



GREAT EXPECTATIONS

U.S. Wind Energy Development

Governors' Wind Energy Coalition
2010 Wind Energy Recommendations

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Governorswindenergycoalition.org

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Governors' Wind Energy Coalition's 2010 Wind Energy Recommendations

The Governors' Wind Energy Coalition was formed to address some of the nation's most pressing needs — jobs, energy, and climate — through the use of domestic renewable energy resources.

As a bipartisan group of 30 governors from all areas of the nation, we share a concern that our dependence on unsustainable and carbon intensive energy sources is an unacceptable risk to the nation's energy, economic, and environmental security. These recommendations include the governors' top priorities — green economic development, job creation, and energy security.

Congress began to address these national priorities last year when the House of Representatives passed the *American Clean Energy And Security Act of 2009* (H.R. 2454). This legislation addresses several of the recommendations that follow, especially the renewable electricity standard. It is our hope that these recommendations will aid the Senate in its deliberations.

Background

The nation's past energy policy has left Americans exposed to both volatile energy prices and traditional sources of electricity. The growing national determination is that more renewable energy sources must be used. In addition, many policy makers are pressing for an accelerated move toward vehicle electrification as a means to improve both our national energy and economic security by diminishing our reliance on imported oil. This will involve new electric transmission infrastructure in order to capture the value of the nation's premier renewable energy resources. New transmission will also lower electricity prices for some and support continued electric grid reliability.

The confluence of these issues means that our states and the nation must move to expand wind energy development. Wind energy is a clean, abundant, and affordable source of energy — and it is available and deployable now. In fact, 42 percent of all new power plants installed in the nation in 2008 are powered by the wind. A recent assessment of wind's prospects and impacts released by the U.S. Department of Energy concluded that the United States could supply 20 percent of the nation's electricity needs through wind by 2030. This assessment and related analyses found achieving this goal would:¹

1 20 % Wind Energy by 2030, U.S. Department of Energy, DOE/GO-102008-2567, July 2008; available at <http://www.20percentwind.org>





Working rapidly toward this goal with supportive policies will spur investments that create thousands of good jobs that are critical to stabilizing our states' and the nation's economy.

- Support roughly 500,000 good quality jobs in the U.S. — with an annual average of more than 150,000 workers directly employed by the wind industry;
- Enable significant wind power development in 46 states, and support substantial employment in all states;
- Result in energy-related cost savings to the nation ranging from \$100 billion to \$250 billion through 2030, offsetting by several times the estimated incremental cost of about \$40 billion;²
- Reduce electric-sector greenhouse gas emissions by about 25 percent, relative to a scenario with no new wind additions;
- Reduce electric sector natural gas and coal consumption by 50 percent and 18 percent, respectively; and avoid construction of 80,000 MW of new coal plants;
- Reduce electric-sector water consumption over 15 percent by 2030, with nearly one third of the reduction in the arid western states; and
- Increase annual property tax revenues and rural landowner payments to more than \$1.5 billion and \$600 million, respectively, by 2030.

The assessment also concluded that 20 percent electricity from wind and the associated benefits would not be realized in a business-as-usual scenario. Investment in the nation's electrical transmission infrastructure would be needed, as well as continued investment in wind power technology. Siting and environmental issues would need to be addressed efficiently and promptly.

In addition, the assessment showed that the 20 percent goal could be met using only a small fraction of the nation's available and developable wind resources. Hence wind's contribution could easily exceed 20 percent over time, especially in light of new emerging markets for electricity such as nighttime charging of electric vehicles.

Working rapidly toward this goal with supportive policies will spur investments that create thousands of good jobs that are critical to stabilizing our states' and the nation's economy. It will also reduce total consumer energy costs over time, diminish our dependence on foreign oil, decrease the trade deficit, and lessen carbon emissions. Toward this end, the governors developed these recommendations designed to put our nation firmly on a path to achieve the 20 percent wind energy goal and enable the entry of other renewable power sources to the market. We respectfully request that the Administration and Congress take the following steps:

2 Power System Modeling of 20% Wind-Generated Electricity by 2030," M.Hand et al, Proceedings of IEEE Power Engineering Society General Meeting, Pittsburgh, PA, July, 2008; available at <http://www.nrel.gov/docs/fv08osti/42794.pdf>



Adopt a Renewable Electricity Standard

The nation's wind energy industry and supporting infrastructure will not reach their full potential unless the nation sets a minimum requirement for the use of renewable electricity. A national renewable electricity standard requiring the nation's utilities to provide a minimum 10 percent of their electricity from renewable sources like wind, solar, and biopower, by 2012 is the most efficient and effective way to advance clean domestic energy and to immediately stimulate jobs in renewable energy manufacturing and the supply chain. Such a standard will place tangible value on the environmental and energy-security benefits of wind and other renewable energy sources.³

In addition to avoiding emissions and increasing America's energy security, hard targets for the use of renewables are a proven job creator both in the U.S. and around the world. This standard is necessary to support immediate economic stabilization and growth while also providing essential long-term requirements to guide the industry's growth. This requirement is especially needed today because of the difficulty of securing financing. The lack of a long-term renewable energy requirement in the United States is resulting in the loss of wind manufacturing investments in our states to Europe and other areas where mandatory renewable energy requirements and a longer-term view of energy policy have been adopted.

Over half of the states in the nation have enacted some form of renewable electricity standard. These standards vary considerably from state to state, complicating compliance by the electric-power and renewable-energy industries. And those states without renewable electricity standards generally have very little renewable energy development to date. A national standard — coupled with associated transmission system additions and markets for renewable electricity credits — would enable least-cost development of the highest quality renewable energy resources regardless of their locations, streamline compliance through uniformity of terms and conditions, and enable transfer of renewable electricity or its environmental attributes to all regions in the nation. With a properly designed national standard, a reasonable level of compliance would be established; and states that wish to exceed the terms of the national standard would be allowed to do so.

Nearly every survey of public opinion — no matter where it has been conducted throughout the nation — demonstrates strong public support for

Nearly every survey of public opinion – no matter where it has been conducted throughout the nation – demonstrates strong public support for expanded development and use of renewable electricity.

Since this public desire is not confined to individual states, but is expressed regionally and nationally, it is time to extend a renewable energy standard to the entire nation.

³ "The American Clean Energy and Security Act (ACES) requires retail electric suppliers to meet a growing percentage of their load with electricity generated from renewable resources and electricity savings. The combined renewable electricity and electricity savings requirement begins at 6% in 2012 and gradually rises to 20% in 2020. At least three quarters (75%) of the requirement must be met by renewable energy, except that upon receiving a petition from the governor, the Federal Energy Regulatory Commission can reduce the renewable requirement to three fifths (60%). In 2020, 15% of the electricity load in each state must be met with renewable electricity and 5% with electricity savings. Upon petition by the governor, the renewable requirement can be reduced to 12% and the electricity savings can be increased to 8%." Committee Summary, H.R. 2454, June 9, 2009.



National policy is needed that will facilitate state and regional coordination in the siting and construction of transmission projects to deliver large amounts of power from renewable-rich areas.

expanded development and use of renewable electricity. This support is founded in a public desire to reduce our dependence on imported fuels, create new jobs, and to obtain our electricity from sources that will not hasten climate change, endanger public health, or otherwise harm our natural environment. This public desire needs to be reflected in effective policies that encourage and enable the expansion of renewable electricity. Indeed, renewable energy standards in individual states are examples of such policies in response to not only public will, but also sound energy, environmental, and economic policy. Since this public desire is not confined to individual states, but is expressed regionally and nationally, it is time to extend a renewable energy standard to the entire nation.

Electricity from wind and some other renewables is nearly free of negative environmental impacts and the associated costs, but this advantage does not appear in a direct comparison of today's prices for conventional and renewable energy. The encouragement of renewable energy selection through a renewable energy standard serves in part as a proxy for the environmental and energy security attributes of renewables that are not yet reflected in energy price comparisons.

Some organizations have expressed a preference for voluntary guidelines over standards. However, voluntary approaches generally do not produce the desired results in a timely fashion. Since implementing the guideline generally carries with it some cost that affects price competitiveness, suppliers are reluctant to take the initiative for fear of losing market share. But if all suppliers are required to play by the same rules, then this concern becomes moot. Consequently a standard is preferable to a voluntary guideline.

Develop New Interstate Electric Transmission System Infrastructure as Needed to Provide Access to Premier Renewable Energy Both On-Shore and Offshore

Developing the states' rich domestic renewable resources will involve improvements to the electric transmission system. Our national electric grid has evolved over 100 years to serve local markets and meet the needs associated with growing electric loads and new market structures, and it is not well suited to transmit major renewable energy resources from certain rural areas where abundant renewables are found to electricity load centers. Over the last 20 years, transmission investment has not accelerated; to accommodate growth in renewable power, it will need to.

New high-voltage lines built to access renewable-rich areas can capture economies of scale in transmission construction and minimize environmental damage that results from construction of numerous smaller lines to the same area. National policy is needed that will facilitate state and regional coordination in the siting and construction of new interstate transmission projects to deliver large amounts of power from renewable-rich areas. This policy should also

facilitate regional coordination in planning and permitting transmission projects to reach renewable resources, while respecting the rights of individual states. Such a national policy will help support the new wind investments in our states required by a renewable electricity standard. Implementation of this policy will also improve the reliability of the nation's power system, and reduce electricity generation costs for some consumers.



The existing transmission system was built by a large number of individual power suppliers to increase operating options in their individual systems — thus providing improved reliability and lower costs. Connections to neighboring systems provided additional flexibility and benefits. But the nation's power network has evolved in accordance with plans developed at local or regional rather than national levels. In general, electricity suppliers have good access to neighboring suppliers, but access to distant systems or regions is often weak or expensive. Direct access to distant resources would require passage through several intermediate systems over wires that may be inadequate to handle the additional traffic in electrons.

A stronger interstate transmission system would provide high efficiency connectivity throughout the nation. Studies have shown that the cost of such a system would be offset several times by the savings that would occur. So why don't we already have such a system?

A major impediment is that each state has its own approval process for transmission. This means that planning for transmission over a large region becomes mired in deliberations in several states as each states' differing — often conflicting — views on the evaluation of costs and benefits emerge. What is needed is federal and regional facilitation of the process for planning and approving transmission lines that serve multiple states while also respecting the needs and circumstances of the individual states involved. National policies must ensure equitable inclusion of concerns from all relevant stakeholders, including all segments of the electric sector, landowners and other residents along prospective transmission rights of way, environmental-protection organizations, and the financial sector.

In addition to these benefits, a stronger interstate transmission system would provide greatly expanded access to electricity markets for those regions of the country that are rich in renewable energy resources such as wind and solar energy. For this approach to work, considerations in coordinated planning processes could include access to renewables-rich regions as a priority. With this system in place, regions with modest renewable energy resources could have access to more affordable renewable electricity.

This level of coordination would also benefit the integration of variable-output renewable power plants into the electric power system. Numerous

If a high capacity, transmission link were available, then those at both ends of the link would benefit – both from the availability of renewable electricity and from the efficient transmission of all electricity on the line.

Customers on the receiving end would have lower-cost electricity, reducing their average electricity costs. And suppliers on the other end would be able to sell electricity that would otherwise have no buyer.



studies have clearly shown that the effects of wind's variability on power system operation are reduced substantially as reliability responsibilities are shared over larger and larger regions. The reason is that variations in wind plant output and system demand tend to average out over larger regions, and larger regions allow greater access to dispatchable resources that help with system balancing. In order to realize this advantage, robust electrical interconnections within and across regions must exist. A stronger interstate transmission system would support this connectivity.

The cost for an expanded interstate transmission system has been estimated on the order of \$75 to \$100 billion to support economic power transfers and meet 20% of renewable energy standards. This investment can be obtained from the private sector, since current investments in transmission throughout the nation are now in the range of \$5 billion to \$10 billion a year from private sources. The primary barrier is determining which generation developers should pay which share of the cost, and how such costs could be included in delivered electricity prices. In particular, actual transmission investment should flow from successful renewable power projects that can offer to purchasers the lowest delivered price of power for their product.

Support Coastal, Deep Water, Offshore Wind Energy Technology Research and Development

If the nation is to meet the goal of providing 20 percent of its electric needs from wind power by 2030 and then continue wind's expansion to provide even greater contributions in both the electricity and the transportation sectors, it must develop and use wind energy resources from all of its wind-rich regions, including coastal and Great Lakes offshore resources. Unfortunately, the nation has neglected to provide adequate research and development to support the development of resources located offshore. Federal research funding is needed to develop new types of turbines, offshore installation and mooring techniques, and economical approaches for placing transmission lines farther from shore in deeper, rougher water.

Several European countries, including Denmark, Germany and the United Kingdom, are actively developing offshore wind already and have gained considerable related experience over the past decade. The coastal waters surrounding much of northern Europe tend to be fairly shallow – 100 feet or less in depth, allowing wind deployment with technology and techniques that have evolved from those used on land. In contrast, much of the offshore opportunity in the U.S. exists in deeper waters, since the continental shelf in the U.S. drops off more rapidly than in much of Europe. Consequently, the technological challenges for U.S. offshore deployment are greater than those in Europe, and will require new approaches and technological advances that are currently at a very early stage.



The U.S. now has an opportunity to take the lead in developing these advances and techniques, but will soon lose this opportunity to Europe and China if aggressive action is not undertaken. The governors recommend that this opportunity be pursued as a national energy priority, and those from the coastal states pledge to collaborate closely with federal government agencies to define and conduct the needed research, development and deployment activities.

Streamline Permitting Processes for Both Offshore and On-Shore Wind Development Projects

Congress must approve legislation that will allow for the efficient and timely review of wind projects on federal lands and in offshore coastal regions. While legislation is needed to improve the permitting process, dramatically improved coordination among state, federal and industry participants is equally important. The Administration should establish a pilot process for streamlining the permitting process across federal agencies and jurisdictional roles, and should support collaborative processes with states where multiple state and federal jurisdictions collide.

In a number of European nations, offshore wind farms are well established. However, in the United States, the concept is relatively new and an established approval process for offshore wind farm permitting does not yet exist. While comparisons with off shore oil and gas development exist, wind energy development differs in many important ways and special focus is needed to advance this process as rapidly as possible while respecting environmental and other considerations. An example of the types of issues faced by developers would include roles and decisions for the following federal entities:

- ▶ The U.S. Department of Interior, whose offices administer a wide range of policies, oversee activities that affect national parks, wildlife refuges and sanctuaries, submerged land leases beyond the 3-nautical mile range, and fisheries.
- ▶ The U.S. Department of Defense, including the U.S. Army Corps of Engineers, Army, Navy, Air Force, and Marines, has jurisdiction over certain areas or activities that may be of importance to national security, radar, or military practice ranges.
- ▶ The U.S. Environmental Protection Agency manages air and water quality issues.
- ▶ The Federal Aviation Administration reviews any development that may interfere with aviation, such as an offshore wind towers.
- ▶ The Federal Energy Regulatory Commission regulates the transmission and wholesale sales of electricity in interstate commerce.

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These federal decisions are compounded by necessary state policy and regulator review, which must also be refined and streamlined. The Coalition recommends a focused series of pilot efforts with the states, coordinated at the federal level, to quantifiably improve and streamline the siting and permitting process over a period of three years.

Dramatically Expand Wind Research, Innovation, and Collaboration

Wind power technology is one of the best economic development opportunities for our states. Production of wind energy components and systems can help revitalize the manufacturing sector, and will provide substantial benefits to the nation's economy through domestic and export markets. However, investment by other nations in wind power technology research and advancement aimed at breakthroughs and continuous improvements in manufacturing processes, components and materials exceeds that of the United States. Moreover, collaborative research and investment models utilized by our competitors will accelerate these advances. If the United States does not provide more funding — and utilize that funding through improved collaboration among federal, state, and private interests — for wind research and advancement, the U.S. wind industry's relative competitive position will be eroded. This will leave the significant economic benefits of wind energy technology manufacturing to our global competitors.

Therefore, the nation should expand public-private wind technology advancement activities through the states and the U.S. Department of Energy's Wind Energy Program, and focus efforts on such issues as improvements in manufacturing processes; continued advances in wind technology; increased characterization and pursuit of offshore wind potential; analysis and demonstration of the integration of wind production with other conventional and renewable energy resources; and outreach to regional, state and local stakeholders to facilitate understanding and acceptance of wind power. These efforts should also encourage the coordination of power system operating responsibilities over larger areas to take advantage of geographical and temporal diversity in wind resources and electricity demand, and provide access to a wider range of generating resources.

The nation's knowledge base and capability in wind power is a major national asset. This asset has substantial public- and private sector components. It spans a spectrum from basic science to sophisticated proprietary products, with the former residing in the public domain at the National Laboratories and in state-based academic institutions, and the latter residing in industrial firms. Between these two end points is a wide range of knowledge and technology in which all three of these sectors are involved to varying degrees. If the nation is to continue as a leader in the expanding wind business, it is essential that

this national asset be maintained and advanced. Other nations in Europe and Asia recognize this reality, and are making substantial ongoing investments to maintain their own positions in wind power. We must do the same in the United States.

Fortunately, the passage of the *Wind Energy Research and Development Act of 2009* (H.R. 3165) by the U.S. House of Representatives in September 2009 offers the right approach to ensuring America's wind energy leadership and advancing the benefits of renewable energy green job creation. The governors strongly support the priorities of this legislation and encourage the U.S. Senate and the Administration to provide their full support to authorize the nation's first comprehensive program to improve the efficiency, reliability and cost effectiveness of domestic wind energy systems. This legislation addresses essential research and technology transfer priorities identified by the governors and others, including:

- ▶ Examination of new materials and designs to make larger, lighter, less expensive, and more reliable rotor blades;
- ▶ Advancement of technologies to improve gearbox performance and reliability;
- ▶ Creation of systems that provide automation, materials, and assembly of large-scale components;
- ▶ Creation of low-cost transportable towers greater than 100 meters in height;
- ▶ Development and transfer of advanced computational modeling tools, control systems, blade sensors and advanced generators;
- ▶ Innovation in the area of wind technology for offshore applications;
- ▶ Advancement and transfer of methods to assess and mitigate the effects of wind energy systems on radar and electromagnetic communications;
- ▶ Development of cost-effective wind turbines with a maximum electric power production capacity of 100 kilowatts or less; and
- ▶ Improvement and demonstration of technologies to improve transmission from remotely located renewable resource rich areas.

Offshore wind research and development is included in the legislative recommendations above. However, the Coalition believes this is a critically important new program area and deserves more explicit support. If the nation is to meet the goal of providing 20 percent of its electric needs by 2030 and realize wind's potential for even greater contributions, it must develop and use wind energy resources along our coastlines and the Great Lakes as well as its land-based resources. In addition to necessary work on advanced turbines and



other technologies, there is a lack of research funding to support development and demonstration of turbine foundations and mooring systems designed for the deep offshore environment. Transmission networks that can be placed off shore to connect off shore wind plants to land-based transmission system also need to be designed and evaluated. Strong support for addressing these needs is important to the governors and to the nation's success in advancing wind energy.

The recommended funding level for these critical program elements, as well as a related demonstration program to prove the feasibility of advanced off shore wind systems and evaluate wind plant performance, is not less than \$500 million each year. It is a credit to the federal wind energy program, many states, and the industry that significant contributions to the advancement of the technology have been made despite extraordinarily low funding levels. However, the result of a lack of reasonable funding for this critical energy source is that other nations are moving quickly to gain dominance — and in some cases are succeeding — in this field. Key economic competitors include Asian and European nations that are investing considerably more in wind power than the United States.

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The proposed legislative program above builds on the current federal wind program operated by the U.S. Department of Energy. One valuable area not addressed specifically by the Wind Energy Research and Development Act of 2009 is collaboration with the states. As long-time leaders in the funding and development of innovative wind energy policies and demonstrations, the states are ready partners that can aid the U.S. Department of Energy and industry in more rapidly achieving shared wind energy development goals. The Coalition believes the federal government must work with the nation's governors and relevant states as public interest partners if we are to reach our nation's full wind energy potential and grow our economy. Specifically, we recommend that the U.S. Department of Energy take the following steps in putting a collaborative state-federal program into action:

- **State Wind Energy Working Group.** The U.S. Department of Energy should support and participate in a State Wind Energy Working Group to identify near- and medium- term actions that can be taken by the Department and the states to advance wind energy technologies. States are unique partners for the Department of Energy since they share similar public interest goals and have capabilities that differ from the private sector. Potential action areas would range from policy and regulatory best practices identification and transfer to identification of high-priority baseline natural resources studies and wind energy research, demonstration and outreach projects for groups of states or regions.
- **State Wind Energy Technology Collaborative.** The U.S. Department of Energy should support a multi-state process to identify priority wind energy demonstration, analytical, and outreach activities. In coordination

with the State Wind Energy Working Group, the U.S. Department of Energy should create a competitive process targeting state entities to obtain cost-share funding for high-impact technology advancement initiatives. The unique feature of this collaborative approach is focusing on the needs and contributions of the states in ways that help the Department reach national research, development, and deployment goals. This collaborative approach engages states in a true partnership with the federal government in a way that allows for combined public interest funding — state and federal — to advance technology and development. This multi-state and regional process affords opportunities that are not likely to surface in typical solicitation processes that do not reflect the federal-state relationship in energy programs and policy. The recent U.S. Department of Energy initiatives in testing facilities for large, state-of-the-art wind turbine blades and high power drive trains are welcome examples of this approach.

- ▶ **State - Federal Workforce Development Initiative.** Both federal and state officials are preparing — in the case of some states operating — programs to enhance the consistency and offering of wind-related workforce training and staff development. The American Recovery and Reinvestment Act (ARRA) provided substantial resources for green job training, and many states are moving to expand programs using their own resources as well as pending federal funding from a variety of sources. In addition, the wind industry has been working to address worker training to ensure component quality, maintenance capability, and worker safety. The Coalition recommends establishing a public-private working group to not only bring focus to potential state and federal actions in this area, but to identify collaborative opportunities and act in support of wind workforce development now. The purpose of the working group would be to identify key areas for action and a set of recommendations for consideration by the U.S. Department of Labor and U.S. Department of Energy, as well as relevant state entities (e.g., governors' offices, universities, vocational institutes). The mid- and long-term recommendations would be aimed at better synchronizing state programs, training certification efforts, and training and development programs.

Extend the Treasury Department Grant Program Created by the American Recovery and Reinvestment Act and Adopt a Long-Term Renewable Energy Production Tax Credit with Provisions to Broaden the Pool of Investors Eligible to Participate

An extension of the Treasury Department grant program is necessary while financial markets continue to recover. The grant program has been proven to provide a strong stimulus for completing wind projects in 2009. Over the longer-



The current production tax credit serves as financial recognition of the environmental and energy-security benefits of wind power.

A long-term extension of the credit would offer a key incentive for market stability.

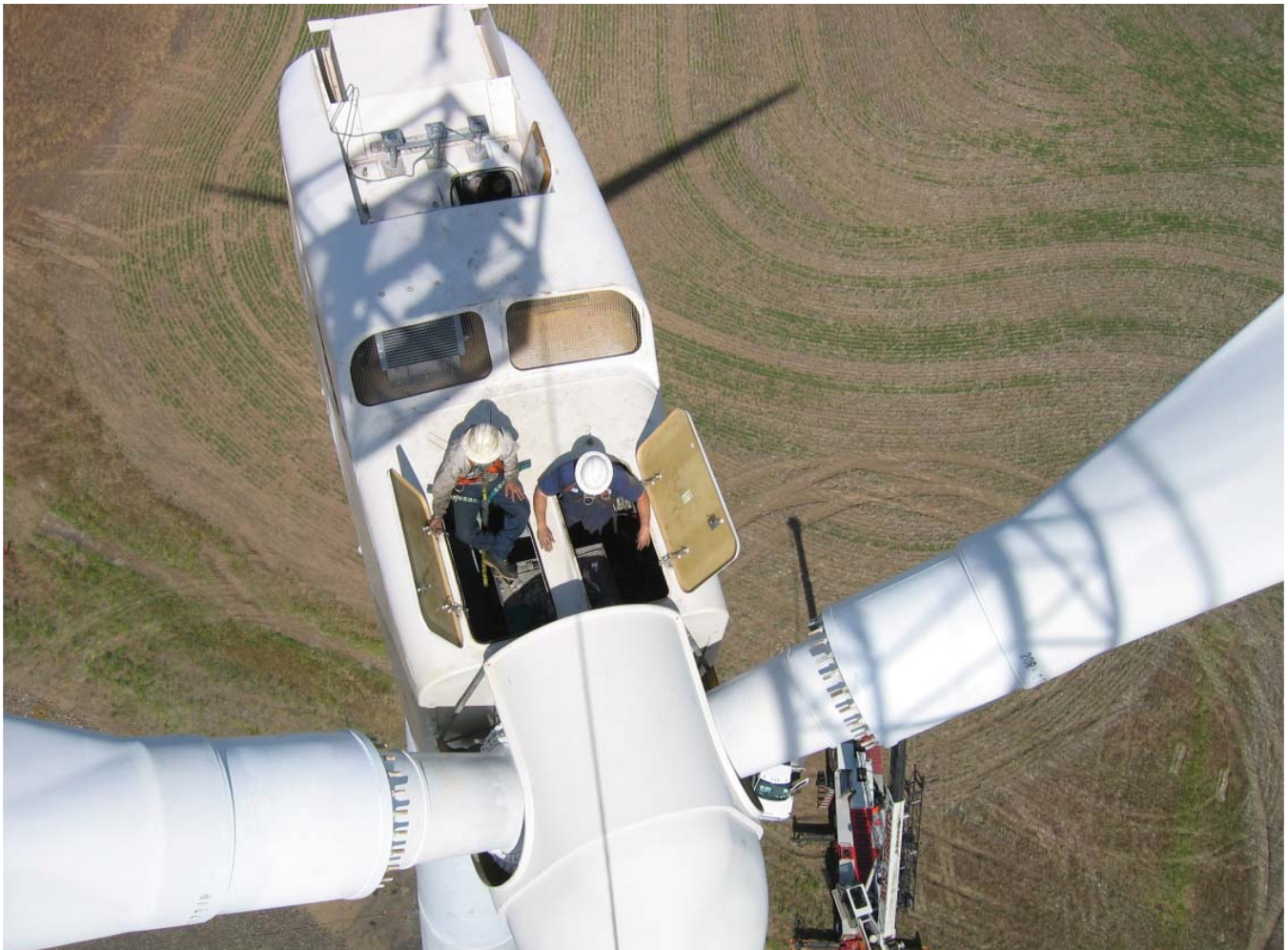
term, the Production Tax Credit, which has been the primary federal incentive for wind energy, should be extended for at least five years to provide a stable incentive for wind energy investment. The recent history of short-term extensions of the credit is an example of the absence of long-term energy policy in our nation that has caused the loss of manufacturing capacity to foreign competitors.

The current production tax credit serves as financial recognition of the environmental and energy-security benefits of wind power. In order for the wind production tax credit to have the desired effect, it must continue for a period of five years or more so that investment decisions are made in favor of establishing or expanding wind component and turbine manufacturing capability here in the U.S. Existing U.S. manufacturing facilities in the nation — some of which are idle today because of the contraction or demise of other industries — can be adapted to production in support of the wind business. But this will not happen without reasonable assurance of market stability over a several year period. A long-term extension of the credit would offer a key incentive for market stability. Reforms are also needed to broaden the pool of investors who can participate in wind energy financing and take advantage of tax incentives for doing so. As the nation's economic crisis has shown, it is not wise to have an industry reliant on such a limited number of investors for such a large share of financing.

Historically, this tax credit could only be used by entities that pay significant income taxes to the federal government. In the current economic climate, the number of financing entities in this category has decreased substantially. Indeed, some of the major traditional financing partners have recently disappeared or are in the midst of painful restructuring. The governors applaud the Administration and Congress for modifying the tax credit as part of the ARRA to provide an alternative cash-based incentive. This grant-in-lieu of tax credits should be extended until substantial recovery of the nation's economy has occurred.

CONCLUSION

Many challenging economic and environmental issues confront the nation today. These recommendations address the nation's economic and environmental challenges immediately. The long-delayed passage of a renewable electricity standard will guide the expansion of the nation's transmission system, unite the nation's state regulators in implementing a national requirement, and stimulate significant local renewable energy generation development — all of which will create major investments in our states and address the economic and energy challenges we face as a nation.





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