

WIND AND SOLAR ENERGY IN THE U.S.

Policy Recommendations for Rural Development

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INTRODUCTION

Renewable energy has, within the past few years, shifted from being novel to a major source of electric power production that is altering the landscapes and future development prospects of rural areas across much of the United States. While there are many forms of renewable energy – including biomass, geothermal, and hydroelectric – our focus here is on wind and solar technologies, both of which are expanding very rapidly in the US and worldwide.

Electricity produced by photovoltaic, concentrated solar, and wind power systems more than doubled between 1990 and 2012 in the US (EIA, 2013). Photovoltaic solar capacity grew from 138.8 MW in the year 2000 to a total of 7.2 GW (or 7200 MW) by 2012 and is projected to reach 9.2 GW by 2016 (IEA, 2010; SEIA, 2012; SEIA, 2013). US wind power capacity increased from 2.5 GW in 2000 to over 60 GW by 2012 (DOE, 2013) and is expected to add another 20 GW by 2016 if existing tax credit policies remain in place (EIA, 2013a).

Although both wind and solar technologies have seen impressive rates of growth, current renewable energy production from these sources still comprises less than six percent of total US electric power capacity. However, rising concerns about the effects of conventional electric power facilities, especially coal-fired power plants, on air quality and global climate change have



contributed to policy shifts that are helping to drive a major surge in renewable energy development. Those concerns, along with rapid technological advancements, innovative financing strategies, and broad-based public and political support suggest renewable energy development will continue to accelerate and contribute an increasing share of electric power production into the foreseeable future.

As the shift toward increased reliance on renewable energy sources continues to unfold, it will have both socio-economic and environmental consequences for rural America. For example, rural areas with economies tied to coal mining or the previous siting of electric generating stations could experience economic decline as growing numbers of coal-fired power plants are decommissioned in response to more stringent emissions standards and as alternatives to coal become more cost effective. At the same time, siting requirements for utility-scale wind farms and solar arrays will concentrate such developments in rural areas, giving rise to a variety of both opportunities and liabilities.

Possible opportunities include reduced pollution, potential for employment growth, new sources of personal income, and increased revenues for local governments. Among the potential liabilities are negative effects on viewsheds, displacement of alternative land uses, damaging effects on wildlife, ecological disturbance and fragmentation effects, and public controversy and conflict.

Renewable technologies, unlike traditional energy sources, are not limited to only utility-scale applications. While there has been rapid growth in the number of large, utility-scale wind and solar power installations, there has also been rapid expansion of “distributed” wind and especially solar capacity at the residential and community scales. Although market penetration of distributed systems is still very small relative to utility-scale systems, their growth has important ramifications for utilities and may force changes to their business model. Small-scale or distributed energy has added benefits for users as a long-term investment, with fewer of the socio-environmental problems facing utility-scale energy.

OPPORTUNITIES AND LIABILITIES

Increasing reliance on renewable energy is likely to have a number of important outcomes with respect to rural economic and social well-being. First, increased reliance on renewably sourced energy represents a key element in a carbon mitigation response to climatic changes threatening ecosystem conditions that are central to the livelihoods of many rural residents. Climate change creates a panoply of problems involving

increasingly extreme weather patterns – including droughts, floods, wildfires, and invasive species infestations – that threaten to disrupt agricultural production, forest industries, and other traditionally rural commodity production activities. Climatic changes may affect the ability of rural areas to attract new growth and development or even sustain existing populations and economic activities. In addition, climate changes and their effects may over time alter natural amenity conditions that have become key drivers of in-migration and economic development across much of rural America. The adverse consequences of climate change for rural America, and for the broader society, are sufficiently serious to require multiple strategies to reduce carbon emissions. While a large-scale transition from fossil fuel-based electricity production to renewable energy systems will not in itself be enough to reverse global climate change trends, it is clearly an important piece of what must be a multifaceted response.

Renewable energy developments – including both utility-scale and small-scale systems – have the potential to bring an array of new economic opportunities to rural areas. Utility-scale wind farms and solar arrays can create much-needed employment opportunities in areas where such facilities tend to be sited. Local residents and officials often have overly optimistic expectations regarding job creation that may require some tempering given the short-term nature of construction-phase employment, the relatively small numbers of long-term employees required to operate such facilities, and a tendency for relatively few of these newly created jobs to be filled by established local-area residents. Nevertheless, even a handful of new jobs can represent a substantial economic boost in many rural areas, as can short-term, construction-related increases in sales for local-area materials providers and service-sector businesses. In areas where development occurs exclusively or extensively on privately owned lands, utility-scale renewable energy facilities can produce an economic windfall for landowners who sell or lease their property for the siting of wind turbines or solar arrays. In addition, such

facilities can produce substantial new revenues for local governments, primarily through taxes on the assessed value of costly capital equipment such as wind turbines and solar panels.

Although utility-scale developments can offer positive development opportunities for rural areas, it is important to keep in mind that they are not without environmental and social impact. Effects on wildlife and ecological conditions, the creation of service roads that contribute to ecological fragmentation and require long-term maintenance, and land use changes that alter the character of and future development options for large tracts of rural land all require careful site assessment and planning to address both short-term and long-term effects. Local-area residents, landowners, and land users have frequently opposed large-scale renewable energy developments, leading to major delays and in some cases cancellation of proposed facilities. Such reactions make it clear that renewable energy development requires sensitivity to the needs and concerns of those who live near to or make use of lands affected by these facilities. In particular, careful attention must be directed to the visual impacts and activity-displacement effects that can accompany the large-scale application of these technologies.

While rural areas need to both plan for and seek to maximize development opportunities associated with utility-scale renewable energy, it is also important to consider the implications of and potential opportunities associated with probable future increases in the utilization of small-scale renewable energy systems. In a variety of ways, small-scale renewable energy would appear to be congruent with the goals of environmentally and economically sustainable rural development. Distributed energy in the form of residential and other small-scale renewable technologies has the potential to offer rural residents opportunities for relatively safe and stable investment in energy self-sufficiency while also providing a hedge against increases in the future cost of utility-generated electricity. At the same time, distributed energy is far less likely to create the range of environmental disturbances, economic

vulnerabilities, and social disruptions that can accompany development of both conventional energy resources and utility-scale renewable energy facilities.

Although small-scale, distributed energy systems are perhaps only a few technological innovations away from being able to fundamentally change America's electric power system, these technological advances have not yet fully occurred. Issues of price and intermittency of renewable generation mean that except for particular applications, reliance on grid-based electricity remains necessary. The prospect of disruptive challenges to centralized electricity production and distribution systems that utilities worry will occur as their business model changes requires careful consideration about policies that will help to maintain investment in and stability of utility-based power systems, while also recognizing that what is best for utilities may in the longer term not be what is best for energy customers. These complexities need to be kept in mind when creating and implementing policies designed to promote increased use of distributed power like small-scale wind and solar.

POLICY OPTIONS AND RECOMMENDATIONS

Policies that promote development of renewable energy at both the utility scale and smaller scales seem necessary for the foreseeable future. At the same time, policies designed to promote distributed generation may offer longer-term opportunities and benefits to rural areas, particularly since forecasts point strongly toward a diminishing importance of utility-produced electricity. To best promote renewable energy in ways that will reinforce and enhance positive rural development outcomes, we offer the following policy recommendations:

- **Establish and maintain consistent and predictable policies**

Even as renewable technologies continue to mature, for the near term at least there is a need to continue supportive policies such as the production tax credit, the

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residential renewable energy tax credit, or feed-in tariffs. Such policies also need to be characterized by a higher degree of predictability, stability and consistency than has occurred with at least some programs over the past several years. For example, recurring Congressional threats to discontinue the production tax credit every few years have undoubtedly had a dampening effect on private-sector decisions about investment in new utility-scale wind energy projects. Long-term policy commitments will help signal to investors and inventors that renewable energy technologies are worth pursuing. At the same time, to provide the correct incentives such policies should include a defined time horizon and a reduction schedule that will lower subsidy levels as these technologies mature and as new innovations and increased efficiencies lead to a declining need for subsidization and incentive programs.

- **Coordinated planning at the federal, regional, state, utility, and local levels**

The electric power grid is vast and complex, and the intermittent nature of power production from renewable sources poses serious challenges to the existing grid system. To be stable and reliable the grid will require the interconnection of backup capacity and increased integration across multiple scales of generating systems. Further deployment of smart-grids and deeper interconnection of the national grid will help smooth the intermittencies of renewable energy supplies and increase the total amount of renewable capacity the grid can use. But successful deployment of these systems needs careful planning, with

emphasis on more effective coordination across the many levels of bureaucracy involved in regulating the electrical system.

- **Low-interest loan programs for small-scale renewable systems**

The high initial cost of a residential-scale solar or wind system prevents many would-be buyers from installing renewable energy. Although banking practices are changing, traditionally banks have not offered favorable loans for renewable energy projects even if they can be shown to offer consistent returns of reduced energy costs. Because of this we recommend continuation of programs like the Rural Energy for America Program (REAP) that offer loans for renewable and energy efficiency projects, and expansion of property accessed clean energy (PACE) financing programs. PACE financing helps spread out the high initial cost of renewable systems but helps assure that the investment can be recouped, because PACE fixes the value of the system to the property. Given the potential for substantial energy cost savings, and because residential-scale energy systems are usually covered by homeowners insurance, such investments tend to be among the safest available to individual property owners and to lending institutions.

- **Local-level revenue generation standards**

Most of the public revenue derived from utility-scale wind and solar energy developments comes in the form of taxes on capital equipment installed at these facilities. Because a rapid depreciation schedule is typically applied to such equipment, it is important that counties and

municipalities hosting developments plan carefully around the timing of and uses of these funds. Renewable energy projects have potential to provide much-needed tax revenues for rural areas, but the relatively short-term and declining nature of revenue flows can create challenges in anticipating the extent and duration of revenue increases and in determining how funds should be used. Because of this, the benefits derived from such funds might be enhanced by creating investment accounts or endowments that can help to address public expenditure needs over a much longer term.

Local governments would also benefit from the creation and use of standardized agreements that clearly establish the amount of tax revenue they will receive, and how revenue levels will change over time. Standardized agreements could help local governments avoid being “bargained out of” revenues by energy companies that may negotiate for reduced taxes on the basis of job creation promises that may not materialize. In addition, a modest energy production tax similar to Wyoming’s wind production tax with allocations to local governments in areas affected by the siting of utility-scale renewable energy facilities, or a payment in lieu of taxes (PILT) arrangement for renewable projects sited on federal land, would help to insure that some revenues remain available over the lifespan of these projects to offset longer-term externalities imposed on the locality.

- **Local job creation and hiring policies**

Although large-scale renewable energy projects are often promoted as providing significant new job opportunities for host

areas, those expectations and promises frequently give way to disappointment in the face of limited job creation and a tendency for many positions to be filled by non-local and in-migrating workers. Policies and programs that help to increase employment opportunities for existing local-area residents are needed if renewable energy projects are to contribute more effectively to rural economic development outcomes. Such policies might include requirements that an agreed-upon percentage of employees needed in positions that do not require highly specialized or technical expertise be hired from the surrounding area during project construction and operation periods, as well as requirements for local purchase of some specified portion of construction materials and services. In addition, establishment of training programs to enhance preparedness of local-area residents for employment at renewable facilities should be considered.

- **“Best practice” siting and interconnection standards**

We also suggest the creation of new siting standards focused on reducing the negative externalities that are likely to accompany development of utility-scale renewable energy facilities. Besides the requisite environmental impact assessment and mitigation considerations, we suggest that standards include recognition of the visual impacts these developments can create. While the visual impact of wind turbines or other large renewable energy structures may appear unimportant compared to the environmental damage associated with some extractive industries, the visual and environmental effects of renewable technologies are not benign. Utility-scale projects require careful planning, with siting standards that include well-defined

setback and distance requirements that protect cultural and natural landscapes. A careful planning process that considers and includes public views and concerns as part of the site evaluation and decision process will help avoid or reduce the controversy and opposition that often arises in response to large-scale project proposals.

For small-scale systems, we recommend adoption of interconnection and permit standards that facilitate and encourage connection of these systems to the grid. Policies are needed that prevent the imposition of unnecessary permitting and connection requirements or expenses. These standards should also fully consider how small-scale renewable energy systems offer benefits grid-wide, such as reduced utility power production and transmission costs and environmental benefits, and insure that owners will receive a fair price for the excess electric power they produce.

CONCLUSION

Although the future trajectory for renewable energy remains uncertain, both the need for an energy system with a smaller environmental footprint and current trends in the creation and use of renewable technologies strongly suggest that our future world will use more and more renewably produced electricity. As that future unfolds, rural areas will experience potentially profound changes linked to increased reliance on both utility- and small-scale renewable energy systems. Through careful planning and policy development those changes can contribute positively to economic, environmental and social well-being, and help to foster positive rural development outcomes. 🌱

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