



## ISSUE BRIEF

# ADVANCES IN WIND POWER TECHNOLOGY MEAN INCREDIBLE OPPORTUNITIES FOR CLEAN ENERGY ACROSS ALL REGIONS



## SOON, INNOVATION WILL BRING COST-EFFECTIVE, POLLUTION-FREE ELECTRICITY TO EVERY STATE

Improved wind power technologies, already widely used in Europe, can cost-effectively open huge swaths of the nation to wind power development, according to a new U.S. Department of Energy report titled *Enabling Wind Power Nationwide*.<sup>1</sup> These technologies include taller turbine towers of 110 meters<sup>2</sup> and higher, more powerful rotors, and American digital innovations too new even to have been included in the report, such as General Electric's recent Digital Wind Farm package that can increase output by as much as 20 percent.<sup>3</sup> These new approaches would allow the United States to use the wind to reliably power the nation more than eight times over, and, in the next decade, make every state a producer of economical, pollution-free wind power.<sup>4</sup>

These advanced technologies can produce no-carbon electricity, to be sure. But they also create good-paying jobs, substantial water savings, significantly increased economic growth, and lower energy prices. Add to that: cleaner air and resulting savings in medical costs and, most importantly, lives. Smart federal and state policies have helped drive these advances<sup>5,6</sup> by spurring demand, creating long-term certainty in the marketplace, and increasing investment in new technologies. Continuing such policies,

including the currently-expired federal Production Tax Credit (PTC) for wind power, and promoting new ones, such as the proposed federal renewable electricity standard (S. 1264, the Renewable Electricity Standard Act) and the EPA's Clean Power Plan to cut carbon pollution from existing power plants, can further propel the domestic wind power industry forward, in both the United States and international markets.

## NEW TECHNOLOGIES INCREASE BY MORE THAN HALF THE LAND AREA CURRENTLY AVAILABLE FOR WIND POWER DEVELOPMENT

Large sections of the country once considered unproductive for wind power development can now take advantage of tremendous wind-power resources.<sup>7</sup> These areas include the Ohio River Valley, the Great Lakes, the Northeast, the Pacific Northwest, the Southeast, and large sections of the interior West. Moreover, utilizing these resources will make our energy grids more reliable and better able to meet peak-load demands.

## EVEN THE SOUTHEAST CAN BECOME A SUBSTANTIAL WIND-POWER GENERATOR

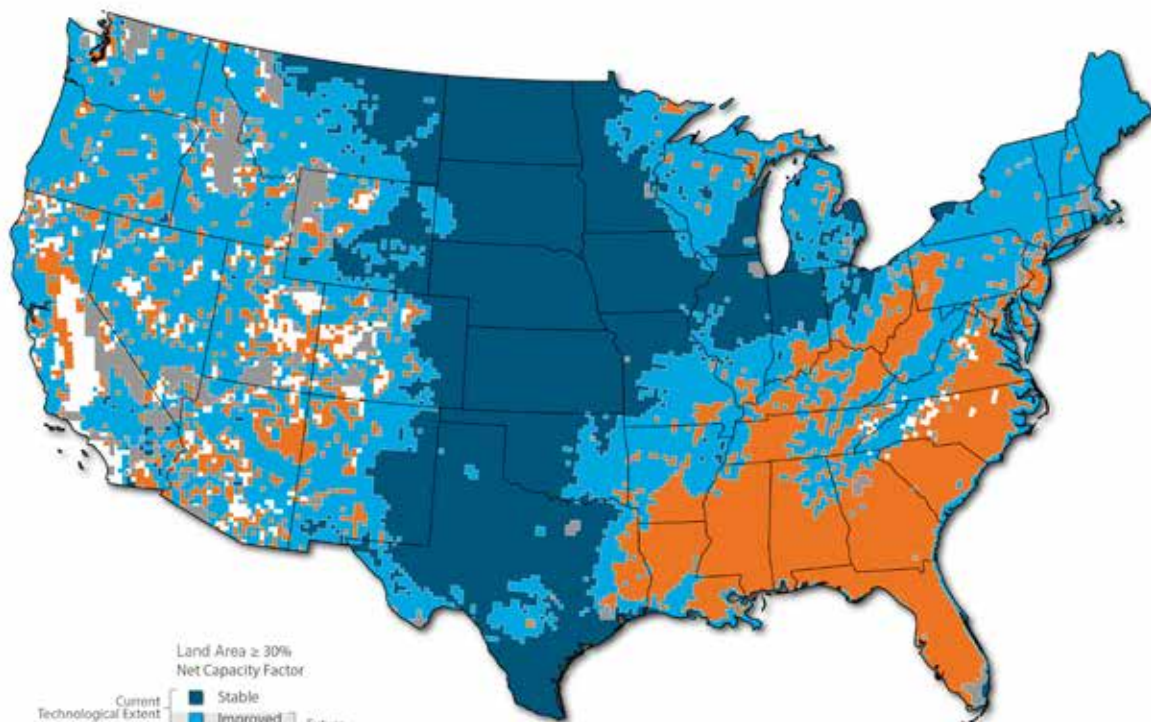
To date, the country's least accessible wind power resources have been located in the Southeast.<sup>8</sup> But current technologies can enable wind power development in Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia. Using just 5 percent of the potential for 110-meter towers, for instance, Arkansas can meet 70 percent of its current electric needs using wind power. Louisiana could generate close to 20 percent and Tennessee could meet 11 percent.<sup>9</sup> New, 140-meter turbine towers—now used in Europe<sup>10</sup> and likely to be deployed in the United States in five to ten years—can open virtually all of the Southeast to wind power.

## NEW TECHNOLOGIES ARE BEGINNING TO BE USED NOW

U.S. wind power developers are designing wind power projects that utilize these new, taller towers. Assuming the reauthorization of the Production Tax Credit for wind power, projects using 120-meter turbine towers will likely be developed in the next one to three years,<sup>11</sup> according to an industry source.

## SMART POLICIES HAVE DRIVEN INCREASES IN DEPLOYMENT, EMPLOYMENT, AND DOMESTIC MANUFACTURING

Thanks to smart federal and state policies, wind power development in the United States has increased exponentially over the last decade. In 2004, wind power supplied less than 0.5 percent of the nation's electricity.<sup>12</sup> In 2014, that number was almost 5 percent,<sup>13</sup> with wind power projects taking root in 39 states.<sup>14</sup> As the share of domestically manufactured wind power components increased to approximately 70 percent in 2012–2013<sup>15</sup>—up from only 20 percent in 2006–2007<sup>16</sup>—wind power employment has averaged 73,000 Americans between 2010 and 2014,<sup>17</sup> including jobs at 560 manufacturing facilities in 43 states.<sup>18</sup> Continuing wind power deployment can add 600,000 jobs by 2050,<sup>19</sup> according to the U.S. Department of Energy. Many of these jobs can bolster the nation's floundering manufacturing sector and offer well-paid opportunities to Americans with high school diplomas.



This map illustrates general wind resource potential only and is not suitable as a siting tool. More detailed site and wind speed data, as well as coordination with relevant authorities, are needed to thoroughly evaluate appropriate wind energy development at any given location.  
Data sources: AWS Truepower, National Renewable Energy Laboratory

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy, March 2015



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## **THE U.S. WIND INDUSTRY CAN BECOME INCREASINGLY COMPETITIVE IN THE GLOBAL MARKETPLACE**

In 2013, experts estimate, global wind energy investment ranged from \$70 billion<sup>20</sup> to \$130 billion.<sup>21</sup> That number is expected to rise to between \$101 billion<sup>22</sup> and \$250 billion in 2020,<sup>23</sup> with wind power development increasing significantly on virtually every continent. Areas of substantial growth will likely include Mexico, Brazil, South Africa, India, and China. To safeguard and advance the U.S. industry's growing presence in the burgeoning international market, with \$422 million in exports in 2013,<sup>24</sup> we must buttress a domestic market for advanced technologies that will soon be in high demand worldwide.

## **ADVANCED TECHNOLOGIES HELP PROTECT WILDLIFE AND SIGNIFICANT LANDSCAPES**

Because advanced technologies allow wind power developers more siting options, they can make it easier to locate wind power projects in areas where there are few conflicts with important species and habitats—thus, better protecting birds, bats, and precious landscapes.

## **WIND POWER PROMOTES RURAL PROSPERITY**

Wind power can help keep many rural communities intact by supporting land-owners and paying for vital public services such as schools, law enforcement, and fire protection. Getting 35 percent of the nation's electricity from the wind can mean \$1 billion in annual land lease payments to land-owners<sup>25</sup> and more than \$3 billion in annual property tax payments to rural communities.<sup>26</sup>

## **WIND POWER SAFEGUARDS THE NATION'S INCREASINGLY SCARCE FRESHWATER WATER RESOURCES**

Conventional and nuclear power plants consume a huge proportion of the nation's diminishing freshwater resources—6 percent, in fact<sup>27</sup>—and are responsible for a full 41 percent of the nation's freshwater withdrawals.<sup>28</sup> Because wind power requires virtually no water, it can cut the power sector's water use by 23 percent<sup>29</sup> and reduce freshwater withdraws by 15 percent overall.<sup>30</sup>

## **PUBLIC POLICIES CUT ENERGY PRICES, DRIVE DEVELOPMENT AND BRING A HOST OF BENEFITS TO THE COUNTRY AS A WHOLE**

Thanks in large part to smart federal and state policies, wind power costs have dropped an amazing 90-plus percent since the 1980s and nearly 40 percent between 2009 and 2013.<sup>31</sup> Policies such as the expired PTC, state renewable energy standards, the recently proposed federal renewable electricity standard, and the EPA's Clean Power Plan can spark further advancement in wind power deployment and technologies. That, in turn, can cut electricity and energy costs for Americans across the country.

Getting 35 percent of the nation's electricity from wind power will reduce electric costs by 2.3 cents per kilowatt hour through 2050,<sup>32</sup> the same cost as the PTC.<sup>33</sup> Public health benefits will be worth an additional 0.9 cents per kilowatt hour,<sup>34</sup> thanks to fewer premature deaths, asthma attacks, and other respiratory and cardiac illnesses. Wind power can help asthmatic kids attend 2.5 million more days of school.<sup>35</sup>

## Endnotes

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- 8 Ibid.
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- 25 U.S. Department of Energy, *Wind Vision*, xxvi.
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