These areas have less diverse economic bases. When pivotal sectors, such as heavy manufacturing and agricultural, are outsourced or are no longer profitable, rural areas lose the communities' economic backbone. Since the mid-2000s recession began, rural unemployment decreased by three percent and the unemployment rate stands at over nine percent, higher than in America's metro areas.[4] Job loses were most pronounced in rural areas of the Midwest, Southeast, and Western states. Manufacturing, especially machinery, forms a major non-farm employment sector in rural areas. Within the last two years, non-metro areas lost over three hundred thousand manufacturing related jobs, dealing rural income and employment opportunities a severe blow.[5]

As economic opportunities dwindle rural America is faced with an increasingly impoverished and debt ridden population. In 2009 the percentage of rural areas with a high risk of foreclosure approached thirty percent, which significantly higher than urban areas.[6] Additionally, rural areas and farmers have suffered from high rates of foreclosed farm loans, a trend that has been expedited by the recession. In 2002, for example, the

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[3] U.S Department of Energy. W*ind Energy for Rural Economic Development,* August 2004, 3.
[4] U.S Department of Agriculture Research Service. *Rural America at a Glance,* Economic Information Bulletin Number 59, September 2009, 3.
[5] Ibid. 2.
[6] Ibid. 4.

farm loan foreclosure rate in Colorado exceeded thirty percent.[7] Poverty is also chronically widespread throughout rural communities. The poverty rate for non-metro areas exceeded fifteen percent, over five percentage points higher than urban areas. Rural child poverty approached twenty three percent in 2009 and almost sixty percent of rural counties had rates higher than twenty percent.[8]

Bleak economic opportunity and diminished chances of upward mobility encourage people to leave rural areas. A long-term trend in rural America has been widespread outmigration to urban areas and regional hubs. This is especially pronounced among the rural youth population who have been seeking opportunity elsewhere in significant numbers. This creates a population that is less educated and increasingly elderly. Rural areas face long-term decline as their economic base is eroding by loss of youth, human capital, manufacturing and agricultural profits. The foundations a strong community are increasingly absent from rural areas, however, alternative energy potential is poised to strengthen rural communities nationwide.

Harnessing Wind Energy in the Great Plains and West

Wind energy is one of the most viable alternative energy options in rural America. The areas that are poised to reap the benefits of wind energy are located mostly in the Great Plains and Western states. These regions, especially the Great Plains, have traditionally large rural agriculturally oriented populations. Additionally, these areas are characterized by stagnant economic growth and high rates of out-migration, but are especially rich in wind energy potential. Wind energy production and supporting

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[7] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August, 2004, 3.
[8] U.S Department of Agriculture Research Service. *Rural America at a Glance*, Economic Information Bulletin Number 59, September 2009, 5.

activities are widely viewed as some of the best ways to revive local economies and create long-term economic opportunities.

Economic activity related to wind energy impacts rural economies in several beneficial ways. Firstly, wind energy directly creates new jobs, in both the initial construction stage and long-term operation stage. Secondly, wind energy creates indirect manufacturing and supply chain-related jobs. As production grows, manufacturers and suppliers will establish plants to meet growing demand. Producers rely on local companies and contractors to provide additional support services. Thirdly, by allowing turbines on farms, farmers can collect royalties to supplement agricultural income. Lastly, reliable and stable energy production will lower the high utility and fertilizers costs that currently plague rural areas by providing an alternative to natural gas, therefore reducing demand and prices.

The U.S Department of Energy recently released a profile highlighting the secondary economic affects of the construction of the Colorado Green Wind in Prowers County Colorado. This analysis shows one community's success, but also implies the effects of wind energy across all rural areas. Over four hundred workers were involved in the direct building process in 2003. Additionally, local contractors built twenty-five miles of roads, erected one hundred and eight turbine foundations, installed twenty miles of underground cable and poured thirty five thousand yards of concert. These secondary activities employed over two hundred additional employees. Furthermore, local restaurants and other non-construction related business experienced a twenty to thirty

percent increase in revenues. These kinds of investments can have pronounced secondary economic affects across rural communities.[9]

[9] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 3.

Chapter 2: Local Employment and Economic Investments

Direct Job Creation Related to Wind Production

Direct permanent operation/maintenance and initial construction jobs are perhaps the most apparent economic impact. These jobs rely on local labor and unlike traditional energy utilities keep maintenance operators local. Furthermore, the U.S department of Energy found that wind projects create more new jobs than traditional fossil fuel projects. Wind energy creates twenty-seven and sixty-six percent more new jobs per kilowatt-hour than coal and natural gas plants respectively.[10] On average the jobs pay relatively high wages, with multiple sources reporting wages ranging anywhere from sixteen to twenty five dollars an hour.

The Center for Rural Affairs released an economic impact study that estimated new job creation in the Plains States of Iowa, Kansas, Nebraska and South Dakota. Under this scenario, jobs would be created over a twenty-year period and renewable energy would account for a least twenty percent of the nations energy supply. These conditions would spur significant investment in wind energy, the majority of which would occur in non-urban areas. Job creation would be substantial. Iowa is leading with sixty-three thousand new short-term construction jobs, followed by South Dakota with twenty-seven thousand, Nebraska with twenty-six thousand, and Kansas with over twenty-two thousand. This translates to almost one hundred and forty thousand jobs that would last an average of two years.[11]

The total number of long-term operational jobs, while still large, is significantly less. These jobs, however, will employ individuals significantly longer than the

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[10] Ibid. 3.

[11] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 1.

construction phase. Operation and maintenance related activity would create a high of nine thousand jobs in Iowa and between three to four thousand in Kansas, Nebraska, and South Dakota. In total, twenty thousand long-term jobs would be created over this twenty-year period.[12]

Among these states Iowa has emerged as a clear front-runner for wind production. Currently, the state produces over three thousand megawatts of wind energy, which translates to seventeen percent of the states electricity supply. This provides energy to power almost one third of the state and over fourteen thousand additional megawatts are under construction or awaiting approval. In fact Iowa is the nations second largest wind producer, surpassed only by Texas.[13] Under the previously mentioned twenty percent scenario, around twenty thousand megawatts would be produced from Iowa wind farms. This translates to over seventy thousand direct long and short-term jobs across rural Iowa.[14] Additionally, Iowa has the tenth largest wind potential in the nation. If Iowa harnessed wind energy's full potential, which is far greater than the twenty percent scenario, the state would produce five times its energy needs and become a major energy exporter. Under these conditions, Iowa would create thousands of more high paying permanent jobs across swaths of rural counties.[15]

Although Iowa is an established leader in wind energy and would probably experience the most numerical direct job creation, other rural areas are also poised to

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[12] Ibid. 1.
[13] Herman K. Trabish. "Iowa: Land of corn and Wind Turbines," *Greentech Media*. April 28, 2010, 1.
[14] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 3.
[15] Teresa Welsh Galluzzo. "Small Packages, Big Benefits: Economic Advantages of Local Wind Projects," The Iowa Policy Project, April 2005, 2.

witness significant job gains. Given that Iowa only ranks tenth nationally for wind potential, it is conceivable that other states with higher potential could eclipse Iowa's job growth under the right political and market conditions. Under the same twenty percent scenario, Iowa's neighbors will still experience significant construction and operational-related job gains. Combined, the states of Kansas, Nebraska and South Dakota will create almost eighty thousand construction and over ten thousand operational jobs. [16] Outside of the rural Midwest, California has made significant investments in rural areas for alternative energy. There are plans for several three hundred-megawatt projects in the rural areas of Kern and Riverside counties, potentially able to create hundreds of jobs. [17] Agriculture-dominated Imperial County currently has the highest unemployment in the state. Several alternative energy projects have brought hundreds of high wage jobs to the sparsely populated region. [18] Rural areas of the South have yet to establish a foothold in wind production, but led by Texas, rural areas are expected to make several investments in the near future. In 2001 alone, Texas's nine hundred megawatts worth of wind projects produced over two thousand jobs throughout the rural panhandle.[19] Additionally, excluding Texas, Southern states collectively have almost two hundred thousand kilometers of land with sustainable wind resources; much of it located in the rural parts of Arkansas, Virginia, and West Virginia. It is also conceivable that offshore wind farms

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[16] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 5-8.
[17] Michal Moore. "How California is Advancing Green Power in the New Millennium," *The Electricity Journal*, 2000, 76.
[18] Ibid. 73.
[19] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 4.

could generate rural jobs in the Gulf Coast and Southeast regions, far away from inland metro areas like Atlanta and Charlotte.[20]

Iowa's Western neighbors rank higher in wind potential than Iowa, yet Iowa is projected to gain the same amount of direct jobs as these three combined. South Dakota, for example, ranks fourth in the nation for total wind energy potential and alone could produce fifty percent of the nation's energy supply. Much of the best wind energy is found in central and western South Dakota, a region that is heavily rural and agricultural and also rapidly depopulating. If the wind production potential were realized, initial investment would be an immediate boon to this long-suffering area, by literally creating thousands of jobs in a relatively short one to two year period.[21]

The wind industry can have profound employment-and wage-related impacts in rural areas. Many rural counties have small populations and relatively small wind projects can employ a significant proportion of the population. In McCone County Montana, a fifty megawatt project can employ anywhere from thirteen to twenty-eight construction workers annually. If the project is increased to three hundred megawatts, those numbers rise to between seventy-five and one hundred and seventy jobs. McCone County is home to fewer than two thousand people, meaning a three hundred megawatt project would employ between ten and twenty percent of the local workforce. Field salaries would average almost twenty-five thousand dollars. This would create significant economic opportunities in an area that suffers from a sixteen percent poverty rate and high unemployment. These projected employment gains are reported across a multitude

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[20] Marilyn A. Brown et al., "Renewable Energy in the South: A Policy Brief." Georgia Institute of Technology, July 2010, 5.
[21] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 9.

of rural counties. Similarly rural and poverty-stricken counties in Montana are predicted to experience similar job gains. The percentage of each county's workforce employed by wind projects is estimated at a low of seven percent in Blaine County to a high of forty-eight percent in Prairie County. Additionally, the annual construction workers salary usually exceeds the average county household income.[22]

Indirect Jobs—Manufacturing

In addition to creating direct jobs relatively quickly, wind projects also can spur industrial growth across the country. Many agricultural regions have historically supported robust heavy manufacturing industries. Manufactures and suppliers—particularly those of heavy machinery, such as Caterpillar—have often been a cornerstone of rural Midwestern economies, supplementing agricultural incomes with high wages. Current trends, however, indicate that large numbers of both rural and urban manufacturing operations are being outsourced overseas. Wind energy-related manufacturing has potential to spur job creation in rural areas, by drawing upon an already trained and highly skilled workforce. Many components of wind turbines are large, making them too costly to transport long distances. This makes local production both cost-effective and lucrative. Unstable transportation costs will help ensure the long-term viability of domestic producers.

A report by the American Wind Energy Association estimates that there is currently over eighteen thousand wind energy related manufacturing jobs in the United

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[22] M. Costani. *Quantifying the Economic Development Impacts of wind Power in Six Rural Montana counties Using NREL's JEDI Model*, National Renewable Energy Laboratory, September 2004, 15.

States.[23] Additionally, as national demand grows and more wind projects are installed, there is potential to create thousands more manufacturing jobs. Manufacturers and supply chains are increasingly interested in producing their goods closer to large-scale wind projects. As most wind projects and wind potential are located in rural agricultural areas, manufacturers are increasingly willing to set up shop in rural regions—particularly the Great Plains states. Trends indicate that manufacturers of turbines prefer producing in local domestic markets. Between 2005 and 2009, the wind industry increased the share of domestic content to over fifty percent and the total number of wind manufacturing jobs grew from less than three thousand to over eighteen. The number of facilities that assemble turbines is expected to more than double in several years.[24]

Wind related manufacturing has only existed as a viable industry for roughly five years, yet has experienced rapid growth. In 2004 the total number of facilities that assembled towers, blades, and turbine nacelles was less than forty. By 2009, however, the number of assembly facilities skyrocketed by over two hundred—creating conditions that allow a majority of wind projects to use domestically produced products. Currently, several key wind turbine components are either not manufactured domestically—such as nacelle facilities—cannot currently meet domestic demands. Within several years, however, domestic production is expected to meet demand as new facilities come online and current facilities expand. In fact the value of total wind product imports peaked at the

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[23] American Wind Energy Association, Blue Green Alliance and United Steelworkers. *Winds of Change: A Manufacturing for the Wind Industry*, June 2010, 5.
[24] Ibid. 6.

end of 2007 and has significantly decreased, declining sixty-five and seventy-one percent for towers and blades respectively.[25]

In terms of growth for rural areas, several manufacturing components are well suited for rural areas. Blade and tower production has a significant presence in non-metro areas across the nation. Rural communities are strategically located near centers of high wind production and capacity, particularly in the Pacific Coast, Mountain West, Great Plains and even a growing presence in some Southern states. The more complex and high value nacelle turbines and internal components are less represented in rural areas, most facilities being located in decidedly more metro areas with existing foundry infrastructure. The nacelle manufacturing sector, however, is the least developed in the US, suggesting potential growth into rural areas. Additionally, production related to offshore wind projects is not expected to take place in rural areas. Most of this activity will take place in coastal industrial cities, particularly in the Rust Belt region. Considering that the US does not currently have any offshore projects, most wind projects will continue to take place in largely rural areas, encouraging further rural manufacturing expansion.

Although manufacturing-related jobs will not be as concentrated in rural areas as are actual wind projects, the effects of manufacturing still will have significant job and economic-related impacts in rural communities. Iowa has become an established leader in courting wind manufacturers and projects show that the state is poised to gain significant future jobs. In the near future, Iowa can expect to attract well over three thousand green manufacturing jobs and some forty percent will be in rural counties. Other states,

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[25] Ibid. 13.

however, are expected to move a larger share of jobs to rural areas. In the some time period, Kansas has the potential to create between three and four thousand green manufacturing jobs. Unlike Iowa, however, over sixty percent of these jobs will be located in non-metro counties. Other regions, ranging from the Plains States, Upper South, Mountain West and Pacific Coast, are expected to attract green manufacturing industries to rural areas to varying degrees. While absolute numbers of rural manufacturing jobs may not seem high, the creation of high paying manufacturing jobs has a disproportionate effect in sparsely populated rural counties.[26]

Iowa's experience provides an optimistic example of not only attracting manufacturing facilities, but also stimulating a high growth industry. Other states, such as Colorado, Kansas, and Nebraska, have sought to emulate Iowa dynamic rural growth patterns. In 2009, TPI Composites constructed a turbine blade plant in the small community of Newton, Iowa. In less than a year, the plant tripled its staff to over five hundred and paid an average of fourteen dollars an hour. The similar Clipper Turbine Works' facility increased production from nine turbines in 2006 to over three hundred by 2008. In both cases these companies were able to draw upon a rural workforce already familiar with heavy industry. Such rapid growth rates have dramatic economic and employment-related impacts, which are even more pronounced given that only several thousand people live in these counties. Other states took notice of Iowa's rapid growth rates and have begun to promote green manufacturing at home. Tower manufacturer Kantana Summit, constructed a facility in Nebraska's small Platte County in the late

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[26] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 4-6.

2000s. This facility expects to produce up to six hundred towers in 2010 and employ several hundred people.[27],[28]

Local Indirect Economic Benefits

The development of wind projects also spurs economic growth outside of the spheres of energy, manufacturing, and agriculture. The high wages and payments associated with wind projects flow into other local sectors that spur indirect job growth. In many small agricultural counties the local workforce may be too to small to support such large projects, and non-local workers could be essential. An influx of additional workers—short and long term—boosts rural business, especially retailers. As wind projects attract people to relocate to rural areas they stimulate the economic base. Many areas have already experienced significant indirect impacts from wind projects. The previously mentioned project in Prowers County Colorado relied upon local suppliers and retail business saw profits jump dramatically during the construction period. These scenarios are becoming common across large parts to rural areas that invest in wind energy and have potential to create rapid economic and employment growth.

The rural Midwest is poised for major job growth and economic investments. During two year construction phase periods, Iowa is expected gain over thirty thousand indirect jobs from wind projects by 2030. During the same period construction of wind projects will also create eleven, thirteen and fourteen thousand jobs indirect jobs Kansas, Nebraska and South Dakota. The majority of these jobs will be in supporting service

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[27] Matt Vasilogambros. "Wind Farms Generating Energy and Jobs in Iowa," *Politics Daily*, July 16, 2010, 1-2.
[28] E. Lantz. *Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office*, National Renewable Energy Laboratory, November 2008, 13.

sectors, but most will be located in rural communities. Indirect jobs from wind facilities operational phases are estimated one and four thousand for each of the Plains States. Indirect benefits to local economies during the construction phase will be in excess of two billion dollars in Iowa, and around one billion each for the remaining plains states. The twenty-year operational phase is expected to contribute one hundred and fifty million per year to state economies, with a high of three hundred million per year in Iowa.[29]

The indirect benefits can be especially pronounced in rural areas. The influx of money can help create a diverse local economy. Induced impacts help invest in other sectors and create more vibrant opportunities for the local population. It also decreases the reliance on one or two key industries that sustain rural areas. A diversified economic base has been lacking in rural communities and essential for both their longer-term survival and sustainable economic growth.

Indirect Agricultural Impacts

Increased usage of wind energy also helps sustain long-term agricultural production. Aside from boosting farm incomes, the wind energy affects several trends that are pivotal to the agricultural industry. Wind energy is a legitimate competitor with fossil fuels, which are subject to rapid price fluctuation. Additionally, all wind projects help decrease climate change-causing emissions. The agriculture industry is expected to be disproportionately impacted by the affects of climate change. Major reductions in emissions will significantly decrease adverse climate conditions that affect agricultural production.

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[29] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 3-10.

With locally installed wind projects, farmer's energy costs would be significantly reduced. The Nebraska Wind Energy Task Force in 2001 found that the state's four windiest agricultural counties had household incomes less than twenty percent the state average. In the same year, the state imported over one hundred million dollars worth of oil. This reliance on outside fossil fuel cuts into rural incomes, especially agricultural incomes that require large amounts of energy. These same areas experienced dramatic price fluctuations thought the mid 2000s. A large reason rural farms are unable to be profitable is due to such high input costs for energy and fuel. In addition to boosting rural incomes, wind energy is becoming increasingly cost effective when compared to fossil fuels. Since 1979, the cost of wind per kilowatt-hour has fallen from forty to three cents. Wind energy can now legitimately compete price-wise with traditional energy sources. In parts of Colorado and Nebraska utility providers have found that wind projects provide the lowest cost among all energy generation options.[30]

Furthermore, traditional power plants require large amounts of water to generate water from fossil fuels. Many major agricultural regions—such as California's Central Valley, the Southwest and Mountain States—are in arid regions. These regions, particularly the Southwest, already must balance the water needs of urban and agricultural centers. Recently in California, new water regulations have redistributed water to growing urban centers. Thousands of acres of cropland are no longer used and are subject to desertification. Wind projects require no water to generate energy and place no burden on local water resources. Wind projects are incredibly beneficial to drought-prone agricultural regions.

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[30] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 5.

Wind powers also helps lower costs of natural gas. Natural gas is pivotal for the majority of agricultural producers, as it makes up ninety percent of the cost of producing anhydrous ammonia fertilizers. Producers cannot meet the increasing demand for natural gas, and prices have risen to six dollars per MMBtu. At these prices the price per kilowatt-hour is more cost effective from wind facilities. High prices for natural gas force farmers to pay high prices for both fertilizers and energy. Wind power can displace the energy needs from natural gas, thereby driving down demand. Farmers can rely upon the cheaper wind facilities for energy generation, while enjoying prices decreases of nitrogen fertilizers.[31]

[31] Ibid. 5.

Chapter 3: Land Owner Returns and Local Tax Revenues

Economic Benefits—Land Owner Revenues

Installation of wind projects boosts employment in rural areas, but land payments benefit the segment of the population directly reliant on agricultural production. As commodity prices have fallen and operation costs increase, many small farmers are unable to turn a profit. Counties that suffer from high rates of poverty, low median income and unemployment are disproportionately agriculturally-dominated. Wind projects can substantially increase and supplement farmer incomes, while providing farmer the economic means to stay profitable.

Leasing royalties can vary from region to region, but overall payments from land leases are relatively high. The US Department of Energy estimates that annual payments are generally in excess of two thousand dollars per year for the average installed seven hundred and fifty kilowatt turbine. This roughly translates to about three percent of the projects' total revenues. A small two hundred and fifty acre farm may be able to earn an additional fifteen thousand dollars per year. In a poor agricultural area—like Blaine county Montana where average income is less than twenty-five thousand dollars—this economic outcome can substantially increase the standard of living, especially when compared to current crop prices. [32] These royalties yield more than fifty dollars per acre. The same acre would annually yield ninety, forty, and five dollars worth of corn, wheat and beef respectively. [33] Additionally, turbine installation still allows farmers to plant crops with relatively little loss of land. The turbines take up little space so crops can be

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[32] M. Costani. *Quantifying the Economic Development Impacts of wind Power in Six Rural Montana counties Using NREL's JEDI Model*, National Renewable Energy Laboratory, September 2004, 18.

[33] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 4.

planted and livestock grazed up to the base of the project. The installation and presence of turbines has hardly any effects on the future yield of crops.

For the Wind Belt region, stretching from North Dakota to Texas, the impact of landowner payments will be most notable. In wind-rich Iowa annual direct payments to farmers are expected to exceed fifty million dollars by 2030. Even in less developed Kansas, Nebraska, and South Dakota, annual payments through 2030 are still expected to total over twenty million dollars for each state. [34] In Nebraska, several projects totaling one thousand-megawatt are projected to pay participating farmers around four million dollars annually. Increasing production to seven thousand megawatts would result in payments skyrocketing to over thirty million dollars annually. [35] In 2001, nine hundred megawatts of projects resulted in annual payments totaling over two million dollars. [36] Several projects taking place in rural Utah demonstrate the landowner revenue on a micro level. The small eighteen-megawatt project in Utah County translates to almost seventy-five thousand dollar payments in 2009. Additionally, proposed fifty megawatt projects in Summit and San Juan Counties would generate over one hundred and fifty thousand dollars annual for landowners.[37]

Usually, investment in wind development spurs manufacturing and other job growth, but growth can be slow to come. Landowner revenues provide immediate

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[34] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 3-10.
[35] E. Lantz. *Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office*, National Renewable Energy Laboratory, November 2008, vi.
[36] W U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 3.
[37] David J. Ratliff, Cathy Hartman and Edwin R. Stafford. *An Analysis of State-Level Economic Impacts from the Development of Wind Power Plants in Summit County, Utah*, U.S Department of Energy, October 2009, 10.

economic relief, even when other wind-related sectors are slow to take hold. In Goldendale Washington, the small town and rural areas had been hemorrhaging jobs for decades. Local smelting refineries and the timber industry had all virtually disappeared, economically crippling the area. Local farmers could not turn a profit and were tied to declining property values. Change came in 2005, when developers installed hundreds of turbines across Kilckitat County. On average, each landowner receives around two hundred thousand dollars in annual payments, a substantial boost to a County where incomes average thirty thousand dollars. Manufacturing facilities have not taken hold, but the landowner payments have resulted in a rejuvenated local economy and profitable farms.[38]

Monetary incentives from land agreements are perhaps the best way to preserve the heart of rural communities. Declining profit margins for small famers are the driving reason why rural communities face declining populations and a loss of human capital. There is a correlation between poverty and population decline in areas that are heavily dependent on agriculture. Considering that agriculture is the economic backbone of most rural areas, it is unsurprising that agricultural decline would signal a larger economic decline. Although rural areas have lost other diversified industries—such as equipment manufacturing—these mainly served as supplemental industries and employment. In the case of heavy equipment manufacturers, many of the outputs were also tied to agricultural production trends. Wind energy allows farmers the opportunity to diversify their incomes without having to seek off-farm employment. The substantial lease payments coupled with continued agricultural production allows farms to remain

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[38] Anne C. Mulkern. "Wind Is the New Cash Crop in Rural Washington Town," *The New York Times*, October 18, 2010, 3-5.

profitable, and potentially lucrative depending on the size of wind projects. By promoting economic success and opportunities for the bulk of rural populations the current stagnating trends can be reversed.

Economic Benefits—Tax Base

Both large and small-scale wind projects help increase rural tax revenues. Historically, rural areas have suffered from an eroding tax base. The exodus of jobs and people from rural areas diminishes property and sales tax revenue and many areas have had to make painful cuts in education and infrastructure, indirectly hastening the rates of outmigration. Cuts to essential services threaten the long-term economic sustainability of rural communities. Wind projects significantly boost property tax payments and are seen as one of the best ways to reverse declining revenues. These payments strengthen the existing infrastructure and economic foundations, while helping lay the groundwork for attracting other industries and economic diversity. Additionally, higher worker wages and increased incomes translate into higher sales tax revenue that further adds to the local tax base.

Tax revenue from wind projects can generate large amounts of money and in may cases can make up the bulk of the rural tax base. It is estimated that tax payments of one percent of the assessed project value can generate around ten thousand dollars per megawatt.[39] The capital costs for wind projects are greater than conventional power facilities, but the upside is that property tax revenue for wind projects are on average three times higher. In 2000, California alone collected almost half a billion dollars from

[39] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 4.

its installed projects, a figure that has increased as more renewable projects develop. [40] Texas's nine hundred megawatt wind investment increased rural tax collections by over thirteen million dollars in 2001. [41] Midwestern states also saw major tax revenue increases for rural areas throughout the 2000s and are poised for future growth as installation rapidly expands. By 2030, Iowa's rural counties are expected to collect over ninety million tax dollars annually solely from wind projects. Kansas and South Dakota will collectively add sixty million dollars annuals for the same timeframe. [42] Nebraska's current one thousand megawatts provide revenues between three and four million dollars annually. If Nebraska can generate an additional six thousand megawatts, tax collection would be in excess of thirty million dollars annually. [43] The vast majority of wind projects are in rural areas, so state wide tax projections are concentrated and spent in these communities.

On a more local level the tax effects are even more apparent. California's Imperial County remains heavily dependent upon agriculture and is plagued by high unemployment. Renewable energy investments have provided significant opportunities for the rural county. Imperial County annually collects twelve million dollars in local revenue and renewable energy projects contribute over a quarter of total tax revenues. [44,]

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[40] Michal Moore. "How California is Advancing Green Power in the New Millennium," *The Electricity Journal*, 2000, 73.
[41] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 3.
[42] Center For Rural Affairs. *Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota,* August 2009, 3-10.
[43] E. Lantz. *Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office*, National Renewable Energy Laboratory, November 2008, 1.
[44] Michal Moore. "How California is Advancing Green Power in the New Millennium," *The Electricity Journal*, 2000, 73-74.

Pecos County Texas has less than fifteen thousand people and collected over four million dollars in taxes solely from wind projects. The equally small Prowers County collected over two million dollars in total revenue. Additionally, studies show that even small wind projects can have an outsized affect. Kewaunee County Wisconsin only has twenty megawatts of total wind capacity—numbers that pale compared to neighboring Iowa and Minnesota—but this relatively small investment represents over fifty percent of the county's total operating budget. [45,] As a percentage of a tax base, a twenty megawatt project in Montana's McCone and Prairie Counties would provide ten and seventeen percent of revenues respectively. This is equal to over six hundred thousand dollars annually. A larger three hundred megawatt project would represent a one hundred and fifty and two hundred and sixty percent increase of the current tax base, or some eight million dollars annually. [46] All of these projects have helped stabilize rural tax bases and have allowed counties to reinvest in infrastructure.

Of the most important beneficiaries of this newfound revenue source are rural school districts. In most of these communities property taxes form a large percentage of school budgets. The influx of tax revenue has allowed school the opportunity not only to avoid budget cuts, but also the chance to expand programs. Investing in rural schools is a pivotal way to ensure community stakeholders are given the means to derive economic opportunities. Increased property tax base also increases the likelihood that localities can

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[45] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 4.

[46] M. Costani. *Quantifying the Economic Development Impacts of wind Power in Six Rural Montana counties Using NREL's JEDI Model*, National Renewable Energy Laboratory, September 2004, 17.

raise bond measures. In rural Washington, increased taxable property encouraged voters to pass several bonds that bought new equipment for schools and local fire departments.[47]

Wind projects enhance the long-term viability of rural communities. The increased revenue allows municipalities to increasing funding to much needed services, areas that have historically seen drastic cuts. Enhanced schools, community colleges, roads, and fire and safety all promote the livability of rural communities. Strong community services not only encourage people to remain in rural towns, but also attract migrants drawn by high standards of living. As agricultural and traditional sources rural tax bases decline, wind projects become rural communities' saving grace.

[47] Anne C. Mulkern. "Wind Is the New Cash Crop in Rural Washington Town," *The New York Times*, October 18, 2010, 6.

Chapter 4: Policies and Trends That Promote Rural Wind Development

Impacts of Local Ownership

The majority of attention goes to the large hundred-megawatt wind facilities in Texas and California. Small locally owned turbines, however, play a notable role in the wind energy sector. This is particularly true in rural areas where small landowners can participate in the growing sector. Small wind projects can collectively produce significant amounts of power while keeping economic impacts local. While large projects are needed to rapidly expand wind generation, states should pay particular attention to fostering small projects in a complimentary role.

The definition of small wind turbine can vary between states, but generally it includes anything less than twenty megawatts. Wind energy leaders, however, set requirements by state. For example, in Iowa, projects that are less than three megawatts and are over fifty percent in-state owned only are considered small projects. Farmers, residents, schools, and small business can all develop small-scale wind projects. Small-scale projects are not the norm—accounting for about one percent of wind power installations nationally—but the market is growing over forty percent annually.[48]

One major reason farmers choose not to self-operate projects is because of high upfront costs and attractive lease agreements. As previously discussed, lease agreements provide farmers lucrative royalties while still allowing for agricultural production. Research has found, however, that locally owned projects provide greater long-term economic returns. It is estimated that farmers could double or triple the average four thousand dollars in annual payments if they opt for ownership. Furthermore, these

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[48] Teresa Welsh Galluzzo. "Small Packages, Big Benefits: Economic Advantages of Local Wind Projects," The Iowa Policy Project, April 2005, 1.

revenues are kept completely local and are not paid to non-resident owners. For every megawatt of locally generated power, over sixty thousand dollars stays within the community and one hundred thousand dollars stays within the state. For non-locally owned projects these numbers drop to twelve thousand and five thousand dollars respectively. Local projects will see only twenty thousand dollars leave the state per megawatt, while one hundred and fifty thousand dollars go out of state for non-local projects.[49]

The impacts of local ownership have been studied in Montana and Iowa. Each scenario shows significantly more local economic activity associated with small projects. In Iowa's Cherokee County one forty-megawatt non-locally owned plant and twenty two-megawatt locally owned facilities were constructed. The total number of direct jobs was equal for both projects, but the locally owned projects produced more than double the number of indirect jobs as the non-local project. Additionally local spending during the operational phase was six million dollars higher than the non-local project.[50] The same results were found with other counties; indirect jobs creation and annual spending remained significantly higher for smaller local projects. In Prairie County Montana, studies have shown that an out of state fifty-megawatt project would employ three percent of the local workforce. If the project is wholly locally owned total employment jumps to over eight percent. For six rural Montana counties job creation increases consistently when projects achieve higher percentages of local ownership.[51]

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[49] Ibid. 6.
[50] Ibid. 4.
[51] M. Costani. *Quantifying the Economic Development Impacts of wind Power in Six Rural Montana counties Using NREL's JEDI Model*, National Renewable Energy Laboratory, September 2004, 13.

Barriers and Policies Regarding Small Turbines

Despite rapid growth, installation of small turbines faces several hurdles. High upfront costs make it hard for individuals to pay upfront capital costs, farmers and small landowners need incentives to make small turbines as appealing as royalty payments, and states have begun to realize the value of small wind projects and are creating tailored policy. The most successful states have been able to enact polices that spur growth, however, most of the states with high wind potential have failed to enact enabling legislation. Upfront costs usually rage from twelve to thirty thousand dollars for the purchase and installation of small wind turbines. Although landowners will be energy self-reliant, many—particularly those in poor rural areas—need financial incentives to outweigh the high capital costs burden and make projects cost-effective.[52]

Metering policies have proven to be a popular incentive. Here excess power can be purchased from local owners for above or below market rates depending on state policies. Most households use about ten thousand kilowatt hours annually, so any excess power can be sold.[53] Minnesota currently has one of the most pro-small turbine project incentives in the nation. The state offers a program that pays landowners above the retail price, in this case one and a half cents per kilowatt-hour over a ten-year period. Additionally, these small producers are exempt from property and sales taxes related to production and installation.[54]

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[52] T. Forsyth, P. Tu and J. Gilbert. *Economics of Grid-Connected Small Wind Turbines in the Domestic Market*, National Renewable Energy Laboratory, September 1999, 4-5.
[53] Ibid. 5.
[54] Teresa Welsh Galluzzo. "Small Packages, Big Benefits: Economic Advantages of Local Wind Projects," The Iowa Policy Project, April 2005, 6.

Like Minnesota, California offers a buy-back program, but utilities purchase power at the market rate. California has no state wide buy back policy, instead allowing utilities the option to set individual contracts with owners. Additionally, California has a buy-down program that subsidizes up to fifty percent of the total upfront costs. As a result many small landowners have installed small projects, particularly in rural inland and coastal regions. California was one of the first states to establish a successful small-turbine policy and provided an example for other regions to follow.[55]

Despite having the nations' highest wind resource potential, South Dakota has failed to enact a financially appealing small turbine policy. This is particularly unfortunate since South Dakota has a large concentration of rural landowners that could harness substantial amounts of wind power. South Dakota offers no California-like buy-down or net metering options, thus not reducing upfront costs or providing long-term financial incentives. The lack of net metering allows utilities to purchase power at only the avoided fuel cost, which dramatically decreases the cost effectiveness of installing small projects. South Dakota only offers a property tax incentive, thus explaining the states slower grow rate of small turbines.[56]

Studies typically show that payback for small turbines can range from a low of ten years in pro small turbine states such as, California to a high of forty-five in less policy friendly states, such as South Dakota. Many of these models, however, do not accurately represent the true payback in rural areas. Most studies average the states wind speeds when calculating long term costs and payback. Rural areas, however, often exceed the

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[55] Paul Gipe. "Small Wind Turbines Sprouting as Power Prices Risem" Rahus Institute, 2001, 2-3.
[56] T. Forsyth, P. Tu and J. Gilbert. *Economics of Grid-Connected Small Wind Turbines in the Domestic Market*, National Renewable Energy Laboratory, September 1999, 7.

state average—particularly in the Midwest—making rural buy-back programs more financially lucrative. With progressive policies, states can dramatically reduce capital costs and foster growth of rural small wind projects. Net metering polices, led by California, have caught on and currently are present in over half the states. Additionally, other states have adopted pro small wind turbine policies with or without the presence of net metering, such tax incentives and buy-downs.[57]

Barriers to Growth

One of the biggest barriers to rural wind development is carrying capacity of transmission lines. This is particularly apparent in states with major wind potential—notably North and South Dakota. The most promising areas for wind projects are located in rural areas far away from major urban centers. Rural economic opportunities are meaningless if wind power cannot be exported to meet demand. Additionally, existing transmission lines often lack the necessary capacity to carry electricity long distances—this is especially true in Texas, and wind energy becomes increasingly expensive as it passes though multiple utility providers due to distance-based charges. Upfront costs to hook into regional grids generally run high, which makes small projects less feasible. Varying daily and seasonal wind speeds create deviations in electricity delivery causing operators to be penalized.[58]

Transmission is a major problem in states trying to accommodate rapid wind sector growth. Growth in Texas has been hindered due to the ineffectiveness of the state's transmission lines. The majority of projects are hundreds of miles from population

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[57] Ibid. 6-8.
[58] Randy Schnepf. *Agricultural Based Renewable Energy Production*, Congressional Research Service: Library of Congress, January 4, 2005, 24-25.

centers where few lines run. Wind capacity is so great in west Texas that turbines must shut down on windy days because there is no way to transport all the electricity. Similar problems could occur in large portions of the Midwest, especially as more states pursue rapid wind development. Future major investments are needed to ensure wind development growth is not stalled. Texas recently approved an over five billion dollar network to expand transmission lines to western areas, a move that encouraged California to do the same. Similar actions can ensure that other states install the needed transmission capacity. One foreseeable obstacle is that other states do not have Texas's stand-alone power grid, making it more difficult to plan and install new lines. Minnesota has experience planning on a local base; rural Nobles County produces over six times the amount of electricity needed locally. County officials independently have begun an installation project that will allow wind to be exported to the Twin cities metro region.[59],[60]

Public opinion can also pose barriers to growth and affects how states promote wind development. In a number of states local opposition has sprouted in response to wind development. Many of the issues involve aesthetic issues of turbines. The Kansas State Supreme Court upheld a ban in regards to large-scale wind projects on privately held land in Wabaunsee County. Proponents of the ban claimed that large projects would ruin the natural landscape. Projects in rural Maryland and Pennsylvania were also abandoned due to local opposition. Even in Texas—which has enthusiastically embraced

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[59] U.S Department of Energy. *Wind Energy for Rural Economic Development*, August 2004, 6.
[60] Kate Galbraith. "Texas Clean Energy Hampered by Location," *The New York Times*, September 12, 2010, 2.

wind development—private landowners resisted allowing transmission lines to be installed on private property.[61]

To overcome public opinion, states must use different approaches to promote wind development. On the Pacific Coast, residents have often put up with the unsightliness of large projects because of deeply entrenched environmental awareness, concern and activism. In other regions, however, residents are not driven by ideology—particularly in the wind-rich Midwest. Only forty-eight percent of Midwesterners believe that steps need to be taken to combat climate change—the lowest percentage in the country. Many rural residents react negatively to installing turbines solely for environmental reasons. These states must promote the economic benefits of wind energy in order to sway locals to embrace development. Iowa, Minnesota, and Nebraska have successfully promoted the benefits of wind development and rural residents have largely ceased opposition to projects. When states focus on the economic decline of rural America and the merits of wind development, rural residents are more likely to promote local development. Due to the refocus on promotional efforts by the state, rural Kansas recently has shifted away from its aversion to wind projects and currently is pursuing project installation in record numbers.[62]

Varying state regulations can also affect wind development. Two differing approaches have taken place in the major wind states of Texas and California. Texas is notoriously unregulated and requires minimal permitting for large projects. The state's history as a major oil producer also makes the population less concerned about

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[61] Scott Streater. "Wind Energy Faces 'Prairie Rebellion' in Kansas," *The New York Times*, November 5, 2009, 1.
[62] Leslie Kaufman. "In Kansas, Climate Skeptics Embrace Cleaner Energy," *The New York Times*, 2-3.

environmental affects of wind projects, such as bird deaths. California's wind development, in contrast, has stagnated since the 1980s. California has significantly more regulations than Texas and Iowa, and environmental groups are increasingly concerned about developmental effects on wildlife and habitat. California's renewable energy mandates, however, are more stringent than those in Texas, which has promoted a renewed investment in statewide wind projects. Iowa has taken a middle approach. The state imposes modest fees and also is somewhat environmentally conscious. As a result Iowa has become the nation's second largest producer of wind energy. A state-by-state analysis offers valuable insight on how state policies can promote successful wind development.[63]

Impacts of State Policies

In lieu of federal leadership, states led the way fostering domestic wind production. Renewable energy mandates, voluntary purchases of green power, and pro-wind market regulation have driven wind projects in multiple states. For the foreseeable future, states will continue to drive most wind growth as the federal government has ceased to adopt comprehensive policies. Lack of federal actions has made in-state development efforts the driving force behind the rapid expansion of the domestic wind industry.

Renewable Portfolio Standards (RPS) have become increasingly popular at the state level and are widely viewed as one of the best polices to promote wind energy. RPSs require utilities to acquire power from a certain percentage of renewable power. California currently has one of the most ambitious RPS, setting a goal of twenty percent

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[63] Kate Galbraith. "California and Texas: Renewable Energy's Odd Couple," *The New York Times,* 1-2.

by 2017. It is questionable if California will meet its goal on time due to several regulatory barriers. However, the existence of the state's RPS spurred a renewed push for wind projects, an area that has grown little since first expanding in the 1980s. Growth of California's development is largely driven by utilities that use funding from a systems benefits charge on electricity sales, estimated at some one hundred and thirty million dollars annually.[64]

Texas on the other hand, has already exceeded its five percent RPS set in 2001. Although Texas began wind development later than California, the RPS mandate created a wind energy boom in the state particularly between 2005 and 2010. Large wind projects sprouted up over large parts of rural Texas, installing enough megawatts to overtake the historical leader, California. Unlike California, wind development in Texas has been driven the private sector, since that state does not provide funding to utilities. The structure of Texas's RPS allowed for rapid expansion, even after exceeding the mandated level. This contrasts with the situation in California, where funding supports above-market costs and therefore development is likely to slow after reaching the twenty percent mandate. California will, however, gain substantially higher percentages of power from wind than Texas due to the higher RPS requirement.[65],[66]

Iowa and Minnesota developed a slightly different approach than the standard state wide RPS. Both states have property and sales tax exemptions that lower the cost of producing wind power. Additionally, the state legislatures required particular investor-

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[64] Lori Bird et al. *Policies and Market Factors Driving Wind Power Development in the United States*, Energy Policy, 33, 2005, 1399-1402.
[65] Ibid. 1402.
[66] Ryan H. Wiser and Ole Langniss. *The Renewables Portfolio Standard in Texas: An Early Assessment*, Lawrence Berkley National Laboratory, November 2001, 1-4.

owned utilities to achieve varying percentages of renewable energy. In the early 2000s a select few utilities drove wind development in both states. Iowa has since extended RPS mandates to all utility providers and Minnesota will continue to increase the percentage of Xcel Energy's power derived from renewable sources. Additionally, Minnesota adopted policies that promote small wind projects—particularly in rural areas not served by Xcel.[67]

The Pacific States of Washington and Oregon have used a mix of policies to promote wind projects. Both states have lowered capital costs by providing sales and property tax exemptions. Additionally, Oregon adopted a California inspired system benefits fund to offset above market costs. The absence of state requirements and consumer interest, have led utility providers to set modest yet significant RPS goals. The proximity to California also provides a lucrative and expanding market for Pacific Northwest wind developers.[68]

Nebraska is one of the few states to enact policies intended to promote rural wind development. Community-Based Energy Development or C-BED, extends wind projects a Production Tax Credit (PTC) only if projects provide lost-cost energy and substantial rural economic impacts. C-BED provides financial incentives for public utilities to invest in projects that provide the greatest economic benefit to rural areas. Furthermore, the state mandates that public power companies must consider local economic impacts when making development decisions. The use of PTC allows projects to be cost effective and

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[67] Lori Bird et al. *Policies and Market Factors Driving Wind Power Development in the United States*, Energy Policy, 33, 2005, 1402-1403.
[68] Ibid.1403.

competitive with traditional energy sources, while ensuring the majority of economic development stays in rural communities.[69]

Additionally, some wind development has been driven by out of state policies—particularly in the Eastern States. Neither West Virginia nor Pennsylvania has passed RPS requirements, but wind power has taken root in both states. Both states have tax exemptions, consumer interest, high standard offer utility rates and in Pennsylvania's case a system benefits fund. All of these have contributed to state wind projects, but these states also see a lucrative future providing wind energy to neighboring states. The state of New Jersey and Washington DC have passed RPS mandates, however, both are small and lack the land and wind potential to meet their respective RPS. Both states see financial incentives to export wind power in order to meet regional demands. The regions most likely to benefit from wind growth are the rural Appalachian communities that have some of the highest wind potential in the Eastern United States.[70]

Impacts of Potential Federal Policies

The federal government has failed to pass a nation wide RPS, but there is still significant legislation that affects wind production. One of the major incentives is the Federal Production Tax Credit. Beginning in 2002 wind generators earned a per kilowatt-hour production tax credit, which is adjusted for inflation and lasts the initial ten years of operation. This system has been in place since the mid-1990s, but uncertainty of tax credit extensions creates a boom and bust cycle for wind development. The similar

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[69] E. Lantz. *Economic Development Benefits from Wind Power in Nebraska: A Report for the Nebraska Energy Office*, National Renewable Energy Laboratory, November 2008, 4.

[70] Lori Bird et al. *Policies and Market Factors Driving Wind Power Development in the United States*, Energy Policy, 33, 2005, 1404.

Renewable Energy Production provides similar tax credits for public utility companies that invest in renewable energy. The Public Utilities Regulatory Policy Act (PURPA) allowed for feed-in tariffs and there have been additional investment credits and accelerated depreciation.[71]

The uncertainty of future programs and credits on the federal level has caused states to be the main drivers of wind power. Despite the rapid growth of wind nationwide the benefits have been concentrated in a handful of states. Many states have passed legislation and imposed RPS, but many lack the comprehensive elements to make then actually viable, particularly in Eastern states that pass ambitious RPSs. Federal leadership would be exceedingly helpful in ensuring fast and stable wind development nationwide.

Historically the federal government has led in several areas regarding wind development. In the early 2000s congress passed the previously mentioned *Federal Tax Exemption for Wind Energy Systems*, setting a tax credit for each kilowatt of wind energy produced. Additionally, the 2002 Farm Bill included *Renewable Energy Systems and Energy Efficiency Improvements,* which had major beneficial impacts for rural areas. The program authorized loans for farmers and ranchers to invest in renewable systems and improve energy efficiency. Farmers can use a combination of loans and grants to cover up to fifty percent of total project costs. Unsurprisingly, wind systems were the represented the majority of grants issued and greatly promoted the value of small wind turbines.[72]

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[71] Ibid. 1397-1399.
[72] Randy Schnepf. *Agricultural Based Renewable Energy Production*, Congressional Research Service: Library of Congress, January 4, 2005, 21-28.

Many groups believe that under the right market and policy conditions, renewable energy—the majority being wind—could make up anywhere from twenty to twenty-five percent of the nations energy needs in the next twenty years. Federal incentives totaling thirteen billion annually would create the conditions to meet these projects. While that seems like a large-scale investment, it is significantly less than the almost three hundred billion dollars the US pays for annual oil imports. Major investments related to wind would include additional funding for research and development to lower the costs of wind energy. Increased funded would also be needed for Production Tax Credit (PTC) and Clean Renewable Energy Bonds (CREBs) in addition to extending these programs in the long term. Major investments would be need to build a more efficient grid system (something that has somewhat started) and ensure that all wind producers have equal access to power markets.[73]

While federal policies play an important role subsidizing and encourage wind production; a federal RPS mandate would substantially boost national wind production. As witnessed in Texas, the Midwest and particularly California, in introduction of a RPS encourages rapid wind development, even in areas where the industry has yet to form. In California, an ambitious RPS quickly jumped started decades stalled wind projects. A national precedent supplemented with tax and grant incentives would expand wind production from the core areas of the Midwest and Pacific states. Nationwide wind projects would greatly enhance rural communities in every state. Major wind producing states that have embraced RPSs—Minnesota, Iowa, California and Texas—have all generally experienced both greater wind development and rural economic growth than

[73] 25X'25 National Steering Committee. *25x'25 Action Plan: Charting America's Energy Future.* February 2007, 34-36.

states high wind potential states that have not—South Dakota, North Dakota and Colorado. To truly economically rejuvenate rural areas, large amounts of wind power must be exported from sparsely populated areas to major urban multistate markets. A national RPS would spur development and increased transmission line funding and tax breaks would make wind a major rural-centered domestic energy source.

Chapter 5: Future Trends and Conclusion

The benefits of wind development are numerous and well documented. Rural areas have been given new economic vitality with the rapid growth of the nation's wind systems. From individual lease payments to tax revenue to manufacturing plants, wind development affects many spheres of rural economies that contribute to higher levels of living and economic opportunities. While economic benefits are substantial and are major economic drivers, it is important not to view the industry as monolithic. Wind energy brings an array of diverse industries to rural areas that do not necessarily materialize in the same manner. Some communities can be disproportionately manufacturing centered, while others only acquire lease payments. Not every community's economic successes will be the same, but numerous examples demonstrate the benefits of wind development regardless of individual sub-sector. Wind development has brought a level of economic diversity to an area that is important for continued economic stability. While, wind energy may not be the solution for every rural area, it provides an important economic base that can be built upon.

The economic benefits of wind power have been demonstrated on small and large scales, both having significant merits. Neither is inherently better economically for rural communities. The debate is not necessarily over which type of rural wind development is best, but rather what drivers are needed to promote organic rural wind development. Rural communities are enthusiastically embracing wind development, whether it is small turbine projects in Minnesota or sprawling wind farms in West Texas. If the opportunity for wind development exists, rural

communities have shown willingness to take advantage of the opportunity. It is important that governments and regulators promote the correct mechanisms to ensure that rural areas can fully harness wind development's full economic potential.

State policies have been important drivers for initial growth. Texas, California, Iowa and Minnesota have been at the forefront critiquing and perfecting policies that maximize the development of wind energy. Long-term federal policies, however, are needed to ensure wind growth can continue to expand. The lack of comprehensive federal policy is perhaps the biggest barrier to future wind growth, and significantly contributes to the boom and bust nature of the industry. It is in the best interest for rural areas the nation as a whole to promote sustainable wind energy sector. From a purely economical standpoint—disregarding the issues of climate change and foreign oil consumption—wind development provides a proven successful development model. Wind development boosts rural incomes and strengthens the continually troubled rural manufacturing sector. In times of economic hardship, governments should promote new potentially high growth diversified sectors. Wind energy continues to be highly regarded by the public and demand will continue to grow. The federal government has the opportunity to substantially increase the rate of expansion.

The success of wind development in rural areas provides a successful blueprint for the nation to follow. Economically stagnant and impoverished areas have the potential to utilize local resources and establish a vibrant economic base. While rural areas across the board have benefited from development, it is important

that policymakers ensure all members of rural communities have equal access to opportunities. Iowa and Minnesota have constructed the most comprehensive policy aimed at protecting small-scale farmers and rural entrepreneurs. Both states wind generation capacity rivals both Texas and California, insinuating that grassroots growth can compete against large-scale developers under the right political conditions. A national policy should promote policies with rural areas in mind and not solely give mega-developers a competitive advantage. Rural communities should be seen as partners in wind sector and treated as such. Rural areas still have a lot to gain from wind development and the proper mechanisms must be put in place to allow for maximum benefits. Wind generation is one of the most promising economic sectors rural areas can cultivate in the foreseeable future, and rural America's social and economic fabric may hinge on the future outcomes of national wind development.

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