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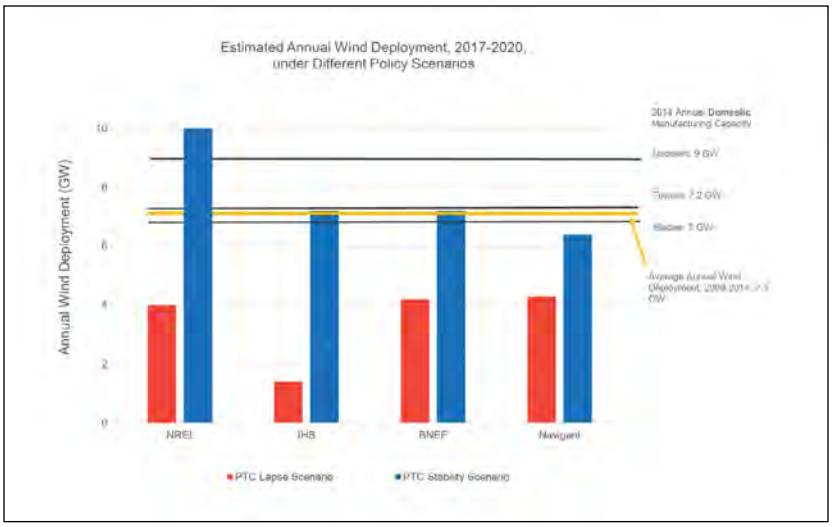
WIND ENERGY AND THE PTC: SUSTAINING AN AMERICAN SUCCESS STORY

By AWEA



The United States leads the world in wind energy generation, driven by the innovation and productivity of American workers and businesses. American wind energy now supports 73,000 direct jobs in 50 states and produces enough electricity to power the equivalent of over 18 million homes with a reliable, stably priced source of electricity. The renewable energy production tax credit (PTC)[1] plays a key role in unleashing that productivity by encouraging private sector investments. Federal policy plays a critical role in the wind industry's decisions to make long-term investments in U.S. manufacturing facilities, research and development, and worker training to create the modern American wind industry. However, near-term uncertainty about the PTC puts those investments and the gains they have achieved at risk.

Recent analyses from a range of independent experts paint a clear picture of the crossroads facing U.S. policy makers. In the first scenario, an extension of the PTC enables the private investment needed for the U.S. wind industry to make the further gains in productivity needed to achieve cost-competitiveness with more traditional sources of electricity. Commercial, industrial, and residential consumers will have greater access to reliable, stably priced, non-polluting, and domestic wind energy for decades to come. In the second scenario, the PTC remains expired, not only dissuading the private sector from making further investments, but also forfeiting the progress and cost reductions that have been achieved so far by forcing U.S. wind turbine manufacturers to relocate factories and jobs overseas in search of more stable markets. These diverging paths lead to dramatically different outcomes for America's economy and the diversity of our energy mix.

U.S. WIND INDUSTRY AT A CROSSROADS

Independent experts have determined that the future of the U.S. wind industry hinges on the fate of the renewable production tax credit, particularly over the next five years.

Estimated annual wind deployment under different policy scenarios, 2017-2020:

EXPERT ANALYSIS	POLICY STABILITY	POLICY LAPSE
NREL [1]	10 GW/ year	4 GW/ year
HIS [2]	7.2 GW/ year	1.4 GW/ year
BNEF [3]	7.2 GW/ year	4.2 GW/ year
Navigant [4]	6.4 GW/ year	4.3 GW/ year

[1] This paper refers primarily to the PTC for simplicity. However, the ITC in lieu of the PTC is a valuable and effective policy option, especially for offshore wind energy projects.

THE PTC: AN AMERICAN SUCCESS STORY

America leads the world in wind generation in large part because we have performance-based incentives like the PTC, as well as excellent available wind resources. Like other pro-growth policies, the PTC allows private companies investing in America's future to reduce their tax burden.

Despite periodic expirations, the PTC has been a tremendous success as the primary policy support for wind energy development over the years. It has bipartisan support in Congress, as well as high levels of popular support. Without the PTC, the benefits described here would not have been realized.

For every kilowatt-hour (kWh) of electricity sold, a wind project owner receives a tax credit (presently valued at 2.3 cents per kWh) over the first 10 years of operation. The credit is indexed for inflation. Taxpayers have the option of electing an investment tax credit in lieu of the PTC for any PTC-eligible project.

The PTC is a production-based tax credit provided to a variety of different renewable electricity sources.

New nuclear energy facilities are also eligible for a production tax credit under a separate section of the tax code. Congress designed the PTC as a performance-based incentive such that the credit can be taken only if and when actual electricity is produced. The structure of the PTC has been an efficient way to drive the innovation needed to bring costs down.

The value of the tax credit flows ultimately to homes and businesses in the form of lower electricity costs. Typically, a utility will choose to either build wind energy or procure the output from a wind farm through a long-term contract. Sellers of wind power compete to sell at the lowest price, and the utility will typically choose the lowest priced option, while meeting its other criteria. The PTC makes this option attractive for many utilities. Once the utility takes the power, it serves its retail customers. The cost of its power whether from wind, gas, coal, or other sources are typically passed on to retail customers per state regulatory policy as overseen by state regulatory commissions. The cost that is passed on is lower when the PTC is in place. Due to the competitive nature of the wholesale electric power market, nearly the full amount of the PTC is typically passed on to retail customers. [5]

The PTC could be even more effective at reducing costs for American consumers. Due to certain restrictions in the PTC's design, many wind companies rely on relatively expensive tax equity investors from Wall Street to fund projects. With small changes to the tax code, such as the very effective approach that is used for the low income housing tax credit, Congress could reduce the cost of wind energy for ratepayers even more without increasing the government cost of the PTC.

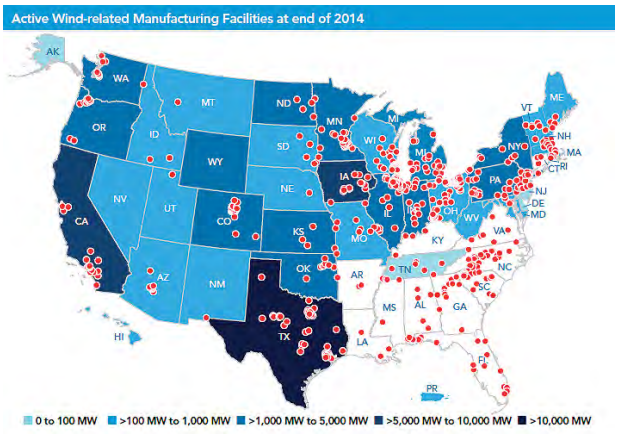
THE IMPORTANT ROLE FOR THE PTC

Correcting for market failures

The renewable energy PTC helps correct for flaws in our electricity market design that do not value wind's benefits for protecting public health and the environment. Wind energy creates billions of dollars in economic value by drastically reducing pollution that harms public health and the environment [6], but those benefits are not accounted for in our current electricity market. A report released last month calculated that a wind deployment scenario to reach cost parity would provide $108 billion in public health benefits by reducing illness caused by pollution and preventing 21,700 premature deaths [7]. Policies such as the PTC correct for costs and benefits like these that are not accounted for in our current electricity market to reach a more efficient market.

Wind energy also protects consumers against fuel price increases. Wind is one of the only resources that can lock in its cost of energy for 20 years or more, as wind has no fuel cost and therefore no fuel price risk [8]. However, the value of securely priced energy is not accounted for in our electricity market. Like buying an insurance policy or paying more for a fixed-rate mortgage, consumers understand the value of protecting against unexpected costs. However, our current electricity market does not pay energy sources for providing this stability, and as a result most power plants do not provide it, making consumers worse off. Policies like the PTC recognize the benefits of volatile energy sources with less volatile prices and result in a more efficient market outcome.

Recent analysis indicates that the value of the PTC almost perfectly corrects for those unpaid benefits, bringing the market to a more efficient outcome [9].

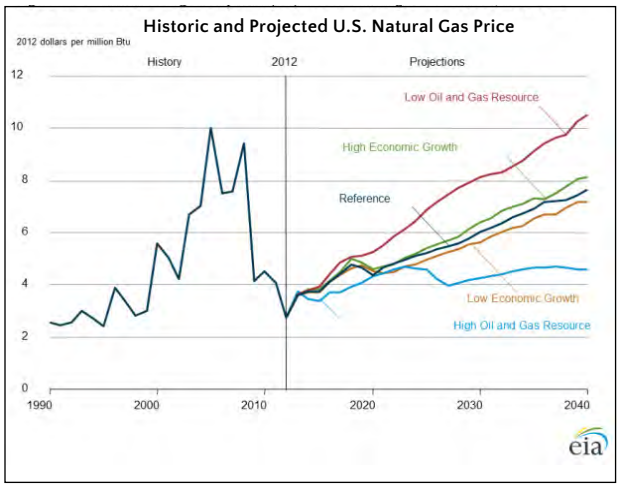


Driving technological progress that benefits society

As described, the PTC plays a critical role in driving wind energy deployment and providing the industry with the certainty needed to make investments in R&D, manufacturing capacity, and worker training that reduce the cost of wind energy. Using deployment to drive cost reductions for emerging technologies is well-established as an appropriate role of government policy. Many of the energy technologies available today were also driven by deployment-focused government policies, such as the Section 29 production tax credit for shale gas. As the wind industry has matured, it has transitioned from government-funded R&D to deployment as the key driver of continuing cost reductions.

The wind industry needs policy stability to make the investments necessary to bring the next two design cycles of wind turbine technology to market. It typically takes the wind industry about two to three years to complete a design cycle and bring the next evolution of wind turbine design to market, and industry experts believe that only two such cycles will be needed before wind technology achieves cost parity; however, variability in natural gas price forecasts could impact that timeline.

The wind industry is developing technologies to access wind resources at higher altitudes, which could open up wind development in areas that have not seen large amounts of wind deployment to date. Most of the country has excellent wind resources at altitudes above 140 meters (about 459 feet) [10]. For this reason, the Department of Energy's recent analysis found that as further reductions in wind energy cost are achieved, significant wind deployment could occur in all 50 states, with new development possible in the Southeast, Great Lakes, and Northeast states [11].



While these regions already benefit from thousands of wind industry manufacturing jobs, they are poised to see even greater benefits from wind plant construction and operations jobs, land lease payments, property tax revenue, and reduced electricity costs as they increasingly become home to wind energy deployment. However, stable policy is necessary for wind turbine manufacturers to invest in the employees and facilities needed to design and build that next iteration of wind turbine technology that will make that deployment possible.

Creating a more diverse, secure, and resilient energy mix

The price of natural gas, which is used to generate more than a fourth of the nation's electricity, has been volatile in recent years and is currently at an unusually low level [12]. America has been lulled into complacency during temporary downturns in energy prices before, believing cheap energy would last forever, only to be hit harder each successive time when energy prices inevitably increased. Smart energy policy can help us avoid falling into this trap as we have before by ensuring that America maintains a diverse portfolio of energy options.

The wind industry, like all electricity sources, has been significantly affected by the current downturn in natural gas prices. While the wind industry is 32 percent ahead of the aggressive cost reduction projections and 27 percent ahead of the wind deployment projections made in the industry's 2008 roadmap, released by the Bush Administration's Department of Energy [13], abnormally low power prices driven by the downturn in natural gas prices have kept the industry from reaching widespread cost parity. Smart energy policy should take the long view, despite volatility in energy prices, and help maintain a diverse portfolio of energy options. As highlighted here, fuel-free wind energy is uniquely well positioned to reduce America's vulnerability to energy price increases and volatility, as one of the only resources that can lock in its cost of energy for 20 years or more with no fuel price risk. Without stable policy, America is taking the risk that the wind industry will not be there when needed amidst energy price increases.

This highlights the critical choice facing this Congress. With stable policy for a finite period, American ingenuity and productivity will continue to reduce the cost of wind energy and expand our international leadership in designing and building technologies to tap America's world-class resources of stably priced wind energy to diversify our energy mix.

THREE REASONS PTC POLICY STABILITY IS NEEDED

Three key factors explain why the outcomes between the policy certainty and policy lapse cases are so divergent:

Policy stability enables deployment and investment that drive further reductions in the cost of wind energy

Stable policies that encourage private-sector deployment of wind energy drive reductions in wind energy costs, which enables further deployment, which further brings down costs, and so on.

Researchers at Lawrence Berkeley National Laboratory (LBNL) have documented the five main ways in which policy stability drives reductions in the cost of wind energy:

1. More-efficient labor deployment and greater investment in supply-chain capital including lower risk premiums for manufacturing investment.
2. Enhanced private R&D expenditures that improve wind technology.
3. Cost savings from a de-linking of U.S. prices to the Euro-U.S. dollar exchange rate, due to increased domestic manufacturing.
4. Transportation savings created by increased domestic manufacturing of turbines and components.
5. Reductions in other project development and financing costs that are currently inflated due to rushed development schedules [14].

The 2005 and 2009 PTC extensions[2], which were unique because the tax credit was extended for a roughly three-year period versus the one- and two-year extensions of recent years, provide a glimpse of what can be achieved with relative policy stability.[3]

Industry responded by investing in a domestic wind industry supply

[2] For a history of PTC extensions, see http://energy.gov/savings/renewable-electricity-production-tax-credit-ptc.

[3] For further discussion of why short-term PTC extensions are less beneficial for cost reductions, see page 3 at http://www.nrel.gov/docs/fy14osti/61663.pdf: "Most notably, short-term planning timeframes associated with PTC uncertainty can discourage investments in domestic manufacturing capacity, deployment capability, component orders, and private sector research and development."

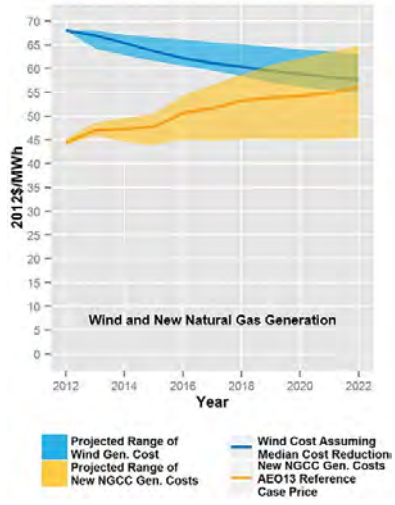
chain of more than 500 manufacturing facilities and 73,000 workers that now builds over 60 percent of the value that goes into U.S. wind projects here in America. As predicted by the LBNL researchers, these policy-enabled investments achieved dramatic cost reductions through economies of scale, technology improvements, and a reduced need to import components.

The cost of wind energy fell by more than half over the last five years, bringing the wind industry a significant distance down the road to achieving cost parity. The key now is staying on that cost reduction trajectory — by maintaining the policy stability that made it possible — so that cost parity can be reached.

Wind energy is not yet at cost parity in most regions of the U.S., but the goal is coming into focus

With the dramatic cost reductions of more than 50 percent achieved over the last five years, the U.S. wind industry is moving closer to achieving cost parity with other sources of electricity in a few particularly windy parts of the country, but there is still work to be done to reach the national deployment consumers expect. As shown in the National Renewable Energy Laboratory chart [15], an additional 10-30 percent reduction in the cost of wind is all that is needed to achieve cost parity by 2020 in many parts of the country, depending on the price of natural gas. The future cost of gas generation varies considerably depending on assumptions about natural gas prices.

Cost parity is not achievable without stable policy. Additional cost reductions may have been possible if policy interruptions in 2012 and 2014 had been avoided by Congress. Industry experts have documented that these cost reductions are achievable by approximately 2020, if the private sector has the policy stability that is necessary to continue critical investments in R&D, manufacturing capacity, and worker training [16]. Continued cost reductions, gradual fuel price increases, and growing utility interest in carbon-free power could drive to a more stable market in the 2020s in which wind energy can compete and succeed without today's incentives.



The "Historic Impact of Production Tax Credit (PTC) Expiration" chart also explains why failing to extend the PTC would lead the U.S. wind industry off a cliff. Because wind energy is not yet at cost parity in most parts of the country, the $23/MWh PTC is essential for driving the wind energy deployment that in turn drives further cost reductions. This explains the divergent outcomes seen in the policy stability versus the policy lapse cases. The "Historic Impact of Production Tax Credit (PTC) Extension" chart provides even more compelling evidence of what will happen if the PTC is allowed to lapse, based on historical experience.

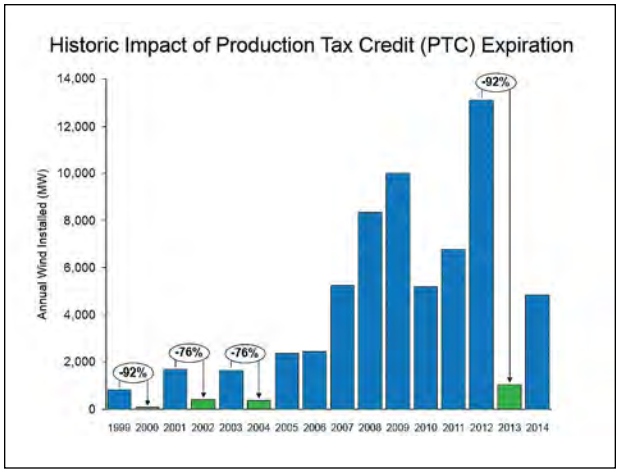
As illustrated in the "Estimated annual wind deployment under different policy scenarios, 2017-2020" graph, wind deployment dropped precipitously in years when the PTC expired. Even the risk of expiration scares private sector investment in manufacturing facilities, R&D, and worker training away from the U.S. in favor of other countries with greater policy stability. The PTC lapse at the end of 2012 resulted in the loss of nearly 30,000 wind industry jobs [17]. Without ongoing deployment, the virtuous circle of wind deployment driving cost reductions is reversed, with falling deployment causing the industry to withhold investment, which causes the cost of wind to increase, which further harms deployment. Not only does a PTC lapse threaten future wind cost reductions, but many of the cost reductions achieved to date could also be reversed.

Without policy stability, U.S. wind manufacturing will move overseas, forfeiting cost gains achieved to date

As stated previously, analysts project that without the PTC, wind deployment would stagnate at a few GW per year. This level of deployment is insufficient to keep America's wind energy supply chain in business. Some level of deployment would continue, but most of the turbines and other wind plant components would likely be built overseas, resulting in layoffs of American workers.

As of the end of 2014, the U.S. domestic supply chain had the capacity to produce 7 GW of blades, 7.2 GW of towers, and 9 GW of nacelles annually [18]. All projections for deployment levels without the PTC are less than half of this amount.

As shown in the "Active wind-related manufacturing at the end of 2014" map, tens of thousands of jobs and over 500 manufacturing facilities operating today in four states are at risk in such a scenario.



The wind industry currently provides 73,000 full-time direct jobs, with tremendous resources invested in training these workers and building these facilities to achieve the cost reductions attained so far.

The wind industry has annual wind deployment thresholds below which it cannot sustain large-scale U.S. manufacturing or maintain economies of scale. If the wind industry drops below those levels, even briefly, the domestic supply chain and the cost reduction benefits it has produced to date can be lost. The wind industry depends upon a network of products and services suppliers that could easily collapse during even a brief downturn. Those suppliers would be forced to shut down or shift to other product lines, and many of the investments, knowledge, and skills gained so far, would be forgone.

As explained in NREL's recent analysis, "reductions in demand can be expected to translate relatively rapidly into factory closures and job losses. The effects of reduced demand for 2013 equipment deliveries became evident as early as 2012 as year-over-year employment in wind manufacturing fell by nearly 5,000 workers, and 12 facilities exited the U.S. wind market." Wind industry-wide employment dropped by 30,000 jobs in 2013, largely as a result of the PTC lapse at the end of 2012.

These three factors explain the wide divergence between the policy stability and policy lapse scenarios shown. The positive circle of deployment driving cost reductions driving deployment has been a strong driver of cost reductions, but it can work just as strongly in the other direction if deployment falters before cost parity has been reached. The slope of cost reductions is steep, which offers either tremendous promise or tremendous risk depending on whether you are going up or down that slope.

America's energy future is at a crossroads. The choice is whether to renew the PTC to finish the job of achieving cost parity for wind energy after having made so much progress, or to abandon all of that and the trajectory of continuing cost reductions.

THE BENEFITS OF ACHIEVING COST PARITY FOR WIND ENERGY

Achieving cost parity for wind energy would provide a number of benefits to America's economy and consumers. Comprehensive analysis released in March [19] compared a scenario in which wind energy is deployed at sufficient scales in the near-term to reach cost parity, versus a scenario with far lower deployment. The wind deployment and cost parity scenario would create 600,000 domestic jobs, while also saving consumers $150 billion on their electric bills through the year 2050 by further reducing wind costs and decreasing our reliance on more expensive energy sources. By using more stably priced wind energy, electricity prices would be 20 percent less sensitive to fuel price fluctuations, protecting consumers against unexpected fuel price spikes. American homes and businesses would save $280 billion through 2050 from reduced natural gas costs. Public health costs would also be reduced by hundreds of billions of dollars as wind energy helps keep our air and water clean.

Wind energy would continue to emerge as a powerhouse of the American economy. Wind energy would contribute $30 billion per year to the American economy by the 2020-to-2030 time period, and $70 billion per year by 2050. Wind energy would also generate $1 billion in annual lease payments to private landowners, and more than $3 billion in annual property tax payments under this scenario.

The analysis found that achieving this future costs nothing in the long-run, with only a small investment required in the near-term. While wind energy does cost slightly more than the alternatives in the early years, near-term policy support can bridge that gap by driving greater wind deployment that leads to further wind cost reductions, as explained here. Combined with the increasing cost of other fuels, this allows wind to emerge as the lowest cost option.

In return for investing pennies per monthly household electric bill during the early years when the cost of wind is higher, consumers get paid back $150 billion in savings over the long-term. As an added return for this investment, America gets hundreds of thousands of jobs, billions of dollars in local economic development, and cleaner air and water.

CONCLUSION

The PTC has been an effective, market-based policy that has enabled renewable energy development to meet the demands of American consumers. While successful, however, the policy is still needed to encourage private sector investment in an industry that is still a relative newcomer when compared to traditional sources of energy. With adequate policy support, the U.S. wind industry will continue to promote economic development, diversify our energy portfolio, strengthen our energy security, and ensure that future generations have access to clean air and water.

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THE COMING SHORTAGE OF QUALIFIED WIND TECHS

By Shawn Lamb, CEO of Danish Wind Power Academy's U.S. Operations

The 2014 report by European Wind Energy Association (EWEA) titled "EU Wind Industry Faces Critical Worker Shortage" [1] has identified a deficit in the EU of 7,000 qualified wind workers per year until 2030, after which the deficit will more than double to 15,000 workers per year. This report echoes a similar problem that we will face in the U.S. and Canada. According to the U.S. Bureau of Labor Statistics' (BLS) website [2], the "employment of wind turbine service technicians in the U.S. is projected to grow 24 percent from 2012 to 2022, much faster than the average for all occupations." The BLS also stated that "the number of wind turbines being installed is increasing, which should result in consistent and growing demand for wind techs. In fact, some areas have reported a shortage of qualified workers."

Recently, President Obama announced a strategic carbon reduction plan that includes a large ramp up of wind turbine assets in the U.S. The Department of Energy (DOE) has published its Wind Vision report [3] that includes a projection of 30 percent generated wind power by 2035. If the coming shortage of qualified wind workers is not fully addressed by industry, government, and academia, it may grind these plans to a halt before they have a chance to really get off the ground. A long-term and comprehensive strategy has to be developed and implemented in order to prepare for the shortage in qualified techs.

There are various reasons for the coming worker shortfall that include the rapid expansion of new installed capacity over the last decade, worker demographics (retirement), the boom-bust cycles associated with the U.S. wind market, recruiting in remote locations, and the attempted commoditization of the industry.

In the U.S., the renewal and non-renewal cycle of the PTC has caused many companies to downsize during "non-PTC" years. This boom-bust cycle should have many qualified techs sitting idly by, waiting to be called up for duty. In reality, this is not the case, since most experienced wind techs who have built up enough skills to work outside of wind do not return to the industry. Many skilled workers are staying with more stable industries, such as medical, oil and gas, or aviation. According to Charles Clayton, the training manager for Suzlon, "We see no excess availability because those guys are so well 'systems-trained,' and they go on to other industries."

In general, there is a major brain-drain of skilled workers retiring in the U.S. and Canada. Many experienced power plant operators and experts are leaving the workforce in droves with fewer people to replace them. The days of grabbing anyone who can fog a mirror and pump grease are over. The responsibility of operating a multi-million dollar, highly-automated, robotic power plant is huge. In regard to the challenges associated with finding qualified workers in Canada, Mike Doherty, the director of Learning and Continuous Improvement for Shermco Canada, said, "It is a massive business issue for wind or any industry to get qualified technical staff. Even the 55- and 60-year-old folks now will be retiring in the next five or 10 years, and there will be a massive grab of workers that must be developed for the long-term.

"Within any industry, training and development is key to retention, but there has been an attempt by some wind companies to commoditize this industry by hiring cheap labor and not developing them beyond basic safety standards in order to win bids for contracts. This leaves techs feeling uncommitted and just waiting for the chance to jump ship to a better company where they see a long-term career. According to Doherty, "Your best people are going to go where the best jobs are."

The remote locations of wind farms can also add to the problem of finding qualified workers in the wind industry. Many managers within remote locations will hire someone based on some electrical or mechanical background and a good work ethic. According to Sandeep Sharma, the senior manager of Renewables for Capital Power, "We are hiring for success, not failure. We need a little bit more effort to ensure that our employees are successful in remote locations." These are all issues that lead to worker attrition and must be factored into addressing the coming shortfall of qualified wind workers.

Addressing each one of the causes for the worker shortfall in isolation will still only solve part of the problem. A comprehensive action plan has to be implemented by the wind industry, government, and academia and should include improvements in workforce development, education and training, recruitment, and retention in order to get ready for the massive shortage of qualified wind workers that is approaching in the near future.

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