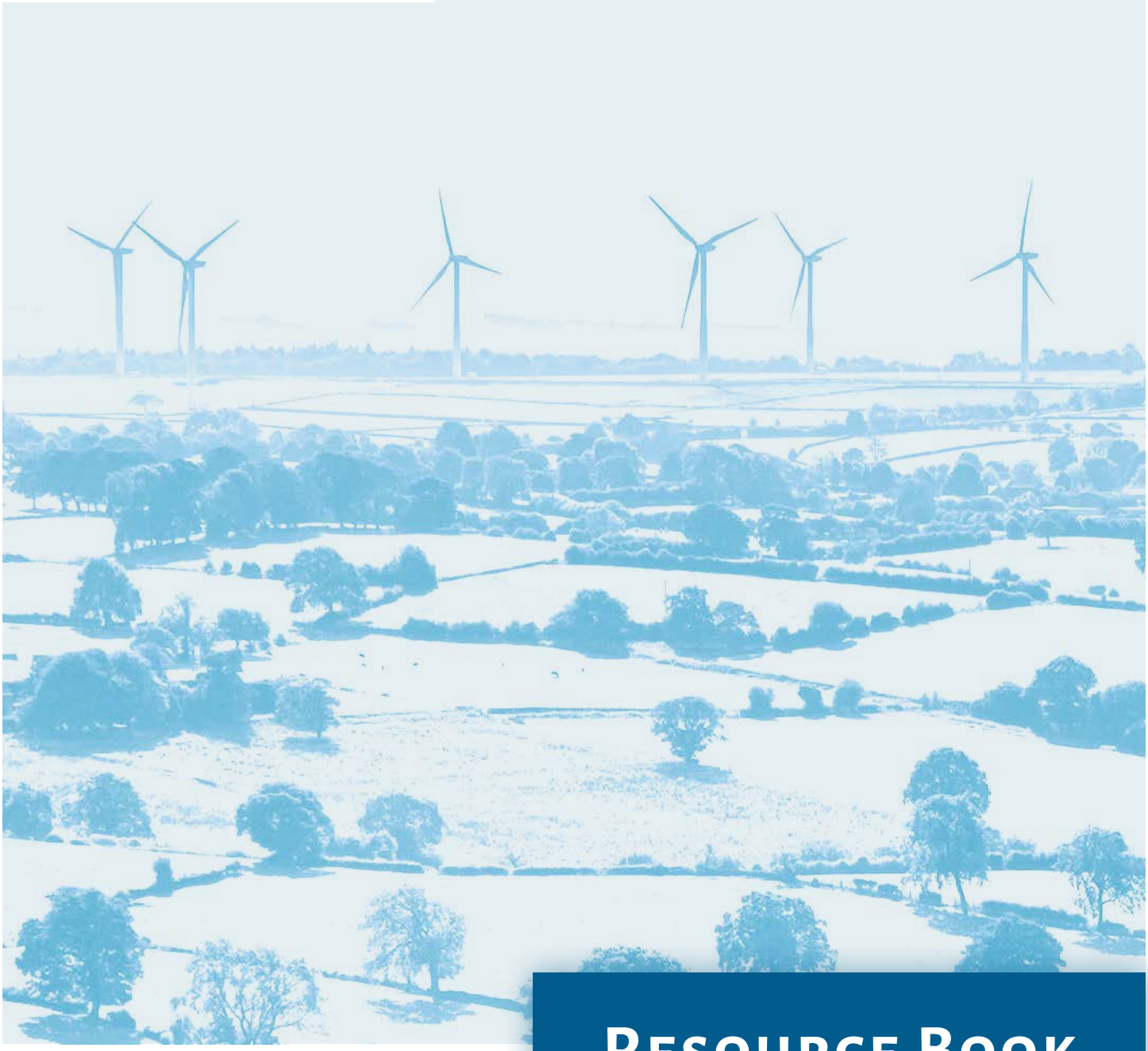
Bluestone
WIND FARM



# Resource Book

MAY 29, 2019

*The Bluestone Wind Farm is currently under advanced development in the towns of Windsor and Sanford in Broome County, New York. It is anticipated to be an approximately 124 megawatt wind energy project comprising up to 33 wind turbines. The wind farm will be located on 6,425 acres of leased land in the Southern Tier of New York with a target commercial operation date of no later than December 31, 2020. The Bluestone Wind Farm filed its Article 10 application in September 2018 and is progressing through the state permitting process.*

*Following is a compilation of information about the Bluestone Wind Farm for your quick reference, as needed.*

# Table of Contents

# *Bluestone Wind Farm Fact Sheets*

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## Project details:

- The project is a 124-megawatt (MW) wind-powered electric generating facility to be located in the towns of Windsor and Sanford, Broome County, New York
- Approximately 33 turbines

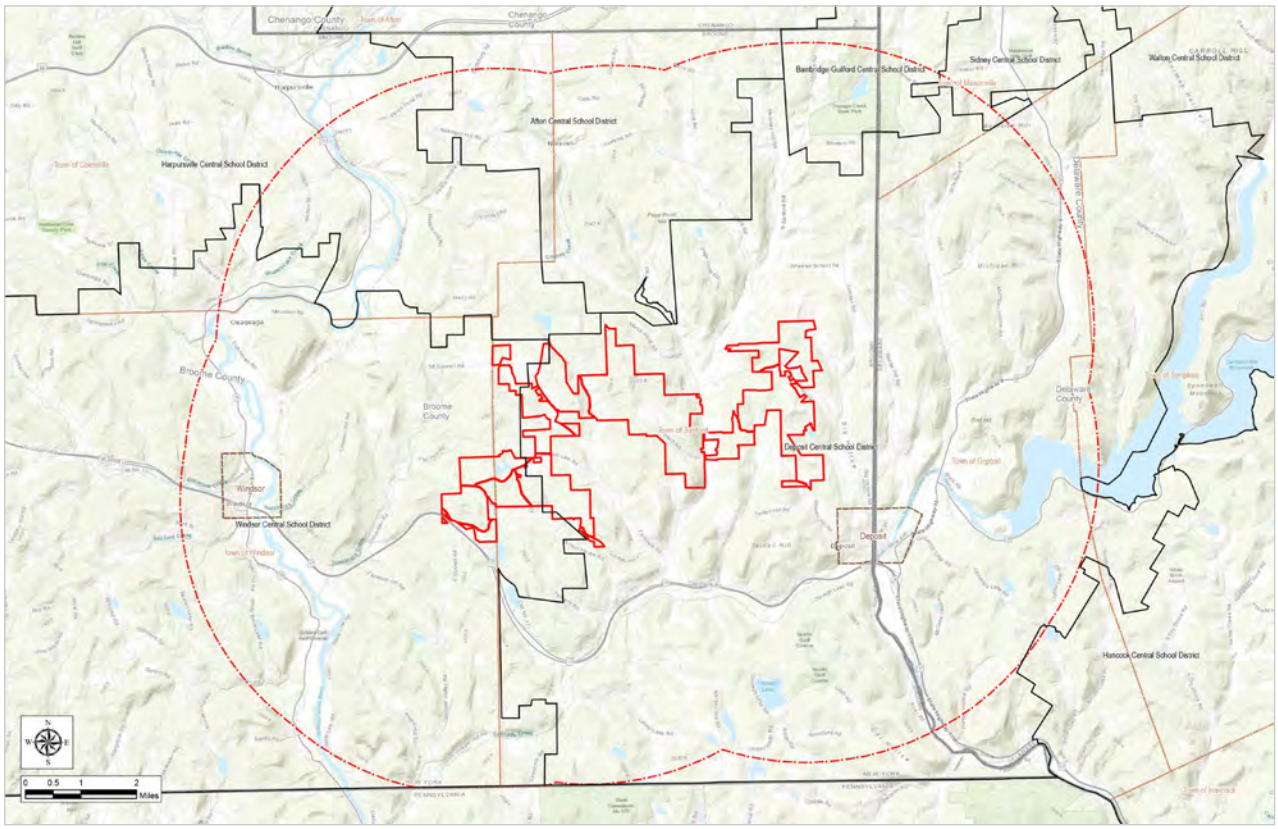
### SOUTHERN TIER ECONOMIC DEVELOPMENT VIA:

- Land leases
- Host community benefit agreements
- New tax revenue
- Complementary and compatible land use (bluestone quarry, agriculture, forestry, dairy farming)
- Job creation

### ENVIRONMENTAL BENEFITS:

- Cleaner air, improved energy infrastructure and progress toward achievement of state clean energy goals
- Working with local agencies to avoid impact to locally sensitive flood-prone areas and forest cover
- Working to maintain local heritage and protect environmental resources

### PROJECT AREA

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**The Bluestone Wind Farm is currently under advanced development in the towns of Windsor and Sanford in Broome County, New York. It is anticipated to be an approximately 124 megawatt wind energy project comprising up to 33 wind turbines. The wind farm will be located on 6,425 acres of leased land in the Southern Tier of New York with a target commercial operation date of no later than December 31, 2020. The Bluestone Wind Farm filed its Article 10 application in September 2018 and is progressing through the state permitting process.**

# Benefitting and Creating a Cleaner Future for Broome County for Decades to Come

**In 2015, New York Governor Andrew Cuomo announced his Reforming the Energy Vision, which includes a clean energy standard that calls for 50 percent of the state's electricity to come from renewables, such as wind, by 2030. Projects like the Bluestone Wind Farm are needed to help New York reach its clean energy goals and bring investment, economic development and jobs to the state.**

## Generating Local Revenues for Broome County

### Tax Revenues

The Bluestone Wind Farm represents an approximately **$200+ million investment**, which will result in a material increase to Broome County's taxable property base. This capital investment will provide additional local property tax revenue for local government services, schools, road upgrades and other municipal infrastructure improvements annually, which will total millions of dollars over the life of the project.

## Wind power pumps billions of dollars into the country's economy every year, particularly into rural areas where more than 99 percent of wind farms are located.

### Wind lease payments

Similar to farming, forestry and bluestone mining, wind energy provides another opportunity for landowners to capture value from their properties' natural resources. Once operational, the Bluestone Wind Farm will pay over **$30 million to local landowners** over the life of the project through annual lease payments. This consistent stream of supplemental revenue can protect against fluctuating commodity prices and help maintain family farms.

### Creating local jobs

Wind energy supported more than **114,000 well-paying American jobs** in 2018. One of the fastest-growing jobs in America is "wind turbine technician," according to the U.S. Bureau of Labor Statistics. In 2018, the wind industry supported more than 3,000 direct jobs in the State of New York.

The Bluestone Wind farm will **create construction, operations and maintenance jobs** directly and will indirectly support other jobs by increasing business activity among local hotels and motels, gas stations, restaurants and similar businesses.

### Benefitting the environment by producing low-cost clean electricity

Not only does wind power provide a clean source of electricity, it helps keep electric rates low and protects consumers against price volatility. The Bluestone Wind Farm will produce enough low-cost clean electricity to power **tens of thousands of homes annually**.

## Please Contact Us with Your Questions, Ideas and Thoughts

**Email:** Alec.Jarvis@calpine.com
**Phone:** (207) 956-1169

Calpine Corporation is America's largest generator of electricity from natural gas and geothermal resources with operations in competitive power markets. Our fleet of 80 power plants in operation or under construction represents approximately 26,000 megawatts of generation capacity. Through wholesale power operations and our retail businesses Calpine Energy Solutions and Champion Energy, we serve customers in 24 states, Canada and Mexico. Our clean, efficient, modern and flexible fleet uses advanced technologies to generate power in a low-carbon and environmentally responsible manner. We are uniquely positioned to benefit from the secular trends affecting our industry, including the abundant and affordable supply of clean natural gas, environmental regulation, aging power generation infrastructure and the increasing need for dispatchable power plants to successfully integrate intermittent renewables into the grid. Please visit www.calpine.com to learn more about how Calpine is creating power for a sustainable future.

Bluestone Wind Farm

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# A Breakdown Of The Article 10 Permitting Process

## Introduction

On behalf of Bluestone Wind, LLC ("Bluestone Wind"), I would like to explain the Article 10 process, the process we are following to responsibly design and develop the Bluestone Wind Project (the "Project"). New York State requires that major electric generation facilities, including wind farms, undergo a rigorous state permitting process, called Article 10, prior to construction and operation. Bluestone Wind is developing the Project in the Towns of Windsor and Sanford and is currently progressing through the New York State's Article 10 Process.

Article 10 condenses the State and local permitting processes into a single, unified proceeding, which is overseen by the Board on Electric Generation Siting and the Environment, also known as the Siting Board. The Siting Board consists of five permanent members and two project-specific local ad hoc members who are appointed specifically to provide a local voice in each proceeding. The New York State Senate Majority Leader and the Speaker of the New York State Assembly each appoint one ad hoc member from residents within the municipality in which the project is proposed (i.e., the Towns of Windsor and Sanford).

## Process for Public Engagement

One of the major components of Article 10 is a public involvement process. Applicants must develop a Public Involvement Program (PIP) Plan that educates, informs, and involves the public throughout the Article 10 process, starting at an early stage. As part of the PIP, Bluestone Wind held an open house meeting at the Windsor High School on January 26, 2017, and at the Deposit State Theatre on November 9, 2017. The meetings were open to the public and provided opportunities for community members to ask questions about the Project and directly interact with Project representatives. Notification of these meetings were published in the Windsor Standard, the Deposit Courier, and the Press and Sun Bulletin, and provided via mailing to those on the Stakeholder List.

Bluestone Wind filed a Preliminary Scoping Statement (PSS) on August 18, 2017. This document provided a description of the proposed Project, detailed the studies that would be performed to evaluate potential impacts, and outlined the steps that would be taken to avoid and minimize impacts. Hard copies of the PSS were available for public review at the Windsor Library and the Deposit Free Library, on the on the DPS's Document Matter Master (DMM) website (http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-F-0559&submit=Search), and on the Project website (www.calpine.com/bluestonewind).

Once a PSS was filed, there was a 21-day comment period during which the public provided comments and other input on the PSS. To inform the public, one week before the start of this comment period Bluestone Wind published advertisements in the Windsor Standard, the Deposit Courier, and the Press and Sun Bulletin, mailed letters to stakeholders, and posted a notice on the Project website.

## Intervenor Funding and the Pre-Application Procedural Conference

The pre-application Procedural Conference, during which the presiding examiner discussed pre-application intervenor funding, made funding awards, and authorized the parties to initiate the stipulations process, took place on October 16, 2017. Bluestone Wind submitted $43,750 to be used for pre-application intervenor funding. These funds were used by intervenors—qualified locally affected parties—to offset certain expenses they incurred while participating in the first part of the Article 10 process, called the pre-application phase.

## Stipulations

Agreements on the scope and methodology of studies (i.e., proposed Stipulations) were released for public review and comment on July 2, 2018, and were made available for review at the Windsor Library and the Deposit Free Library, on the on the DPS's DMM website, and on the Project website. Following closure of the public comment period, on September 7, 2018, the executed Stipulations were filed on the DMM website.

**www.calpine.com/bluestonewind.com**

## Filing of the Article 10 Application

Bluestone Wind filed its Article 10 Application with the Siting Board on September 18, 2018. Prior to submission of the Application, notices were placed in the Windsor Standard, the Deposit Courier, and the Press and Sun Bulletin. The Application includes 41 exhibits, dozens of figures and appendices outlining the details of the project, assessing potential project impacts, and identifying proposed mitigation measures which Bluestone Wind will employ to offset unavoidable project impacts. This comprehensive Application document was made available to the general public at the Windsor Library and the Deposit Free Library, on the DPS's DMM website, and on the Project website. On December 27, 2018, the Siting Board deemed the Article 10 Application filed by Bluestone Wind to be complete, starting the formal hearings and approval process before the Siting Board.

With the submission of Bluestone Wind's Article 10 Application, an additional $124,000 was made available to the parties as intervenor funding. This amount will be used by the parties to allow full participation in the Application and Hearings phases of the Article 10 process.

## Public Statement Hearings

The Siting Board held two public hearing sessions to gain feedback from the general public on the Bluestone Wind Article 10 Application on February 19, 2019, from 2-3 p.m. and 6-7 p.m. at the Windsor Community House. Notices were placed in local newspapers and the public hearings also garnered advance editorial coverage in the local newspapers.

## Post-Application Procedural Conference

On February 20, 2019, the Siting Board held a post-Application procedural conference in Windsor to discuss intervenor requests and award the second round of intervenor funding to be used in the post-application phase of the Article 10 process.

## Next Steps

The next steps in the Article 10 process include the adjudicatory process where the administrative law judges assigned to the Bluestone Wind case will hear testimony from all intervening parties and, after careful review and consideration, will make a recommendation to the Siting Board. At the conclusion of the adjudicatory process, a decision will be made by the Siting Board whether to issue a Certificate of Environmental Compatibility and Public Need. The Siting Board must make its decision within 12 months of receiving a complete Article 10 Application—in this case, by December 2019. When making its decision, the Siting Board will consider impacts to: statewide electrical capacity and energy policies; ecology, air, ground and surface water, and wildlife and wildlife habitat; public health and safety; cultural, historical, and recreational resources; transportation, communications, and utilities.

## We Seek to be a Long-Term Community Partner

In addition to working diligently to appropriately involve and consult with stakeholders throughout the Article 10 process, we are also working hard to be a good community steward. We look to partner with communities in Broome County for the long-term, through community involvement and sponsorships. It's very important to us to be a good neighbor for the life of the Project and to put our money where our mouth is. Strong communities are built through hard work and real investment. Our end goal is to build collaborative relationships with the local community that enable us to promote economic prosperity and build safe, environmentally responsible infrastructure.

We hope that providing more clarity around the process in which we are participating is helpful. For questions pertaining to the Bluestone Wind Project, please call 866-896-0508 or email the Calpine team at calpinewind.northeast@calpine.com. Interested persons can also sign up to receive automated email alerts of various filings by going to the Siting Board's website (http://dps.ny.gov/SitingBoard), and signing up for the Service List in case 16-F-0559.

Alec Jarvis, Director, Development
Calpine Corporation

Bluestone Wind Farm

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# MYTHS vs FACTS

## Clearing Up the Confusion About Wind Energy

### Myth:

**The Bluestone Wind Farm is not needed.**

### Fact:

The Department of Energy Wind Vision Scenario projects that New York could produce enough wind energy by 2030 to power the equivalent of 1.6 million average American homes. In 2015, New York Governor Andrew Cuomo announced his Reforming the Energy Vision, which includes a clean energy standard that calls for 50 percent of the state's electricity to come from renewables, such as wind, by 2030.

Demand for renewable energy by commercial and industrial consumers has grown rapidly in the past decade, with 25 states hosting corporate renewable energy projects for industries spanning the technology, telecommunications, consumer staples, financial, materials and industrials spaces. These companies are focused on sustainability, and the cost-competitiveness of wind energy has resulted in their siting new data center locations and other facilities in areas where wind projects have been built. By bringing more wind to energy to the state, New York would be positioned to attract more economic development.

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### Myth:

**Property values will decrease as a result of the Bluestone Wind Farm.**

### Fact:

According to the Energy Policy Institute, 10 major studies spanning three countries and 1.3 million property transactions over 18 years have found that wind farms do not decrease property values:

- Berkeley National Lab collected data from more than 50,000 home sales among 27 counties in nine states. These homes were within 10 miles of 67 different wind facilities, and 1,198 sales were within one mile of a wind turbine. The data span the periods well before announcement of the wind facilities to well after their construction. The research found no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/preconstruction periods.
- The Massachusetts Clean Energy Center studied the relationship between wind turbines and residential property values in Massachusetts to assess whether home values were affected by proximity to wind turbines. An analysis of more than 122,000 Massachusetts home sales between 1998 and 2012 found no statistically significant evidence that proximity to a wind turbine affects home values.
- Numerous other property value studies based on statistical analysis of real estate transactions have found that wind facilities have no consistent significant impact on property values (Sterzinger et al. 2003; Hoen et al. 2009; Hinman 2010; Carter 2011).

**Myth:**

**Transporting the large turbines for the Bluestone Wind Farm will ruin the roads in Broome County.**

**Fact:**

The Bluestone Wind Farm has entered into a Road Use Agreement (RUA) with the Town of Sanford and is negotiating RUAs with both the Town of Windsor and Broome County. The RUA would minimize the potential effects of turbine transportation on local roads by outlining the process of improving and repairing roads that will be used during construction and operations. Per the RUA, prior to the start of construction, the Bluestone Wind Farm would:

- Identify the public roads to be used for the heavy vehicles engaged in Bluestone's activities, which must be reviewed by the Highway Superintendent and approved by the Municipality;
- Negotiate an agreement with the Municipality regarding specific hauling permits in connection with project activities;
- Establish escrow accounts to secure the payment of costs for professional fees and emergency repairs for potential costs that could be incurred by the Municipality; and
- Perform any identified reinforcement activities needed to enable use in connection with construction activities.

As a long-term community partner, and per the terms of the RUA, the Bluestone Wind Farm would leave local roads in an equal or better condition than prior to the commencement of construction activities.

**Myth:**

**Wind turbines will negatively affect the Broome County wildlife.**

**Fact:**

Even though it has comparatively few effects on wildlife, the wind energy industry is closely regulated by state and federal agencies to ensure any effects are minimized and mitigated. For example, the U.S. Fish and Wildlife Service (USFWS) regulates wind farms for compliance with the Migratory Bird Treaty Act (MBTA), the Endangered Species Act (ESA) (which includes the Indiana bat) and the Bald and Golden Eagle Protection Act (BGEPA). The Bluestone Wind Farm is following the USFWS Land-Based Wind Energy Guidelines and would coordinate with the local USFWS field office to aid in compliance with these laws. The guidelines require multiple years of studies to identify potential effects and detailed plans for minimizing and mitigating any effects that are identified. In addition, extensive wildlife studies have been conducted as part of New York's Article 10 Siting Process and will be reviewed by the state permitting process to ensure that impacts to wildlife are minimized and mitigated to the maximum extent practicable.

The U.S. Department of Energy's National Renewable Energy Lab noted that wind turbines cause less than 0.01 percent of all human-related bird deaths. According to the American Wind Energy Association, aside from habitat loss, the greatest cause of bird deaths are cats and tall buildings. As David O'Neill, Chief Conservation Officer at the Audubon Society stated in a Huffington Post article, "You can't be against renewable energy, wind and solar, if you are for protecting birds."

**Myth:**

**The wind turbines that will be used for the Bluestone Wind Farm are designed for offshore use and should not be used on land.**

**Fact:**

The wind turbines that will be used for the Bluestone Wind Farm are designed for on land use. Technological advances over several decades have resulted in taller towers, longer blades and improved turbine efficiencies. While the underlying technology that has been used for over 30 years remains the same, these taller turbines and longer blades now allow for an exponential increase in output with fewer turbines, decreasing the footprint of wind farms. In addition, taller turbines enable more wind resource sites to be developed in areas with lower wind speeds, bringing economic development opportunities to rural communities across the United States.

**Myth:**

**If the Bluestone Wind Farm is unable to decommission the wind project, Broome County will have no support in maintaining and removing the wind farm.**

**Fact:**

The State of New York's Article 10 Siting Process mandates that the Bluestone Wind Farm must submit a Decommissioning and Restoration Plan that establishes requirements regarding the decommissioning of facilities. Bluestone's Decommissioning and Restoration Plan includes:

- Provisions describing the triggering events for decommissioning;
- Provisions for the removal of all physical material pertaining to the project improvements to a depth of 48 inches below ground level within 12 months of the discontinuation or abandonment of the facility;
- Provisions for the restoration of the project area to a condition as near as practicable of the site before construction;
- A detailed estimate to support the proposed decommissioning site restoration and funding upon cessation of operation;
- A procedure and timeframe for notifying the Towns of Windsor and Sanford and potentially impacted landowners concerning site decommissioning and restoration activities;
- A schedule for completion of site decommissioning and restoration activities; and
- Financial assurances in the form of letters of credit to be held by the Towns of Windsor and Sanford in an amount equal to the estimated decommissioning costs plus a contingency of 10%. The financial assurance ensures that the Towns will be able to decommission the wind farm in the very unlikely event that Bluestone is unable to complete the decommissioning.

**Myth:**

**The Bluestone Wind Farm will produce loud noise and will be disruptive to neighbors.**

**Fact:**

Today's wind turbines take advantage of over 30 years of design, engineering, manufacturing and operating experience to minimize sound from operations. Further, the Bluestone Wind Farm has been designed to comply with local and state laws to limit sound impacts.

As part of the Article 10 application process, the Bluestone Wind Farm had to submit a detailed study of the potential sound impacts associated with the construction and operation of the facility. Based on the results of this study, average nightly sound pressure levels will not exceed 45 dBA at non-participating residences and will not exceed 55 dBA at participating residences. For comparison these levels are considered to be equivalent to a library and quiet suburban night. These proposed limits minimize and mitigate any adverse impacts associated with the sound produced by the construction and operation of the wind farm and are consistent with the World Health Organization guidelines to address sleep disturbance and heath effects.

**Myth:**

**Wind does not blow all of the time, and therefore wind energy is not practical for meeting power demands.**

**Fact:**

Wind power represents a growing percentage of the power generated in several states – at times approaching 40 percent in Texas and exceeding 60 percent in Colorado, for example. While the wind is variable as a power resource, its variability can be predictably forecast and used to complement other generation sources. Maintaining reliability on the power grid requires a balance of resources and generation methods. For example, the ability of Calpine's modern, efficient and environmentally responsible natural-gas fired plants to ramp up and scale down quickly makes them ideal for integrating intermittent renewables like wind power into the grid.

**Myth:**

**Wind farms make people sick.**

**Fact:**

The Massachusetts Institute of Technology published a study in the Journal of Occupational and Environmental Medicine titled "Wind Turbines and Health: A Critical Review of the Scientific Literature." A panel of experts with professional experience and training in occupational and environmental medicine, acoustics, epidemiology, otolaryngology, psychology, and public health was commissioned to "assess the peer-reviewed literature regarding potential health effects among people living in the vicinity of wind turbines." Upon review, they concluded, "No clear or consistent association is seen between noise from wind turbines and any reported disease or other indicator of harm to human health." Further, the American and Canadian Wind Energy Associations (AWEA and CanWEA) established a scientific advisory panel in early 2009 to conduct a review of current literature available on the issue of perceived health effects of wind turbines. This panel reached the same conclusion that impacts from wind turbines do not cause negative health impacts.

**Myth:**

**Wind energy is expensive.**

**Fact:**

According to Lazard's "Levelized Cost of Energy Analysis" compiled by the financial advisory firm annually, wind energy is now the cheapest source of new electric generating capacity. Wind farms generate power without ongoing fuel costs and, in addition, the cost of building wind turbines has been reduced by a variety of new technological efficiencies. Technological advances allow modern wind turbines to reach stronger, steadier winds. That lowers costs and increases the amount of electricity each turbine generates. Improved domestic manufacturing has played an important role, too. Today, more than 500 U.S. factories build wind-related parts. This creates economies of scale and lowers transportation costs. And innovations in operations and maintenance lower the costs of keeping wind farms up and running.

**Myth:**

**Wind turbines are dangerous to live or work around.**

**Fact:**

According to the American Wind Energy Association, hundreds of thousands of people around the world live and work near more than 340,000 operating wind turbines without any health or safety effects.

**Myth:**

**The wind turbines will be built close to homes.**

**Fact:**

As shown in the Bluestone Article 10 Application, no non-participating residences will be closer than 1,450 feet from a wind turbine. That is the equivalent of four football fields.

**Myth:**

**All of the energy produced by the Bluestone Wind Farm will be sent downstate.**

**Fact:**

Calpine does not have a power purchase agreement to deliver the power generated at the Bluestone Wind Farm to other areas of New York. In addition, energy consumption tends to take place near the generation source, therefore the energy produced at the Bluestone Wind Farm will likely be utilized locally through the NYSEG electric grid.

**Myth:**

**The wind turbines require chemicals to de-ice the blades, which will contaminate local soil and water.**

**Fact:**

There will be no chemicals used to de-ice the blades. If ice accumulates on the blades, the turbines will simply shut off and will remain at a standstill until the ice melts and sloughs off naturally.

## Please contact us with your questions, ideas and thoughts.

**Email:** alec.jarvis@calpine.com
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**Web:** www.calpine.com/bluestonewind

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# *Bluestone Wind Farm Visual Simulations*

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# technical memorandum

| | | | |
|---|---|---|---|
| **To:** | Mr. Alec Jarvis, Calpine Corporation | **EDR Project No:** | 16050 |
| **From:** | Gordon Perkins | | |
| **Date:** | April 19, 2019 | | |
| **Reference:** | Revised Visual Analysis for the Bluestone Wind Project | | |

The following technical memo presents the results of a revised visibility and visual impact analysis undertaken by Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) for the proposed Bluestone Wind Project.

## BACKGROUND

In 2018, the Applicant submitted an Article 10 (Certification of Major Electrical Generating Facilities) Application pursuant to 16 NYCRR § 1001 of the New York State Public Service Law for the Bluestone Wind Project (the Project) in the Towns of Sanford and Windsor, Broome County, New York. At that time, the visual impact of the Project was evaluated assuming 33 Vestas V150-4.2-megawatt (MW) wind turbines, each with a tower (hub) height of 427 feet and a rotor diameter of 492 feet (i.e., total maximum blade tip height of 673 feet). The Application included a full Visual Impact Assessment (VIA) that addressed the visibility and visual impact of the proposed Project.

In March of 2019, the Applicant notified the Siting Board of its intent to reduce the size of the Project from 33 to 27 turbines. Additional proposed revisions included minor modifications to the positions of seven turbines ranging in distance from 82 feet to 904 feet and averaging approximately 370 feet. The removal of six turbines from the Project and the movement of seven proposed turbines resulted in proposed changes to the locations of various access roads and collection lines.

To address potential changes to Project visibility and visual impact that will occur as a result of the proposed modifications, EDR updated a subset of the visual simulations previously provided in the Application to reflect the currently proposed Project (Figure 1 and 2).

## METHODOLOGY

### Visual Simulations

To show what the currently proposed Project will look like and to compare its visual effect with the previously proposed Project, a subset of the visual simulations that were prepared for the 2018 VIA were updated using the new layout. The same methodology used for the production of the simulations included in the 2018 VIA was employed in the production of the updated simulations. However, to illustrate the current layout EDR completed the following steps:

1. Create a wireframe model reflecting the new 27-turbine layout.
2. Overlay the new layout on the previous simulations provided in the original layout.
3. Determine whether a detectable change to the simulation occurs considering the proposed shifts and removals.
4. Select a subset of five simulations based on the results of the wireframe analysis to represent various distance zones and degrees of change resulting from the new layout.
5. Compare the simulations from the original VIA to the current proposal.

**RESULTS**

Visual Simulations

As mentioned previously, five of the previously proposed 15 visual simulations were revised to show the modified Project layout. Each of the simulations presents the currently proposed Project in comparison to the existing views and simulations of the previously proposed Project (see Figure 2). A discussion of the appearance and visual effect of the proposed Project for each of the selected viewpoints where there is a detectable change between simulations of the currently proposed and previously proposed Project is presented below.

*Viewpoint 17*

Viewpoint 17 is located along State Route 17/Interstate Route 86 in the Town of Deposit. This viewpoint is located 2.6 miles from the nearest proposed turbine that would be visible in this view to the northwest. This viewpoint is representative of the Transportation Corridor LSZ, and the typical viewer will be a through-traveler/commuter. The existing view features a divided four-lane highway as the dominant foreground feature. The paved lanes are bordered by metal guard rails and separated by a sloping grass median. The highway proceeds away from the viewer, curving towards the west. The curve of the roadway leads the viewer's eyes to rolling, forest-covered hills in the background. The wooded hills along the horizon dominate the view due to their rolling form and color contrast against the sky.

The 2018 simulation illustrates multiple turbines extending above the wooded hilltops. The hills partially screen the towers, but the towers, blades, and/or nacelles are clearly visible above the hilltops. While the light color of the turbines limits their contrast with the sky at the horizon, shadowing created by the strong sunlight highlights the presence of the turbines. The addition of the turbines to this viewpoint creates new focal points in the view and adds a new man-made feature to the forested hills in the background.

A revised simulation showing the currently proposed Project turbines illustrates that two turbines have been removed from the right side of the view, but the remaining five turbines, including two of the closest (2.6 miles) and most prominent turbines, remain the focal point in this view. While the removal of two turbines reduces the presence and density of built features on the hilltop, this will not substantially reduce the visual effect created by the remaining turbines.

Mr. Alec Jarvis, Calpine Corporation
April 19, 2019

*Viewpoint 58*

As described in the VIA, Viewpoint 58 is located on Pazzelli Road in the Town of Sanford. This viewpoint is approximately 1.0 mile from the nearest proposed turbine location and looks east-southeast toward the Project Site. This view is representative of the Forest and Rural Residential/Agricultural LSZs, and the typical viewer on this lightly used rural road will be a local resident. The road is flanked by successional old fields on either side and proceeds away from the viewer toward rolling, forest-covered hills. The branches of a foreground tree directly adjacent to the viewer extend into the photo, framing the left side of the view. Following the road, the landscape descends into a middle ground valley comprised of fields, hedgerows, and blocks of forestland on the level to gently rolling topography. Street signs and portions of widely-scattered single-family residences are the only visible man-made features. The middle ground valley rises into a rolling wooded ridgeline in the background that forms the visible horizon.

The 2018 simulation illustrates the introduction of multiple turbines in the middle ground and background and adds prominent new focal points to the view. The turbines extend well into the sky, and evidence of the forest clearing necessary to accommodate their construction can be seen at the base of each turbine. Due to the proximity of the turbines within the view, they present strong line and scale contrast with the vegetation and landform. The overlap of turbines within the landscape and their proximity to the viewer create a significantly altered experience.

A revised simulation showing the currently proposed Project turbines illustrates that three turbines have been removed and four turbines have changed position. The reduction in the number of turbines reduces the contrast created by overlapping blades and towers in the middle ground and background of the view. However, the positional shifts are generally imperceptible and do not contribute to a change in the potential visual impact. The absence of the three turbines is noticeable, and the smaller number of turbines visible at this viewpoint results in a reduced visual impact.

*Viewpoint 102*

Viewpoint 102 is located along Bryce Road near the intersection with Marsh Pond Road on the Marsh Pond State Forest in the Town of Sanford. This viewpoint is located 1.6 miles from the nearest proposed turbine that would be visible in views to the east-southeast toward the Project Site. This view is representative of the Forest and Open Water LSZs, and the typical viewer will be a local resident or tourist. The existing view looks out from the shoreline of Marsh Pond onto the calm, open water of the pond's surface. Under the existing calm conditions, the pond is reflecting the clear blue sky and the forested edge surrounding the pond's banks. Along the opposite shore, a low band of herbaceous vegetation occurs between the trees and the pond's surface. Trees along the pond's edge block views of more distant landscape features, but due to the presence of the open water, the view feels open and expansive.

The 2018 simulation depicts nine turbines rising prominently above the middle ground tree line. The turbines break the skyline and present appreciable to strong line, color, and scale contrast with the landform, vegetation, and sky. Although the turbines are well-spaced within the view, their reflection on the pond's surface accentuates their presence. The turbines also introduce a sense of visual clutter created by the presence of multiple turbines at

varying distances, which changes their perceived scale in this previously undeveloped view. The addition of the turbines alters the natural character and changes the perceived land use, which may impact viewer experience at this viewpoint.

The simulation of the revised Project layout illustrates that three middle ground turbines have been removed from the view, and some minor shifts of the more prominent turbines have occurred. The removal of the three turbines reduces the visual clutter created by the presence of multiple turbines at varying distances from the viewer. However, closest four turbines still attract viewer attention and change the natural character of this setting. While a reduction in potential visual impact is expected, it will be a negligible reduction.

*Viewpoint 104*

Viewpoint 104 is located on Bryce Road in the Town of Sanford. This viewpoint is located approximately 0.6 mile from the nearest proposed turbine that would be visible in views to the east-northeast. This view is representative of the Forest LSZ and the typical viewer will be a local resident. The existing view features a forest-covered hill, which dominates the middle ground of the view. A flat, open field leading up to the woods' edge can be seen in the foreground. Under the light conditions illustrated in this photo, strong shadows extend over the field and portions of the hill behind it. There are no visible man-made features present in this view, and the natural forested landscape is typical of rural settings throughout the visual study area.

As illustrated in the 2018 simulation, portions of three wind turbines extend into the sky above the hillside. The vegetated hill shields portions of the turbine towers, but the majority of the turbines are still visible. Due to their proximity to the viewer, the turbines dominate the skyline and become major focal points in the view. The relative proximity of the turbines accentuates their line, scale, texture, and form contrast with the existing vegetation and landform. The turbines also introduce modern, utilitarian features to the view and alter the natural character of the existing landscape.

A revised simulation representing the currently proposed Project layout illustrates one turbine removed from the right side of the view. The removal of this prominent feature somewhat lessens the spatial dominance of the remaining turbines, but the two remaining turbines still present contrast with the existing vegetation and landform due to their proximity to the viewer. No change to the potential visual impact resulting from the revised layout is expect from this location.

*Viewpoint 113*

As described in the VIA, Viewpoint 113 is located along Piper Hill Road, west of its intersection with White Birch Lake Road in the Town of Windsor. This viewpoint is approximately 4.2 miles from the nearest proposed turbine that would be visible in this view to the northeast towards the proposed Project Site. This view is representative of the Rural Residential/Agricultural LSZ, and the typical viewer will be a local resident. The existing view features an expansive open vista from a higher elevation that looks across a valley to rolling forested hills that extend into the background. The foreground is dominated by a mowed, grassy field, flanked by a barn and a road to the north and east, respectively. The road disappears from view as it descends into the valley, which includes visible homes

and other man-made structures. Utility poles and wires can be seen along the road in the middle ground where it turns north down the hillside, but these discordant features are subordinate to the attractive composition and variety of landform, vegetation, and land use present in this view. All distance zones are represented, and shadows and sky coloration resulting from the low-angle sunlight add to the picturesque character of the view.

The 2018 simulation illustrates that the background ridgeline has been populated with multiple turbines. The turbines stand out as bright white against the muted tones of the sky at the horizon resulting from the direct illumination provided by the late afternoon sunlight. This accentuates, their line, color, and scale contrast with the sky, vegetation, and landform. Their size, form, and movement will make them new focal points in view, drawing viewer attention away from the valley in the middle ground. While the turbines are not the only man-made features in this view, they are dominant and re-define the character of the view. However, under different lighting and sky conditions their visibility and visual effect would be greatly diminished.

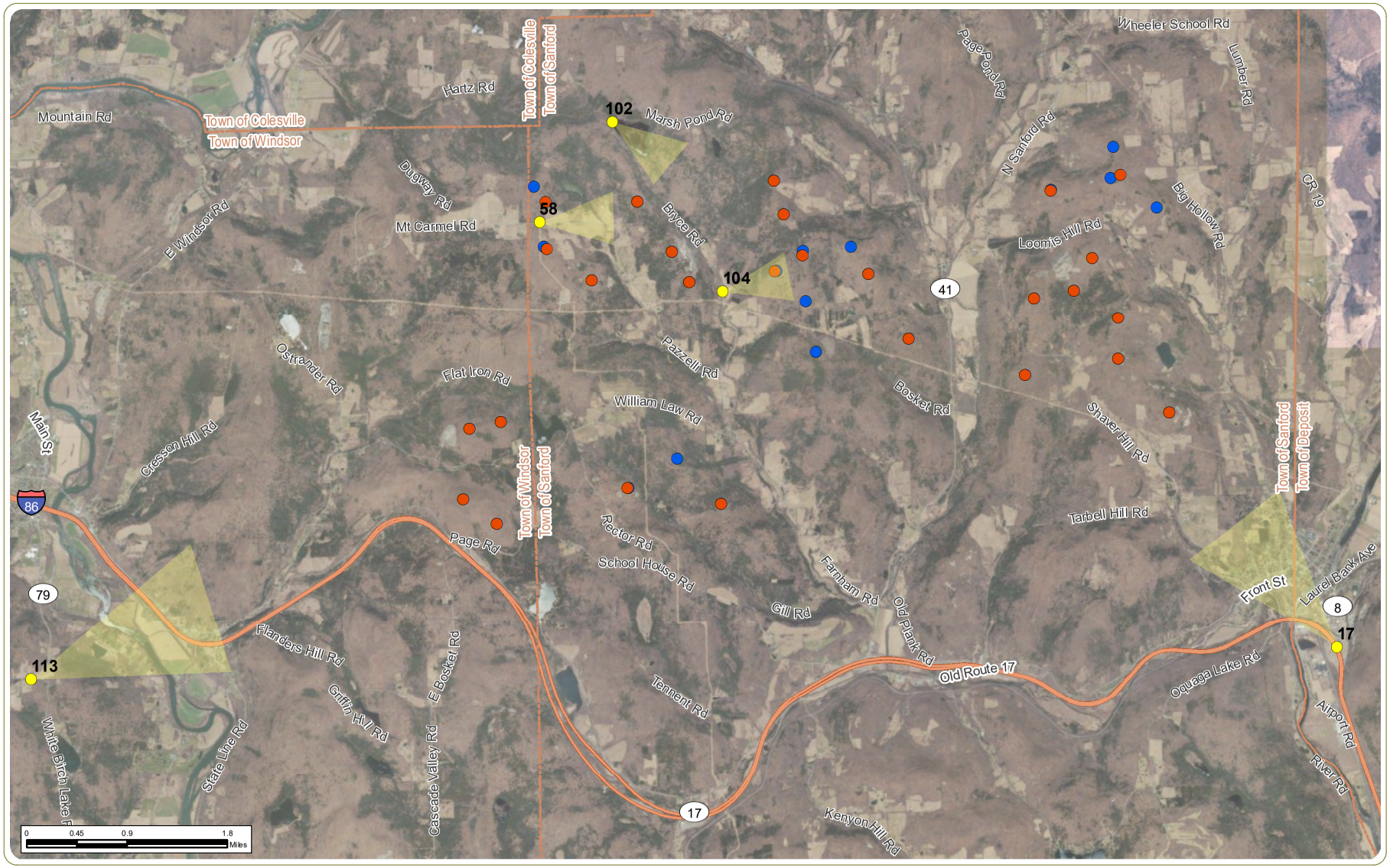
A revised simulation showing the currently proposed Project turbines illustrates that five turbines have been removed from the view, and approximately four turbines have been shifted slightly. The turbines that have been removed from the view all occurred in the distant background (6-8 miles from the viewer), therefore their removal does little to reduce the spatial dominance of the remaining turbines. However, the absence of these five turbines does reduce the apparent overlapping of blades and towers from multiple turbines in the view. As a result, the distribution of the turbines across the ridge appears more orderly and presents less contrast with the rolling topography.

The analyses conducted herein indicate that the revised layout will result in a negligible to minor decrease the overall visual impact of the Project.

Literature Cited

EDR. 2018. Visual Impact Assessment*, Bluestone Wind, LLC, Towns of Sanford and Windsor Broome County, New York*. Prepared for Bluestone Wind, LLC. Prepared by Environmental Design & Research, Landscape Architecture, Planning, Environmental Services, Engineering and Surveying, P.C. Syracuse, NY.

# FIGURES




## Bluestone Wind Project

Towns of Sanford and Windsor, Broome County, New York

**Figure 1: Revised Project Layout Comparison**

**Notes: 1.** Basemap: NYSDOP 2014 orthoimagery map service. **2.** This map was generated in ArcMap on April 19, 2019. **3.** This is a color graphic. Reproduction in grayscale may misrepresent the data.

- Viewpoint Location
- Revised Turbine Layout
- 2018 VIA Layout
- Town Boundary

N W E S

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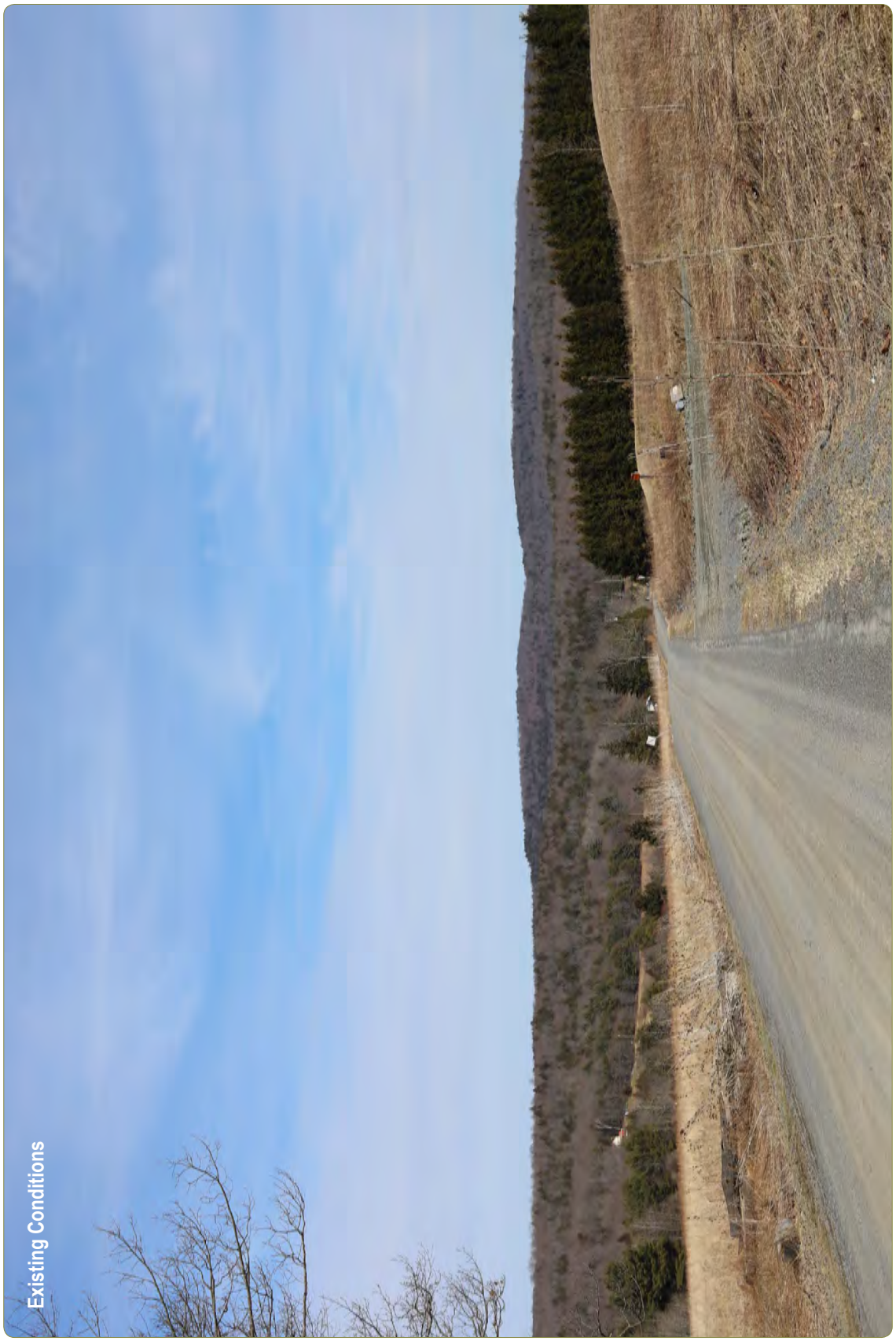
**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 17 - Existing Conditions**
Sheet 1 of 15

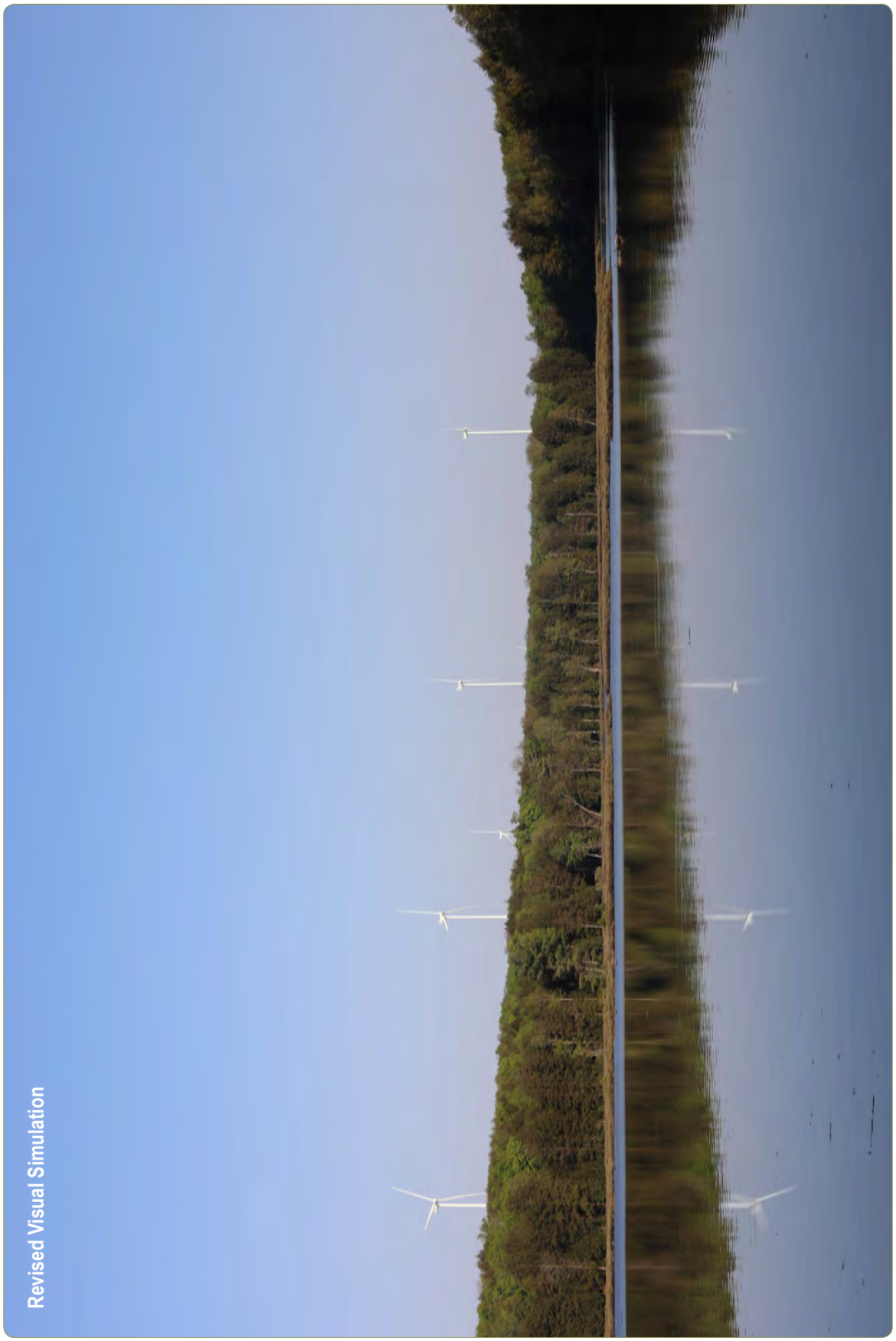

**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 17 - Revised Visual Simulation**
Sheet 3 of 15




**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 58 - Existing Conditions**
Sheet 4 of 15


**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 58 - Revised Visual Simulation**
Sheet 6 of 15

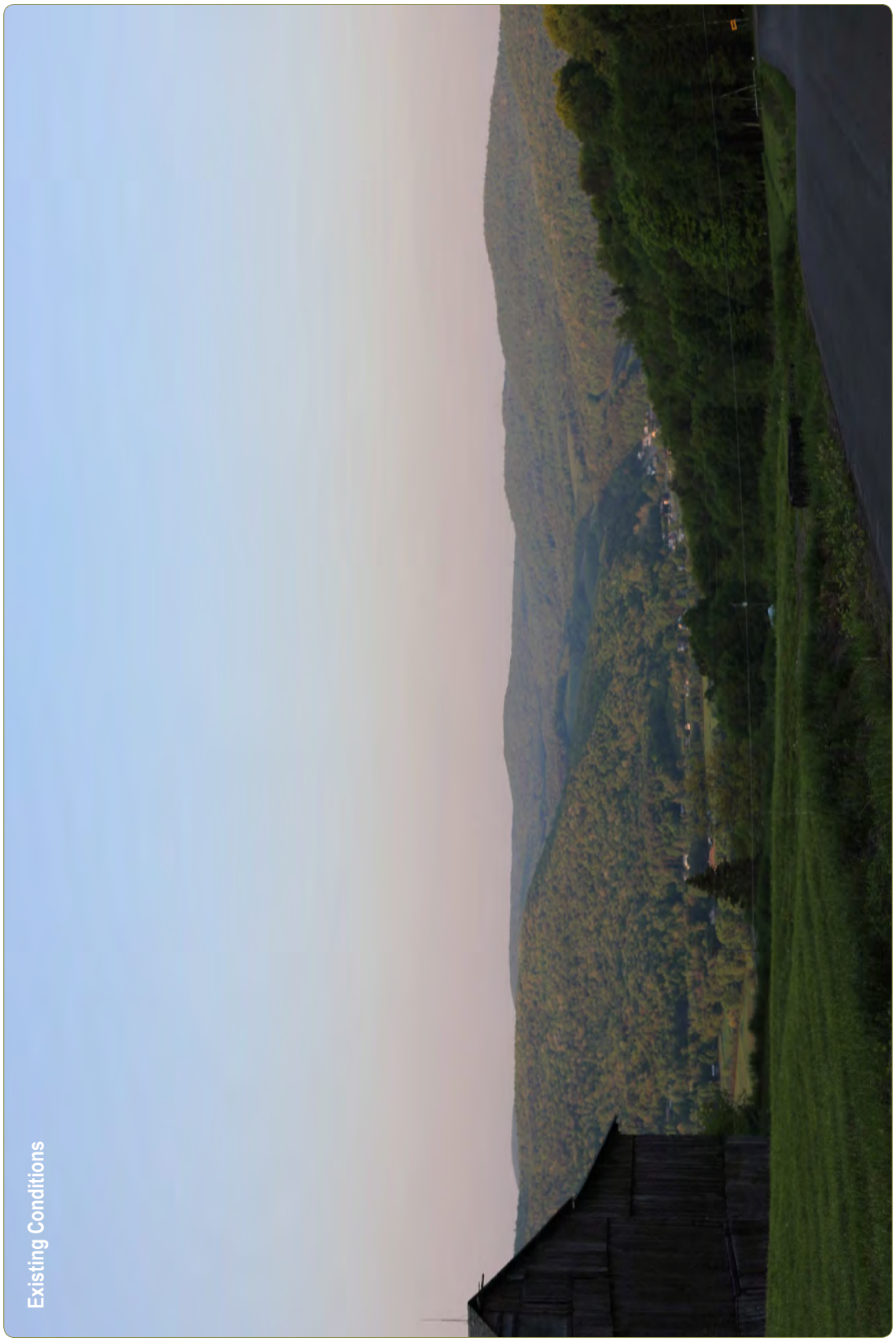

**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 102 - Existing Conditions**
Sheet 7 of 15



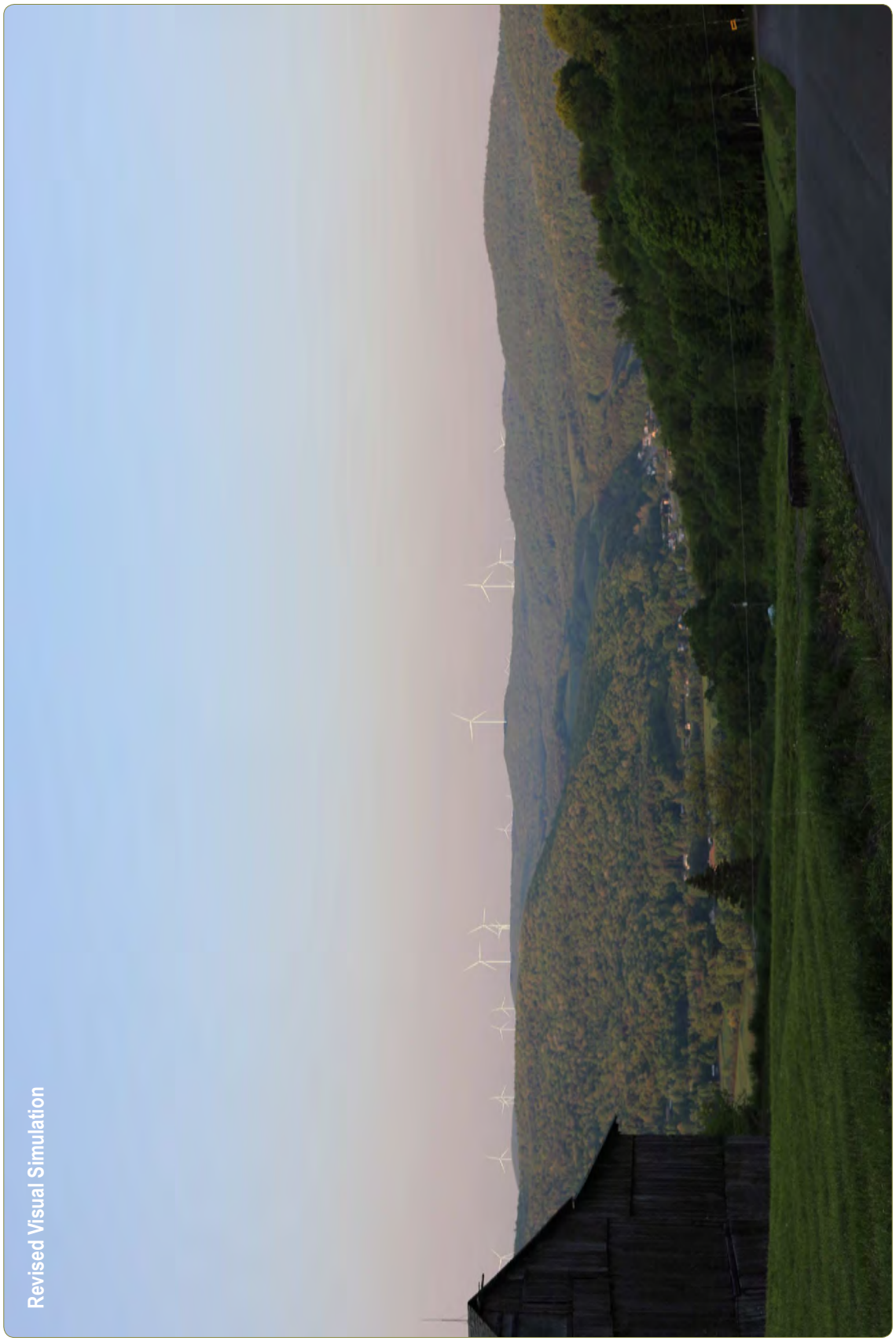

**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 102 - Revised Visual Simulation**
Sheet 9 of 15


**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 104 - Existing Conditions**
Sheet 10 of 15


**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 104 - Revised Visual Simulation**
Sheet 12 of 15




**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 113 - Existing Conditions**
Sheet 13 of 15




**Bluestone Wind Project**
Towns of Sanford and Windsor, Broome County, New York
**Figure 2: Viewpoint 113 - Revised Visual Simulation**
Sheet 15 of 15

# *Newspaper Advertisements*

Bluestone
WIND FARM

**UNITED STATES DEPARTMENT OF ENERGY:**

> "Peer-reviewed scientific data and independent studies consistently concluded that sound from wind plants has no direct impact on physical human health."

U.S. Department of Energy. *"Frequently Asked Questions About Wind Energy."* Retrieved from https://www.energy.gov/eere/wind/frequently-asked-questions-about-wind-energy

Bluestone
WIND FARM

# YOU CAN'T OUTSOURCE THE WIND.

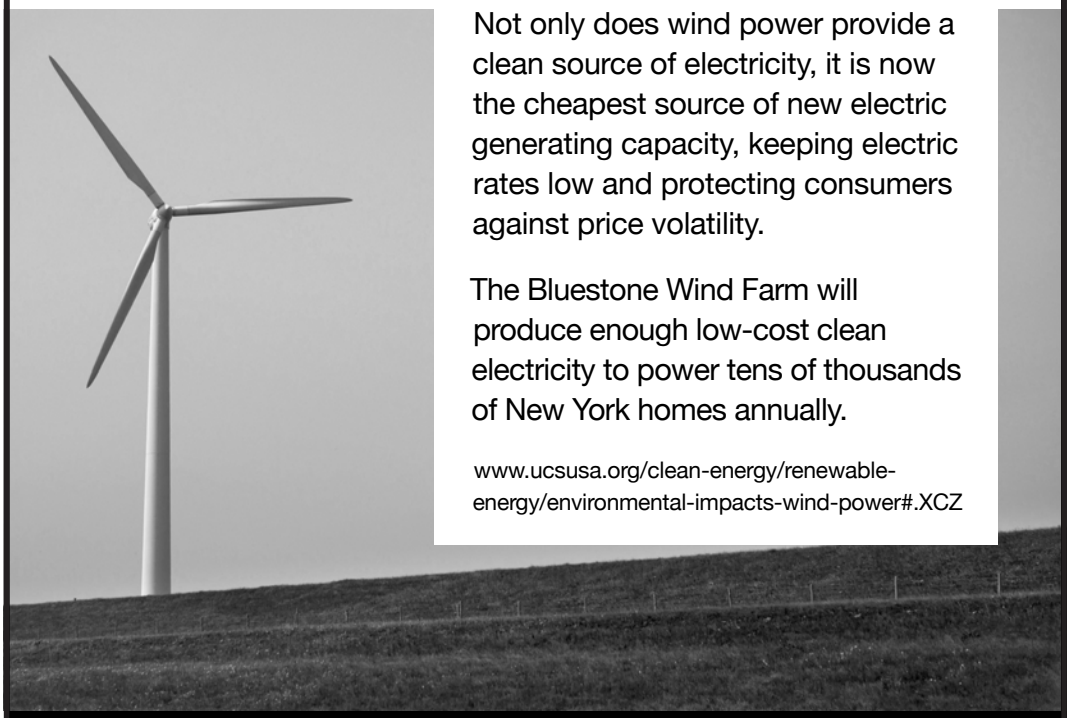
## Good American jobs harvesting an American resource.

Calpine's proposed Bluestone Wind Farm in Broome County would create hundreds of construction jobs and between 5–10 permanent jobs when the project is operational.

Bluestone
WIND FARM

# A CLEANER ENERGY FUTURE FOR NEW YORK.

**The Union of Concerned Scientists confirms that wind energy is one of the cleanest and most sustainable forms of power generation.**



Not only does wind power provide a clean source of electricity, it is now the cheapest source of new electric generating capacity, keeping electric rates low and protecting consumers against price volatility.

The Bluestone Wind Farm will produce enough low-cost clean electricity to power tens of thousands of New York homes annually.

www.ucsusa.org/clean-energy/renewable-energy/environmental-impacts-wind-power#.XCZ

WWW.CALPINE.COM/BLUESTONEWIND

# LET'S SET THE RECORD STRAIGHT

## REPUTABLE THIRD-PARTY ORGANIZATIONS CONTINUOUSLY SHOW NO STATISTICAL EVIDENCE THAT PROPERTY VALUES NEAR WIND TURBINES ARE AFFECTED BY THE PRESENCE OF A WIND FARM

The **U.S. Department of Energy's Lawrence Berkeley National Laboratory** has completed three different studies to evaluate the property value impacts of wind turbines.

Their study titled "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States" examined the following:

**50,000+ homes** near **67 wind farms** in **27 counties** across **9 states.**

More than 1,000 of the homes were located within 1 mile of a wind turbine.

Data collection **spanned multiple years**, including **before any wind development was announced** and **after the wind farms were in operation**.

## CONCLUSION

The research found "**no statistical evidence that operating wind turbines have any measurable impact on home sales price.**"

The other two studies completed by the U.S. Department of Energy Lawrence Berkeley National Laboratory, which were performed using different approaches, came to the same conclusion – **there is no measurable impact on property values**.

https://emp.lbl.gov/sites/all/files/lbnl-6362e.pdf

# LET'S SET THE RECORD STRAIGHT

We believe it is crucially important for members of the community to have the facts about the Bluestone Wind Farm, under development by Calpine in the towns of Windsor and Sanford. The following questions and answers aim to address some of the misconceptions about wind energy, and specifically the Bluestone Wind Farm.

**QUESTION:** Will the wind turbines be built close to homes?

**ANSWER:** As shown in the Bluestone Article 10 Application, no non-participating residences will be closer than 1450 feet from a wind turbine. That is the equivalent of four football fields

**QUESTION:** Who will receive the energy from the Bluestone Wind Farm? Will it all be sent downstate?

**ANSWER:** Calpine does not have a power purchase agreement to deliver the power generated at the Bluestone Wind Farm to other areas of New York. In addition, energy consumption tends to take place near the generation source, therefore the energy produced at the Bluestone Wind Farm will likely be utilized locally through the NYSEG electric grid.

**QUESTION:** Wind energy is expensive. Is this wind farm going to drive up costs of electricity?

**ANSWER:** According to Lazard's "Levelized Cost of Energy (LCOE) Analysis,"[1] compiled by the financial advisory firm annually, wind energy is now the cheapest source of new electric generating capacity. Wind farms generate power without ongoing fuel costs and, in addition, the cost of building wind turbines has been reduced by a variety of new technological efficiencies. These technological advances allow modern wind turbines to reach stronger, steadier winds, which increases the amount of electricity each turbine generates, ultimately lowering the cost of the energy produced.

**QUESTION:** Will the wind turbines require chemicals to de-ice the blades and contaminate local soil and water?

**ANSWER:** No. There will be no chemicals used to de-ice the blades. If ice accumulates on the blades, the turbines will simply shut off and will remain at a standstill until the ice melts and sloughs off naturally.

If you have questions about the Bluestone Wind Farm, we encourage you to get the facts by contacting Calpine at 866-520-4276.

www.calpine.com/bluestonewind

[1] https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf

Bluestone
WIND FARM

# A LONG-TERM ECONOMIC BOOST TO SANFORD AND WINDSOR, BENEFITING FUTURE GENERATIONS

The Bluestone Wind Farm represents an approximately **$200+ million investment**, which would result in a long-term material increase to Broome County's taxable property base.

This capital investment could provide additional local property tax revenue for local government services, schools, road upgrades and other municipal infrastructure improvements annually, which would total **millions of dollars over the life of the project**.

WWW.CALPINE.COM/BLUESTONEWIND

# LET'S SET THE RECORD STRAIGHT

We believe it is crucially important for members of the community to have the facts about the Bluestone Wind Farm, under development by Calpine in the towns of Windsor and Sanford.

New York State requires that major electric generation facilities, including wind farms, undergo a rigorous state permitting process, called Article 10, prior to construction and operation. Prior to the submission of the Bluestone Wind Article 10 Application on September 18, 2018, notices were placed in the Windsor Standard, the Deposit Courier, and the Press and Sun Bulletin. **The Bluestone Wind Article 10 Application includes 41 exhibits, dozens of figures and appendices outlining the details of the proposed project, assessing potential project impacts, and identifying proposed mitigation measures which Bluestone Wind will employ to offset unavoidable project impacts.**

**In addition, the Bluestone Wind Article 10 Application contains visual simulations depicting how the operational turbines would appear from select locations around Windsor and Sanford.** The turbines in the simulations were modeled to the manufacturer's specifications, and all elements in the simulations were geolocated to actual locations in Broome County. The 3D software used to create these images simulates the sun angle and resulting shadows on the turbines and surrounding landscape. The Bluestone Wind visual simulations were created by a leading environmental firm, Environmental Design & Research, Landscape Architecture, Engineering, & Environmental Services, D.P.C.

*Visual simulation with photo taken from Pazzelli Road, Sanford*

**If you are interested in seeing the visual simulations to gain a better understanding of what the Bluestone Wind Farm will look like, please visit the Windsor Library or the Deposit Free Library.** The Bluestone Wind Article 10 Application is also available on the New York Department of Public Service's Document Matter Master (DMM) website (http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=16-F-0559&submit=Search), and on the Bluestone Wind website (www.calpine.com/bluestonewind).

**WWW.CALPINE.COM/BLUESTONEWIND**

Bluestone
WIND FARM

# Wind: An American Economic Success Story

U.S. wind projects **pay over $1 billion annually** to state and local governments and private landowners in the form of tax payments and land lease payments. In 2018, U.S. wind projects paid approximately **$289 million** in lease payments to landowners and an estimated **$761 million** in state and local taxes, with **rural areas hosting more than 99 percent of the wind farms**.

The Bluestone Wind Farm represents an approximately **$200+ million investment**, which will bring economic opportunities to Broome County. The wind farm will **provide additional local property tax revenues** for local government services, schools, road upgrades and other municipal infrastructure improvements annually, which would total **millions of dollars** to the community over the life of the project and would help **reduce the tax burdens on area residents**.

WWW.CALPINE.COM/BLUESTONEWIND

# LET'S SET THE RECORD STRAIGHT

Bluestone WIND FARM

The wind industry is closely regulated by state and federal agencies to ensure any effects are minimized and mitigated. The Bluestone Wind Farm is following the U.S. Fish and Wildlife Service's Land-Based Wind Energy Guidelines and will coordinate closely with the local USFWS field office to aid in compliance with these laws. The guidelines require multiple years of studies to identify potential effects and detailed plans for minimizing and mitigating any effects that are identified. In addition, extensive wildlife studies have been conducted as part of New York's Article 10 Siting Process and will be reviewed per the permitting process to ensure that impacts to wildlife are minimized and mitigated to the maximum extent practicable.

**WWW.CALPINE.COM/BLUESTONEWIND**

- The U.S. Department of Energy's National Renewable Energy Lab notes that wind turbines cause less than 0.01 percent of all human-related bird deaths.
- According to the American Wind Energy Association, aside from habitat loss, the greatest cause of bird deaths are cats and tall buildings.
- The National Audubon Society supports reaching 50% renewable-power generation by 2030, noting that climate change is the greatest environmental threat facing all life on the planet. ***"You can't be against wind energy if you are for protecting birds." – David O'Neill, Chief Conservation Officer at the National Audubon Society***

# *Property Value Studies*

NEWS

# No Evidence of Residential Property Impacts Near Wind Turbines According to Third Berkeley Lab Study

**January 10, 2014**

Massachusetts focused-study finds other factors, such as proximity to highways, beaches have price impact

Lawrence Berkeley National Laboratory (Berkeley Lab) along with University of Connecticut analyzed more than 122,000 home sales near 26 wind facilities (with over 1,500 within a mile of operating turbines) in densely populated Massachusetts, yet was unable to uncover any impacts to nearby home property values.

"This is the third of three major studies we have conducted on this topic [the first was published in 2009, and the second last August], and in all studies [using three different datasets] we find no statistical evidence that operating wind turbines have had any measureable impact on home sales prices," says Ben Hoen, the co-author of the new report.

Hoen is a researcher in the Environmental Energy Technologies Division of Berkeley Lab.

One of the unique contributions of this most recent study is that impacts from turbines as well as a suite of other environmental amenities and disamenities were investigated. The study found strong evidence that highways, major roads, electricity transmission lines, open space and beaches impact property values, but no similar evidence was uncovered for turbines.

"When we find our model so accurately predicts impacts from other amenities and disamenities, we are considerably more confident of our findings for turbines", says lead author Carol Atkinson-Palombo, Assistant Professor in the Department of Geography of the University of Connecticut.

This study, the most comprehensive to-date, in terms of numbers of transactions, builds on both the previous U.S.-wide Berkeley Lab studies as well as a number of other academic and published U.S. studies, which also generally find no measureable impacts near operating turbines.

"Although there have been claims of significant property value impacts near operating wind turbines that regularly surface in the press or in local communities, strong evidence to support those claims has consistently failed to materialize in all of the major U.S. studies conducted thus far", says Hoen.

The research was supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy and by Massachusetts Clean Energy Center.

Lawrence Berkeley National Laboratory addresses the world's most urgent scientific challenges by advancing sustainable energy, protecting human health, creating new materials, and revealing the origin and fate of the universe. Founded in 1931, Berkeley Lab's scientific expertise has been recognized with 13 Nobel prizes. The University of California manages Berkeley Lab for the U.S. Department of Energy's Office of Science. For more, visit www.lbl.gov.

Created by the Green Jobs Act of 2008, the Massachusetts Clean Energy Center (MassCEC) is dedicated to accelerating the success of clean energy technologies, companies and projects in the Commonwealth—while creating high-quality jobs and long-term economic growth for the people of Massachusetts. Since its inception in 2009, MassCEC has helped clean energy companies grow, supported municipal clean energy projects and invested in residential and commercial renewable energy installations creating a robust marketplace for innovative clean technology companies and service providers.

**ADDITIONAL INFORMATION:**

- "Relationship between Wind Turbines and Residential Property Values in Massachusetts"; https://emp.lbl.gov/publications/relationship-between-wind-turbines
- To register for a related webinar on the New 2014 LBNL / UConn Report at 12:30 PM Eastern Time, January 22nd, 2014 go here: Webinar
- "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States"; https://emp.lbl.gov/publications/spatial-hedonic-analysis-effects-wind
- "The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis"; https://emp.lbl.gov/publications/impact-wind-power-projects
- For more information on the report, contact Ben Hoen (BHoen@lbl.gov, 845-758-1896) or Carol Atkinson-Palombo (Carol.Atkinson-Palombo@uconn.edu, 860-486-3023).

**LINKS**

*DOE's Wind Program* | http://www1.eere.energy.gov/wind/index.html

*MassCEC* | http://www.masscec.com

**CONTACTS**

*Ben Hoen* (845) 758-1896 BHoen@lbl.gov

NEWS RELEASE

# No Evidence of Residential Property Value Impacts Near U.S. Wind Turbines, a New Berkeley Lab Study Finds

News Release • **AUGUST 27, 2013**

**Media contact: Allan Chen (510) 486-4210, a_chen@lbl.gov**

Lawrence Berkeley National Laboratory (Berkeley Lab) analyzed more than 50,000 home sales near 67 wind facilities in 27 counties across nine U.S. states, yet was unable to uncover any impacts to nearby home property values.

"This is the second of two major studies we have conducted on this topic [the first was published in 2009 – see below], and in both studies [using two different datasets] we find no statistical evidence that operating wind turbines have had any measureable impact on home sales prices," says Ben Hoen, the lead author of the new report.

Hoen is a researcher in the Environmental Energy Technologies Division of Berkeley Lab.

The new study used a number of sophisticated techniques to control for other potential impacts on home prices, including collecting data that spanned well before the wind facilities' development was announced to after they were constructed and operating. This allowed the researchers to control for any pre-existing differences in home sales prices across their sample and any changes that occurred due to the housing bubble.

This study, the most comprehensive to-date, builds on both the previous Berkeley Lab study as well a number of other academic and published U.S. studies, which also generally find no measureable impacts near operating turbines.

"Although there have been claims of significant property value impacts near operating wind turbines that regularly surface in the press or in local communities, strong evidence to support those claims has failed to materialize in all of the major U.S. studies conducted thus far", says Hoen. "Moreover, our findings comport with the large set of studies that have investigated other potentially similar disamenities, such as high voltage transmission lines, land fills, and noisy roads, which suggest that widespread impacts from wind turbines would be either relatively small or non- existent."

The report was authored by Ben Hoen (Berkeley Lab), Jason P. Brown (formerly USDA now Federal Reserve Bank of Kansas City), Thomas Jackson (Texas A & M and Real Property Analytics), Ryan Wiser (Berkeley Lab), Mark Thayer (San Diego State University) and Peter Cappers (Berkeley Lab). The research was supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

Lawrence Berkeley National Laboratory addresses the world's most urgent scientific challenges by advancing sustainable energy, protecting human health, creating new materials, and revealing the origin and fate of the universe. Founded in 1931, Berkeley Lab's scientific expertise has been recognized with 13 Nobel prizes. The University of California manages Berkeley Lab for the U.S. Department of Energy's Office of Science. For more, visit www.lbl.gov.

**ADDITIONAL INFORMATION:**

- Download the new 2013 report "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States"
- Download the 2009 LBNL Report "The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis"
- More information about DOE's Wind Program
- For more information on the report, contact Ben Hoen (bhoen@lbl.gov, 845-758-1896), or Ryan Wiser (RHWiser@lbl.gov, 510-486-5474).

Updated: June 1, 2015

TAGS: clean energy

NEWS RELEASE

# Berkeley Lab Study Finds No Widespread Impact of Wind Power Projects on Surrounding Residential Property Values in the U.S.

News Release • **DECEMBER 2, 2009**

**Media contact: Allan Chen (510) 486-4210, a_chen@lbl.gov**
**Technical contact: Ryan Wiser (510) 486-5474, RHWiser@lbl.gov**

Home sales prices are very sensitive to the overall quality of the scenic vista from a property, but a view of a wind energy facility does not demonstrably impact sales prices.

Over 30,000 megawatts of wind energy capacity are installed across the United States and an increasing number of communities are considering new wind power facilities. Given these developments, there is an urgent need to empirically investigate typical community concerns about wind energy and thereby provide stakeholders involved in the wind project siting process a common base of knowledge. A major new report released today by the U.S. Department of Energy's (DOE) Lawrence Berkeley National Laboratory evaluates one of those concerns, and finds that proximity to wind energy facilities does not have a pervasive or widespread adverse effect on the property values of nearby homes.

The new report, funded by the DOE, is based on site visits, data collection, and analysis of almost 7,500 single-family home sales, making it the most comprehensive and data-rich analysis to date on the potential impact of U.S. wind projects on residential property values.

"Neither the view of wind energy facilities nor the distance of the home to those facilities was found to have any consistent, measurable, and significant effect on the selling prices of nearby homes," says report author Ben Hoen, a consultant to Berkeley Lab. "No matter how we looked at the data, the same result kept coming back – no evidence of widespread impacts."

The team of researchers for the project collected data on homes situated within 10 miles of 24 existing wind facilities in nine different U.S. states; the closest home was 800 feet from a wind facility. Each home in the sample was visited to collect important on-site information such as whether wind turbines were visible from the home. The home sales used in the study occurred between 1996 and 2007, spanning the period prior to the announcement of each wind energy facility to well after its construction and full-scale operation.

The conclusions of the study are drawn from eight different hedonic pricing models, as well as repeat sales and sales volume models. A hedonic model is a statistical analysis method used to estimate the impact of house characteristics on sales prices. None of the models uncovered conclusive statistical evidence of the existence of any widespread property value effects that might be present in communities surrounding wind energy facilities.

"It took three years to collect all of the data and analyze more than 50 different statistical model specifications," says

co-author and project manager Ryan Wiser of Berkeley Lab, "but without that amount of effort, we would not have been confident we were giving stakeholders the best information possible."

"Though the analysis cannot dismiss the possibility that individual homes or small numbers of homes have been negatively impacted, it finds that if these impacts do exist, their frequency is too small to result in any widespread, statistically observable impact," he added.

The analysis revealed that home sales prices are very sensitive to the overall quality of the scenic vista from a property, but that a view of a wind energy facility did not demonstrably impact sales prices. The Berkeley Lab researchers also did not find statistically observable differences in prices for homes located closer to wind facilities than those located further away, or for homes that sold after the announcement or construction of a wind energy facility when compared to those selling prior to announcement. Even for those homes located within a one-mile distance of a wind project, the researchers found no persuasive evidence of a property value impact.

"Although studies that have investigated residential sales prices near conventional power plants, high voltage transmission lines, and roads have found some property value impacts," says co- author and San Diego State University Economics Department Chair Mark Thayer, "the same cannot be said for wind energy facilities, at least given our sample of transactions."

Berkeley Lab is a DOE national laboratory located in Berkeley, California. It conducts unclassified scientific research for DOE's Office of Science and is managed by the University of California. Visit our Website at www.lbl.gov/

**ADDITIONAL INFORMATION:**

- Download the report, "The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis"
- View a PowerPoint presentation summarizing key findings from the study
- More information about DOE's Wind and Hydropower Technologies Program
- For more information on the report, contact Ben Hoen (benhoen2@earthlink.net, 845-758-1896) or Ryan Wiser (RHWiser@lbl.gov, 510-486-5474).

Updated: December 2, 2009

TAGS: clean energy, energy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