

An aerial photograph of a wind farm in rolling green hills. The sun is low on the horizon, creating a warm, golden glow. Several wind turbines are visible, with one in the foreground on the right side. The text is overlaid in the center of the image.

Stakeholder Engagement and Buy-in Session

Panel Participants

- Jeff Danielson, Central Region Director, *American Wind Energy Association*
- Josh Moenning, Director, *New Power Nebraska*
- Brad Wilken, Visual Resources/Aesthetics Senior Resource Specialist, *Olsson*
- Michael Laird, Field Survey & UAV Pilot, *Olsson*

Nebraska Wind & Solar Conference:

Nebraska Stakeholder and Community Support for Wind Projects

Jeff Danielson
Central Region Director
American Wind Energy Association
jdanielson@awea.org 202.412.0103



AWEA's diverse membership (1000 member companies) includes global & domestic leaders in wind power development, turbine & component manufacturing, including wind towers and component & service suppliers.

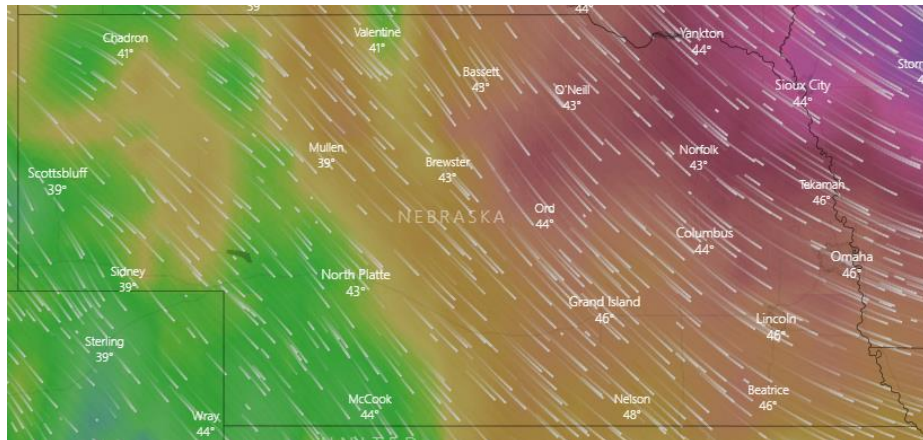
- Manufacturing and supply chain
- Construction stage– requires skilled workers to install the turbines,
- Development - site selection, permitting, resource assessment. engineering
- Operations and maintenance jobs over the life of the turbine
 - Field managers, control room operators, service providers, and turbine techs
 - Turbine techs – 2nd fastest growing job. Long-term, well paying job. These are the people climbing up to the top of the turbine to perform maintenance (Tower Climbing Grease Monkeys - <https://www.tcgm.us/>)
- Other jobs include project finance, insurance, and legal professionals

AWEA is committed to the development of wind workers across all levels of the industry's workforce. Workforce development also includes placing wind industry professionals in the right jobs and connecting wind energy companies with employees that are in line with their needs. This investment in the workforce is integral to the sustained growth and continued success of the U.S. wind industry.

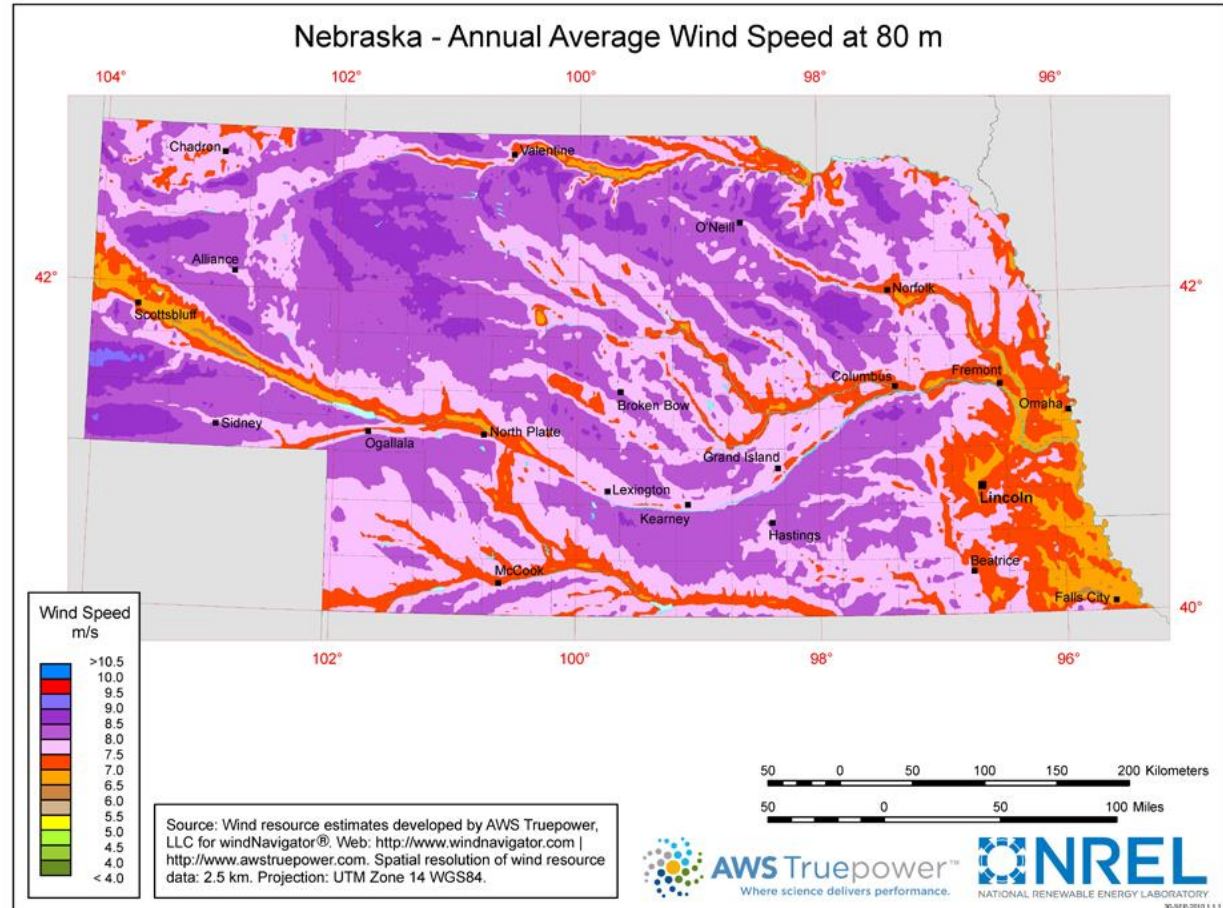


Nebraska's Prime Wind resource

- Land-based technical wind potential at 80 m hub height: 465,474 MW*



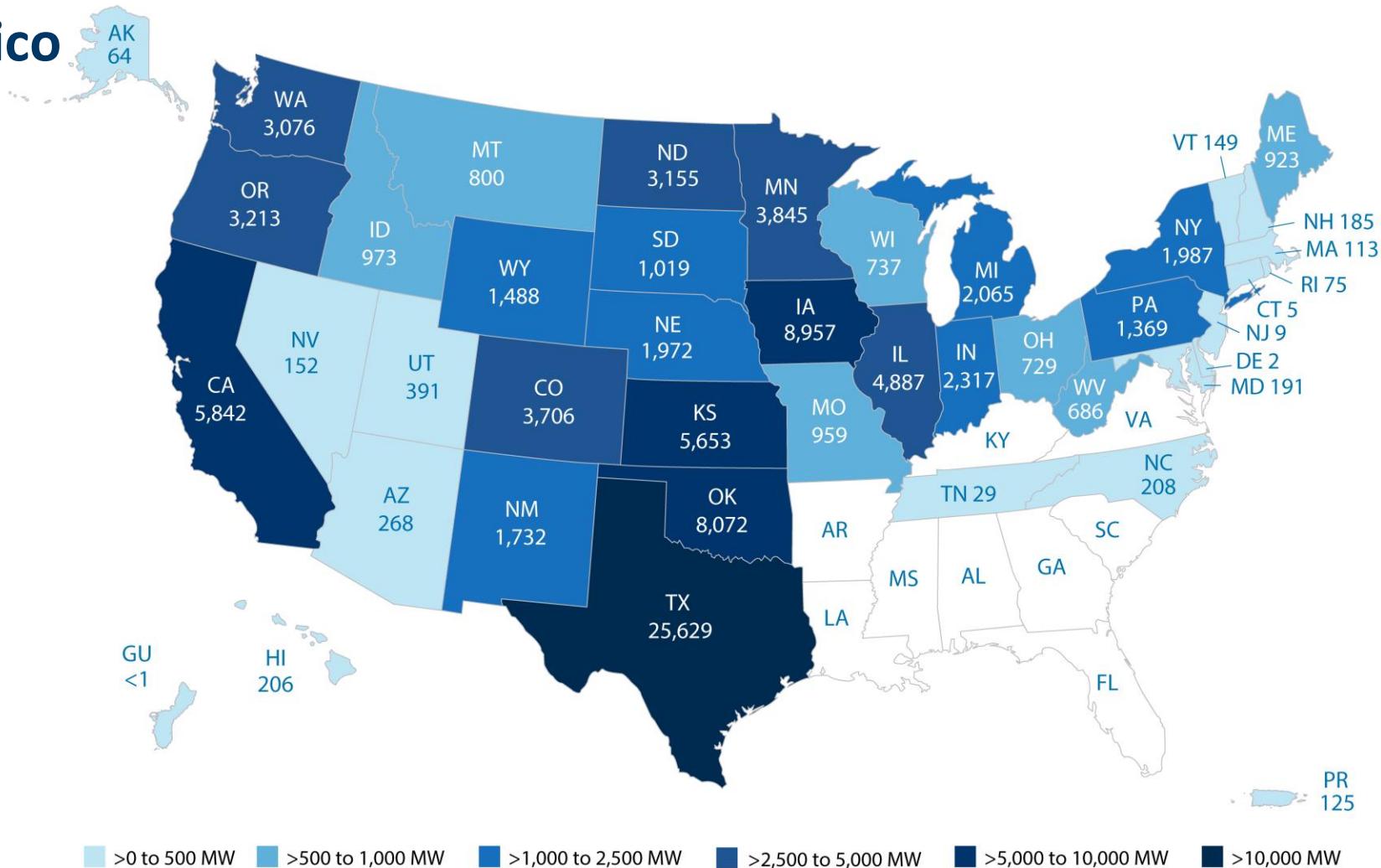
Wind at 100m on October 22, 2019. Source: Windy, Wind IQ





Wind Power Capacity in 41 States, Guam, and Puerto Rico

Rico

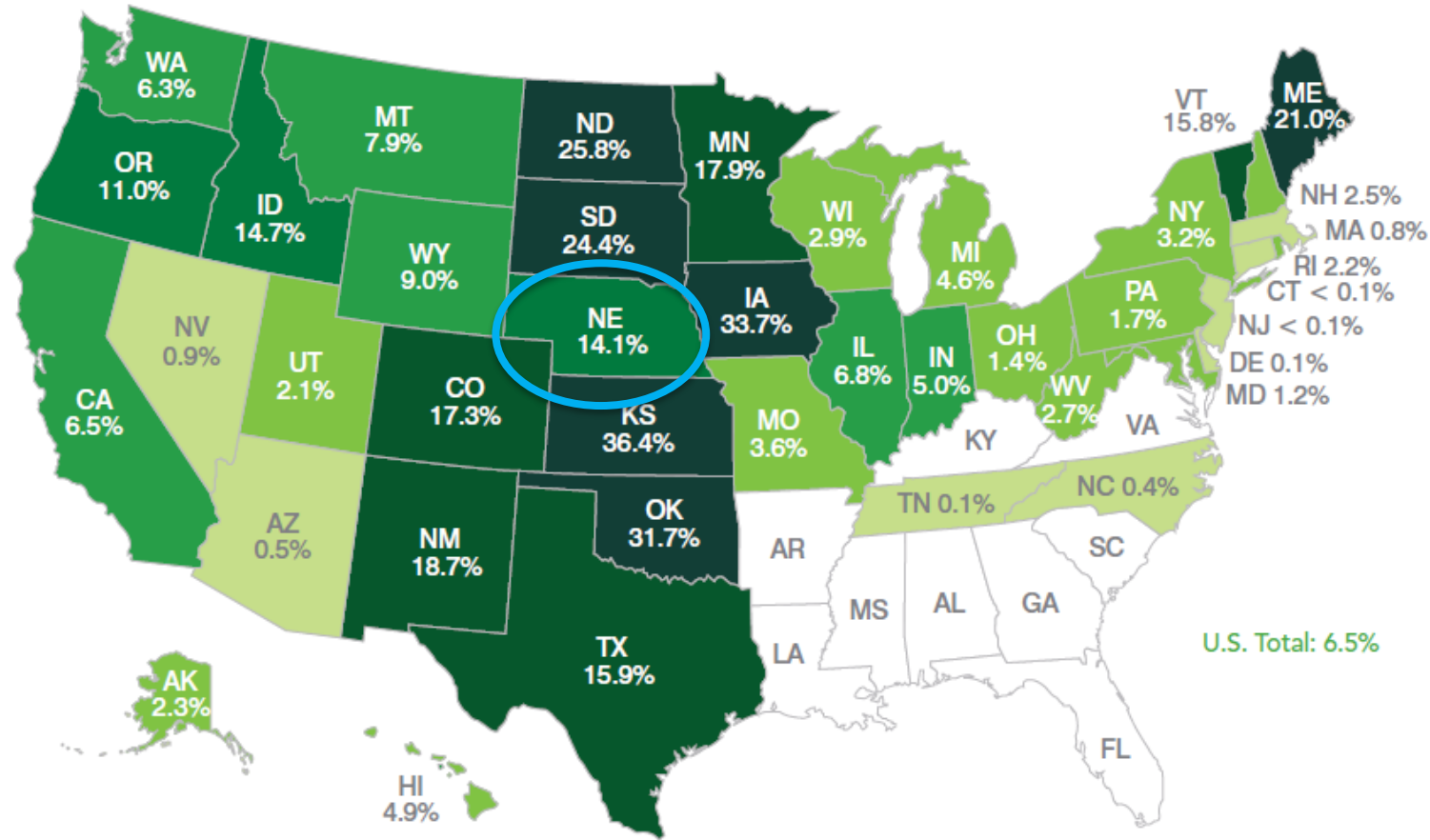


Top 10 Wind States	
Texas	25,629 MW
Iowa	8,957 MW
Oklahoma	8,072 MW
California	5,842 MW
Kansas	5,653 MW
Illinois	4,887 MW
Minnesota	3,845 MW
Colorado	3,706 MW
Oregon	3,213 MW
North Dakota	3,155 MW

■ >0 to 500 MW
 ■ >500 to 1,000 MW
 ■ >1,000 to 2,500 MW
 ■ >2,500 to 5,000 MW
 ■ >5,000 to 10,000 MW
 ■ >10,000 MW



Wind Energy Provided 6.5% of U.S. Electricity in 2018



Top Wind Generation States in 2018

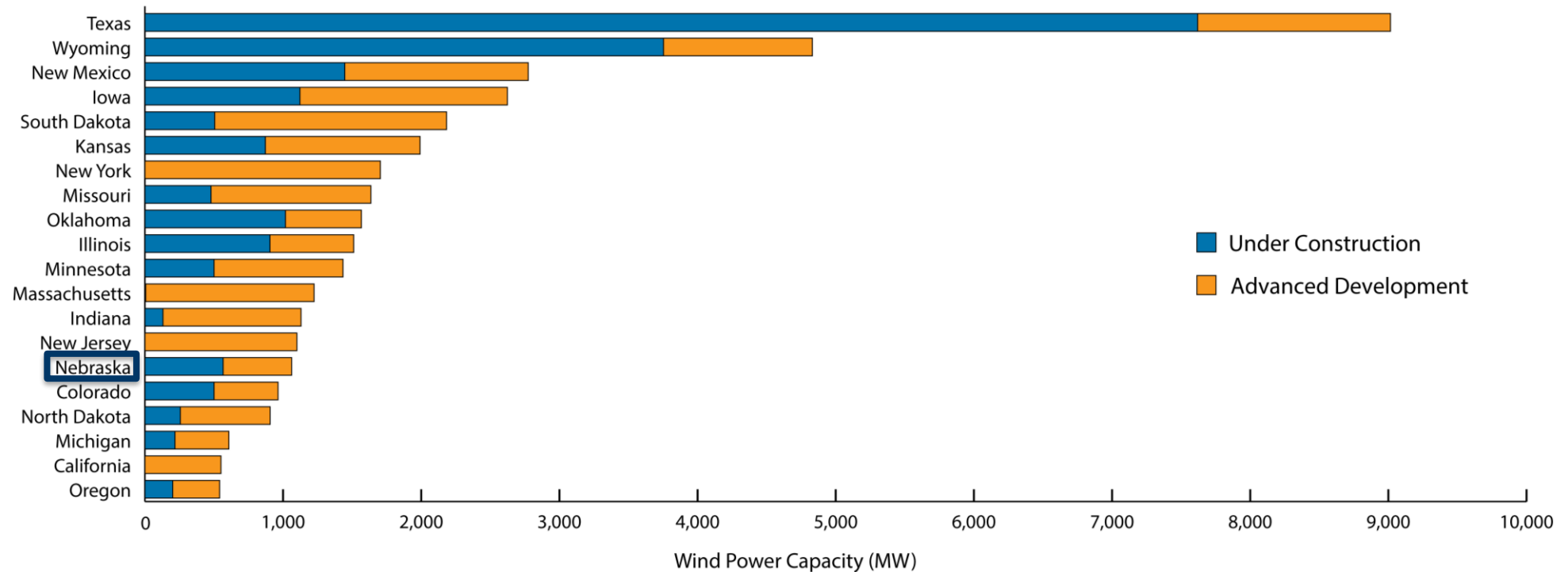
Ranking	State	Wind Generation (Thousand MWh)	Equivalent Average U.S. Homes Powered
1	Texas	75,753	7.28 million
2	Oklahoma	27,593	2.65 million
3	Iowa	21,685	2.09 million
4	Kansas	19,295	1.86 million
5	California	13,650	1.31 million
6	Illinois	12,812	1.23 million
7	Minnesota	11,346	1.09 million
8	North Dakota	10,764	1.04 million
9	Colorado	9,819	944,000
10	Washington	7,356	707,000
TOTAL	U.S.	274,952	26.4 million

■ >0% to <1%
 ■ 1% to <5%
 ■ 5% to <10%
 ■ 10% to <15%
 ■ 15% to < 20%
 ■ 20% and higher

Source: EIA



Top states with capacity under construction or in advanced development

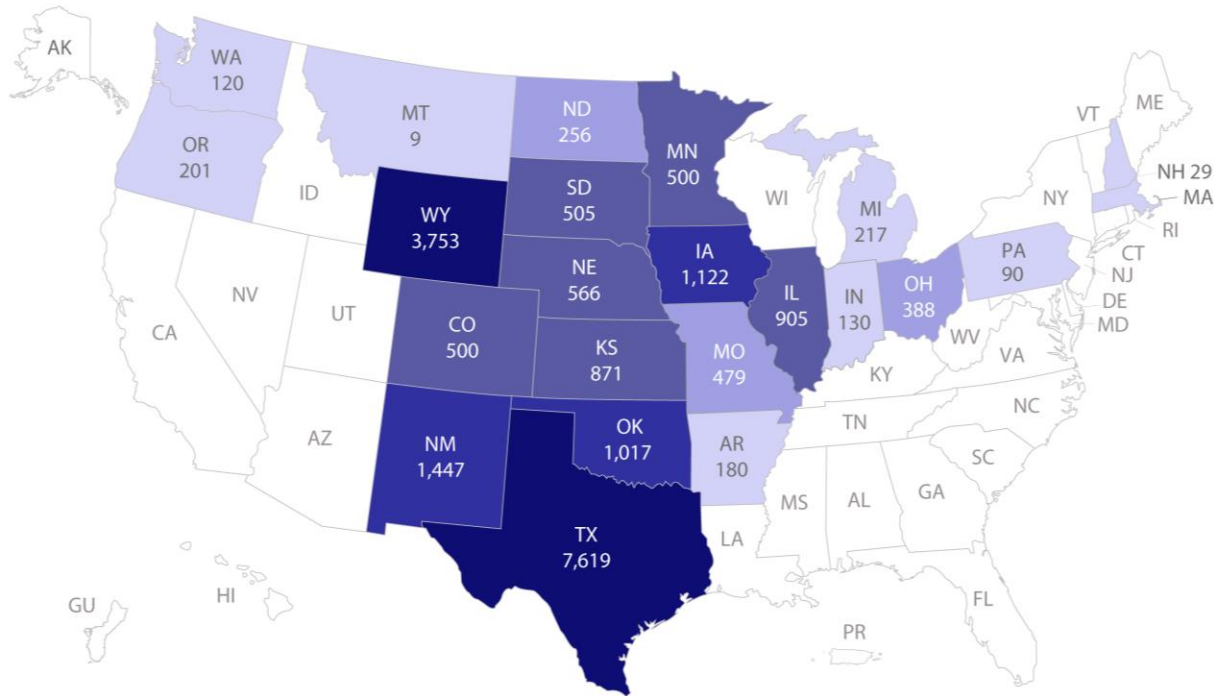


- 41,801 MW spread across 208 project phases in 33 states
- 9 states have enough underway to more than double their installed wind capacity

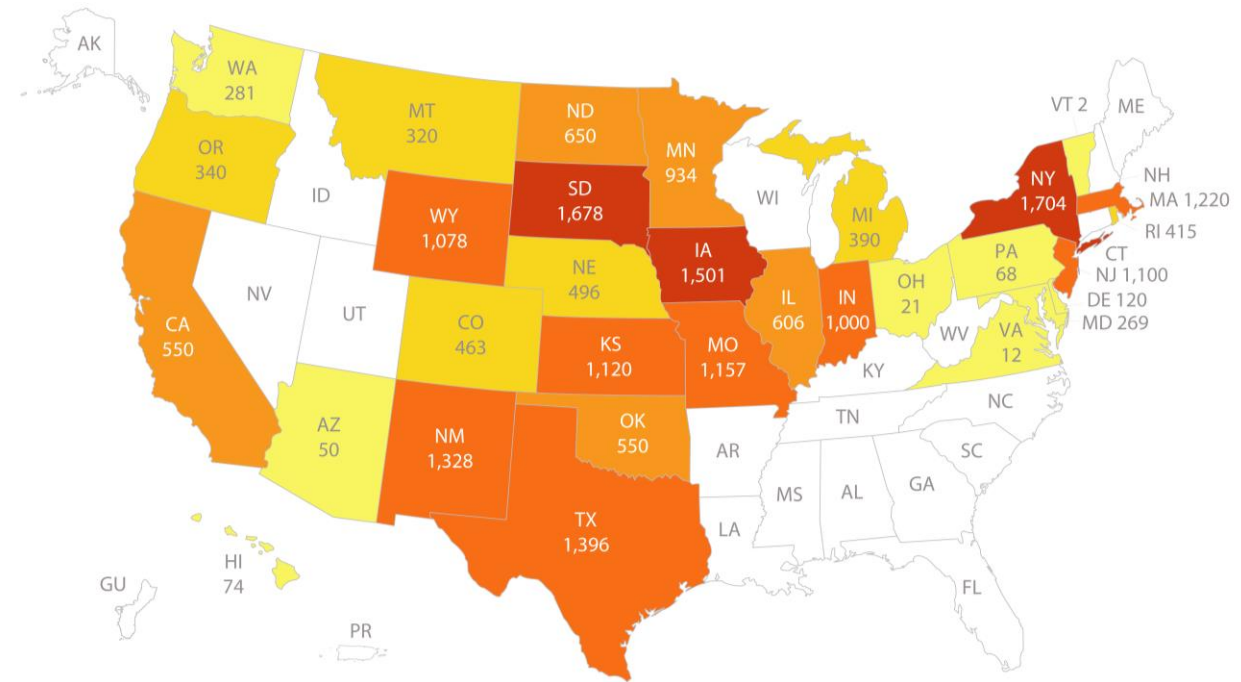


41,801 MW Under Construction or in Advanced Development

Capacity Under Construction



Capacity in Advanced Development



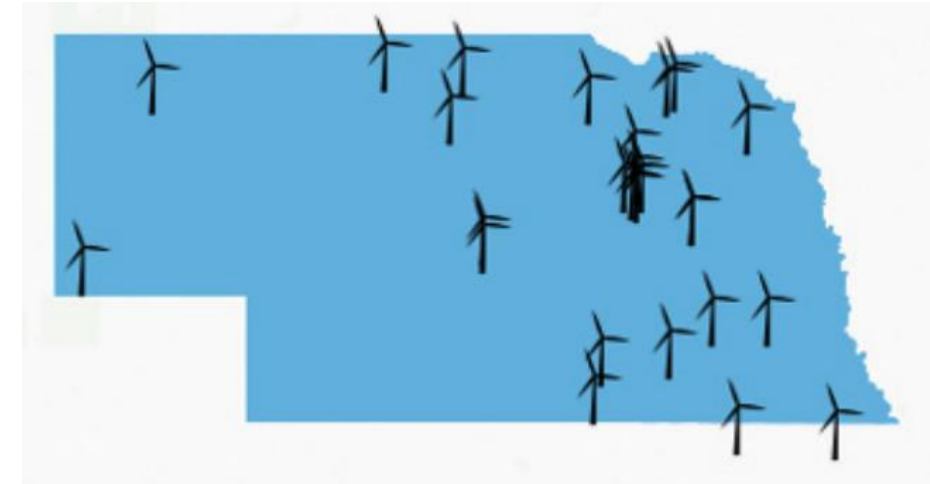
■ >0 to 249 MW
 ■ 250 MW to 499 MW
 ■ 500 MW to 999 MW
 ■ 1,000 MW to 1,999 MW
 ■ 2,000 MW and Above

■ >0 to 249 MW
 ■ 250 MW to 499 MW
 ■ 500 MW to 999 MW
 ■ 1,000 MW to 1,499 MW
 ■ 1,500 MW and up



Nebraska Wind Projects as of 2Q 2019

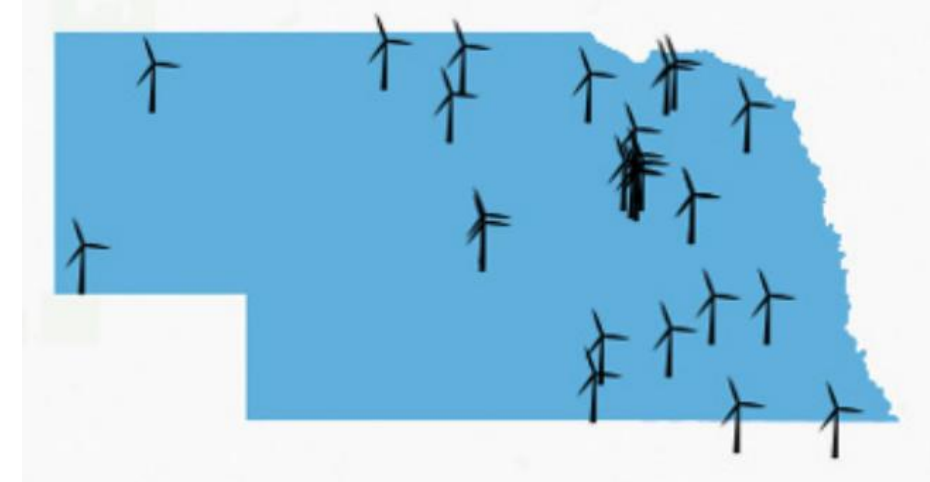
- 1,972 MW Installed wind capacity, turbines
 - State rank for installed wind capacity: 15th
 - State rank for number of wind turbines: 17th
 - 25 Wind projects online
 - 566 MW under construction
 - 497 MW in advanced development:
-
- In 2018, wind energy provided 14.1% of all in-state electricity production, enough to power 497,900 homes.
 - State rank for share of electricity: 13th





Wind Energy Economic Benefits to Nebraska

- Jobs & Economic Benefits in 2018
 - 3,001 to 4,000 direct wind industry jobs
 - \$3.5 billion capital investment in wind projects*
 - \$8.5 million in state and local tax payments
 - \$5- \$10 million in land lease payments*
- Environmental Benefits in 2018
 - 3.5 Billion Gallons of water savings **
 - 6.4 million metric tons of Carbon Dioxide emissions avoided.
 - 1.4 million equivalent Cars' worth of emissions avoided.

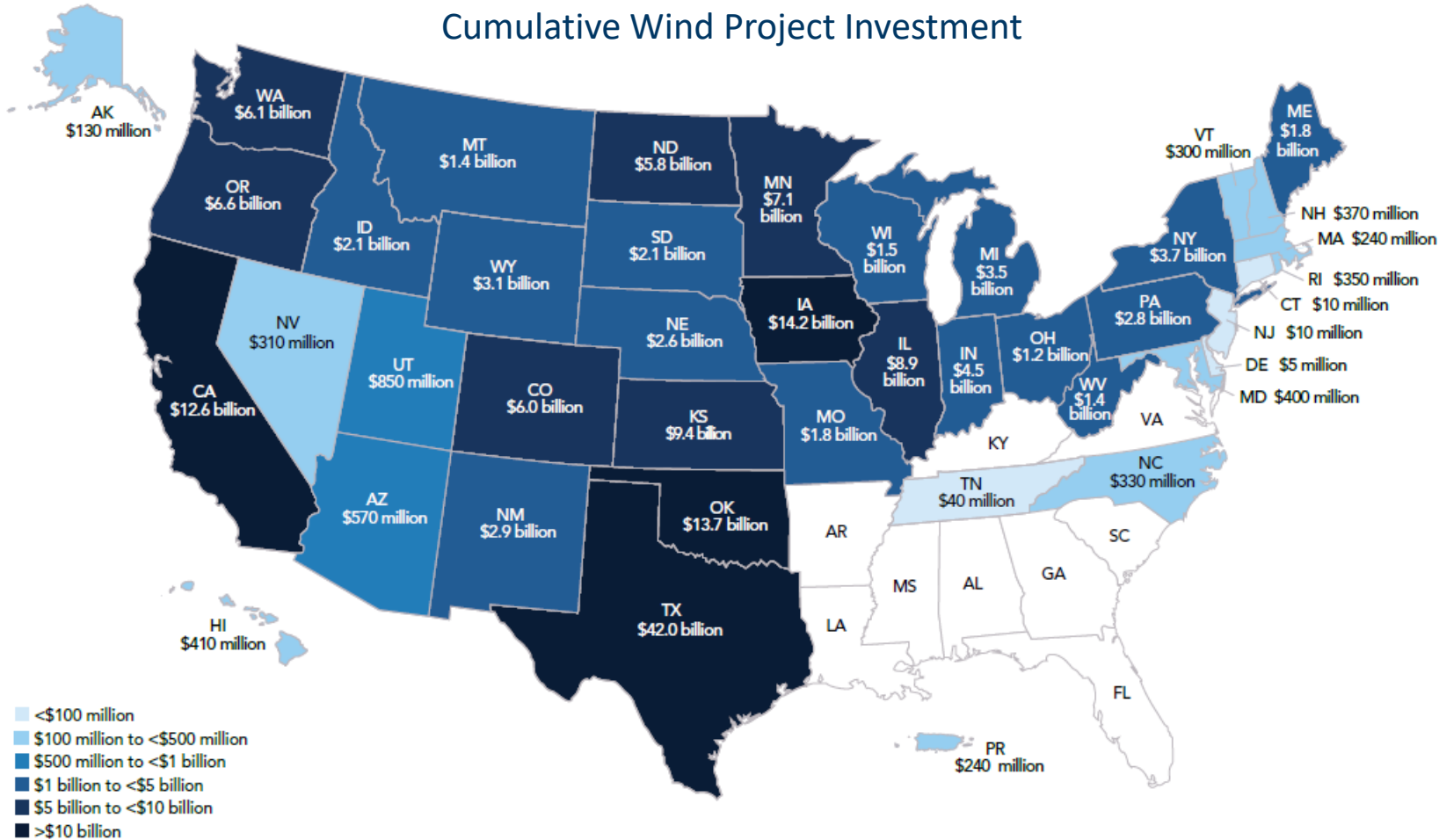


*Source: Based on state and national averages from LBNL, NRE

** Based on national average water consumption factors for coal and gas plants



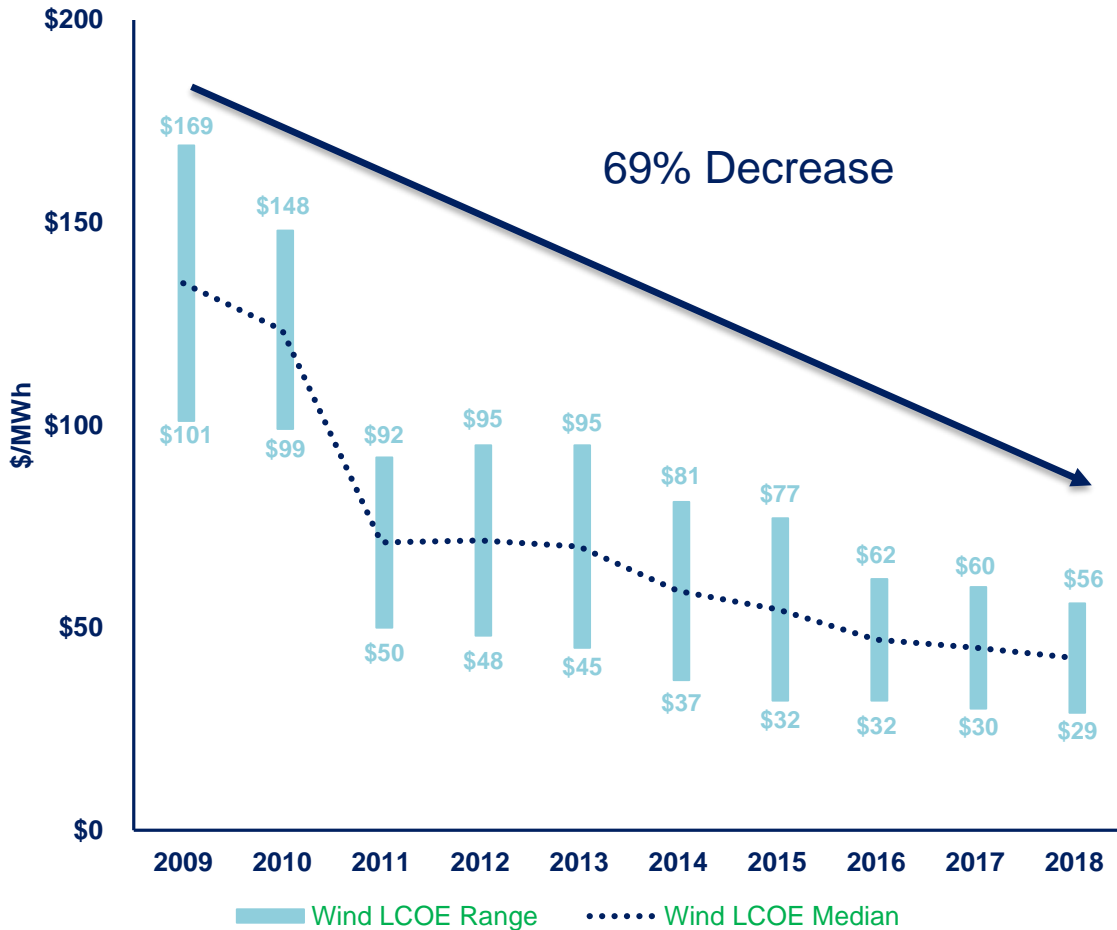
Additional Economic Benefits



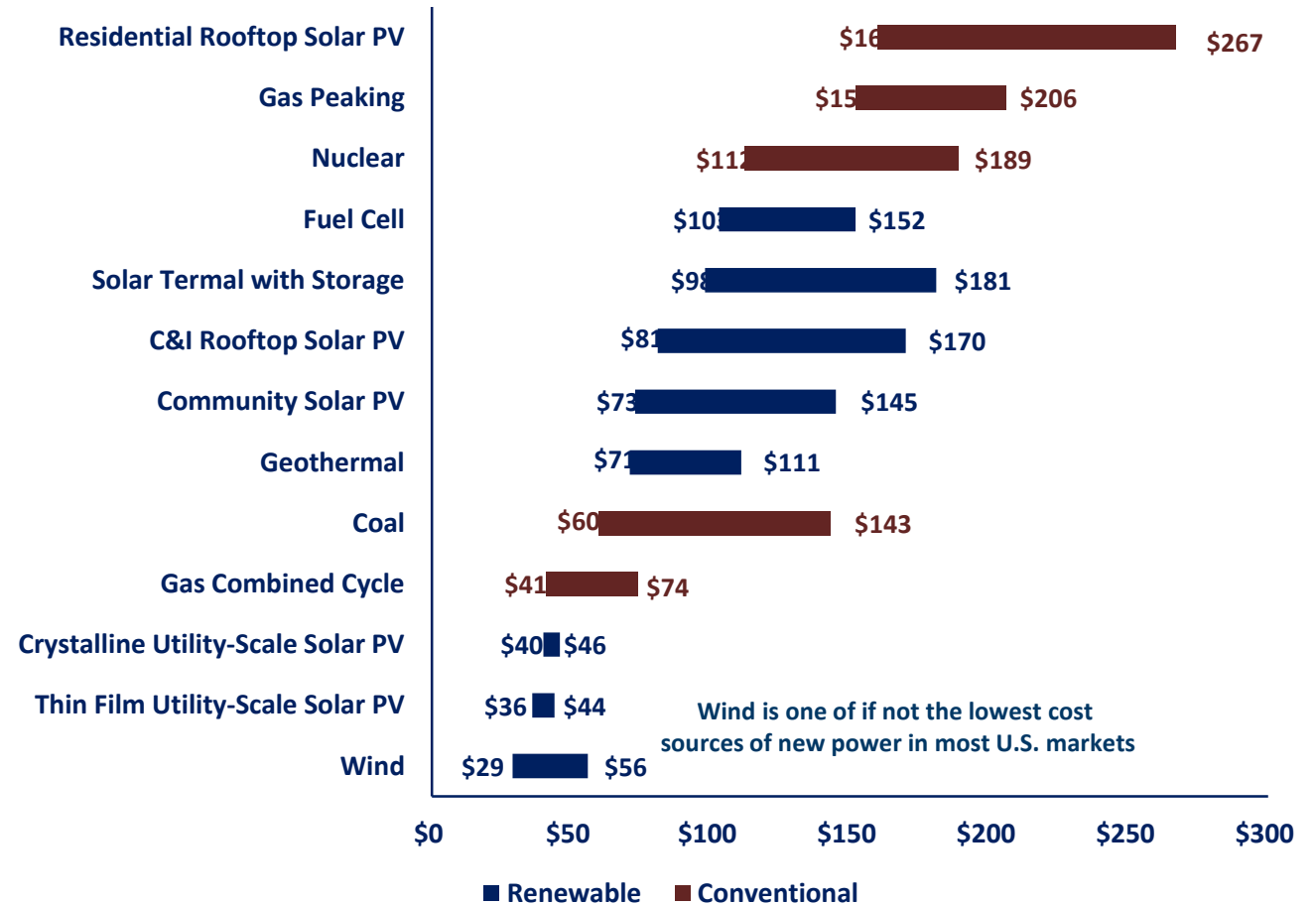
- Over \$145 billion of private investment capital into wind projects over the past 10 years, with \$12 billion in wind projects in 2018
- Rural communities - Drought resistant cash crop to supplement farming via landowner lease payments to farmers & ranchers. 99% of all wind projects are on private land
 - ~\$289 million in 2018
- Property, local, and state tax revenue that help fund local schools, libraries, fire departments, and other community development activities.

COST REDUCTIONS MAKE WIND BOTH BUSINESS & CONSUMER FRIENDLY

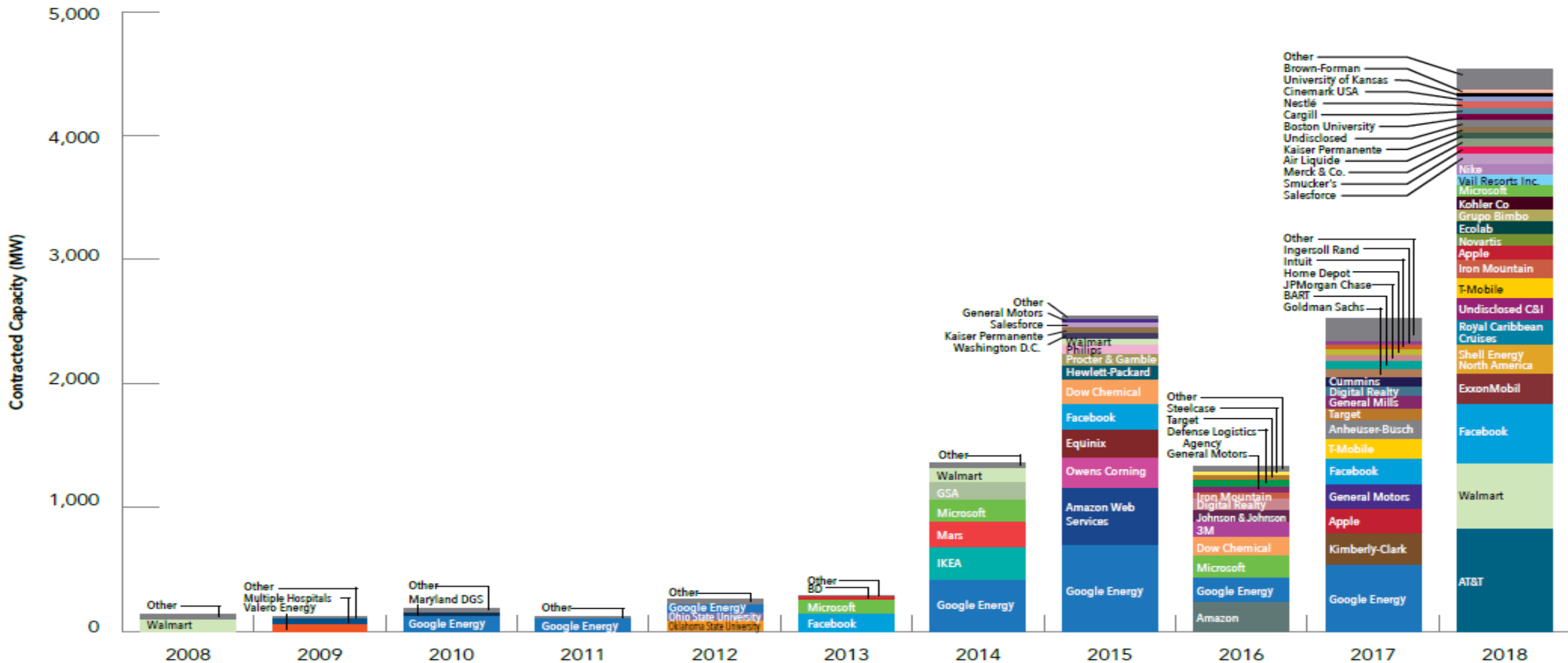
Unsubsidized Wind LCOE



LCOE Comparison



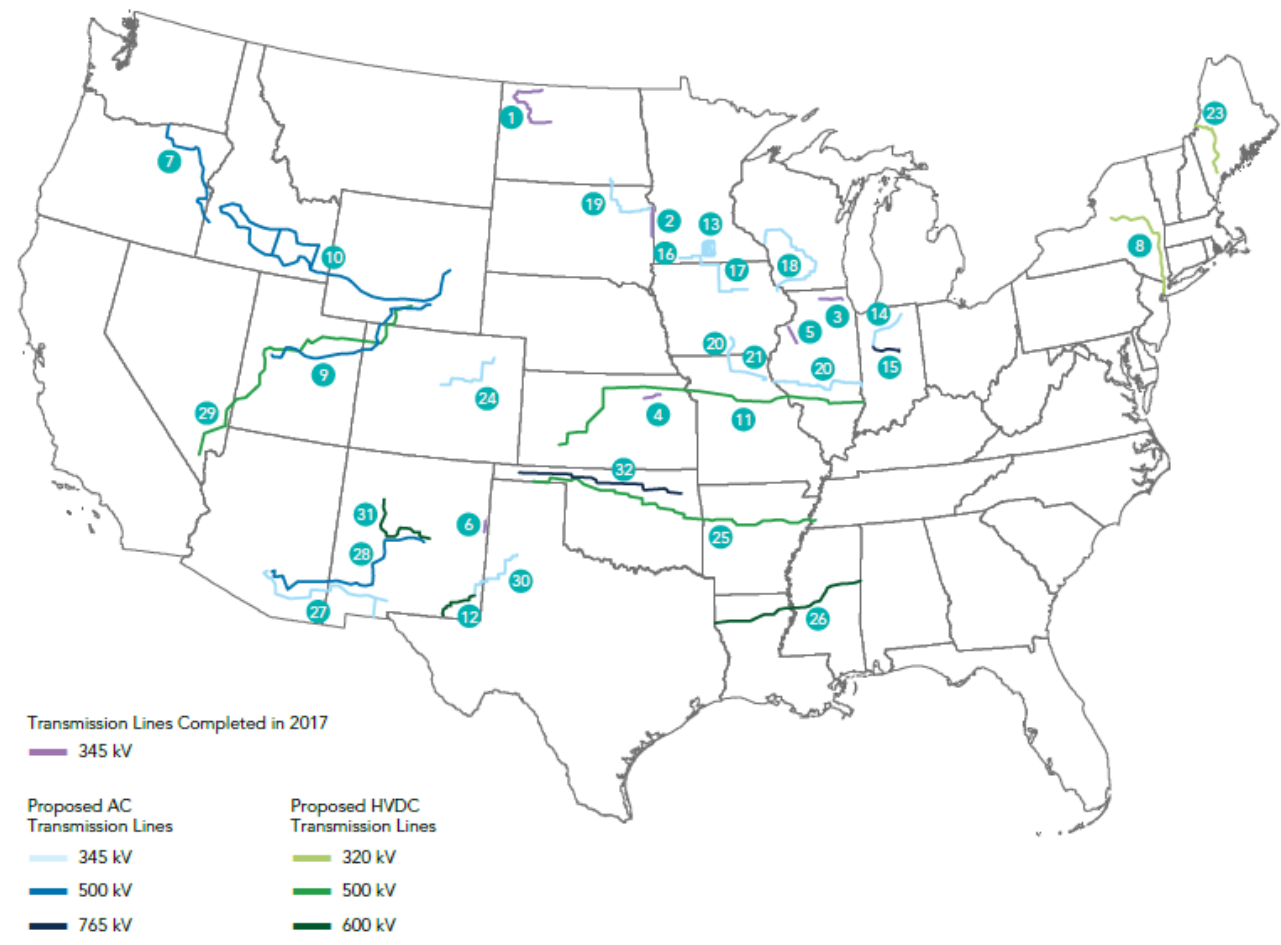
Commercial & Industrial customers contracted record amounts of wind power in 2018





Investment in Transmission Remains Critical

Completed and Proposed Transmission Lines



Transmission provides dozens of quantifiable economic and reliability benefits for consumers. For example, transmission facilitates access to lower-cost electricity generation, reduces the need to build additional generation to hold in reserve, facilitates robust electricity markets, provides economic development and jobs, and helps generators and utilities comply with public policy requirements, among other benefits.

A well-integrated grid increases market opportunities across all energy sources. While transmission does have an upfront cost, transmission more than pays for itself several times over through economic and reliability benefits. With adequate transmission, grid operators can use imports and exports from their neighbors to help meet peak demand, saving billions of dollars per year by not having to build as many power plants and using the ones we currently have most efficiently.

Brattle Group have detailed the expansive benefits of transmission, finding that an annual investment range of \$12-16 billion in transmission through 2030 would stimulate \$30-40 billion in economic activity and support 150,000-200,000 full-time jobs per year across the U.S.



New Power
NEBRASKA



Public Affairs & Education



Grassroots Organization

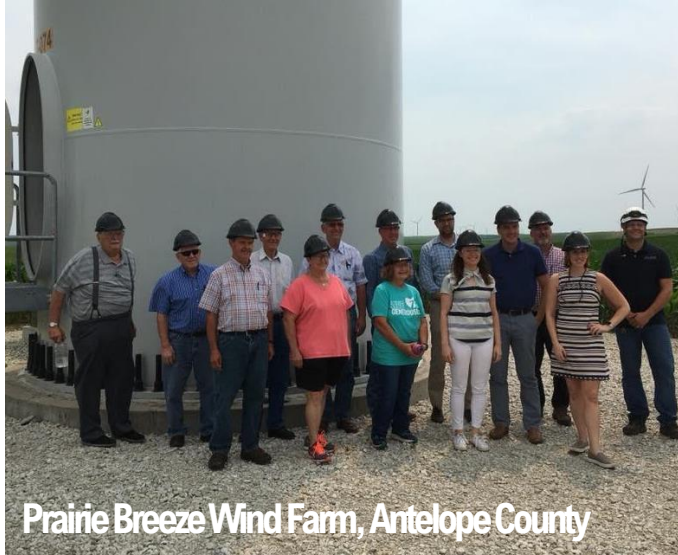


Policy support

Our Mission

New Power Nebraska shines a light on the benefits that wind energy generation brings to Nebraska's communities and rural places - clean power, new farm income, and new jobs.

Public Affairs & Education



Prairie Breeze Wind Farm, Antelope County



Knox County Fair



Lt. Governor Mike Foley Visits Sholes Wind Farm, Wayne County



Harvest & History Festival

STATE OF NEBRASKA

Proclamation

WHEREAS, Nebraska hosts 1,415 megawatts of wind energy, ranking 17th in the nation and producing enough electricity from wind to power 486,700 average homes; and

WHEREAS, Nebraska is home to 22 wind projects with 1,005 total turbines; and

WHEREAS, The wind industry has invested over 2.6 billion dollars of private capital in wind generation projects, manufacturing plants, and supply chain operations; and

WHEREAS, Nebraska landowners receive nearly 5 million dollars in annual land lease payments; and

WHEREAS, Nearly 2,000 men and women in our state are directly employed by wind energy.

NOW, THEREFORE, I, Pete Ricketts, Governor of the State of Nebraska, DO HEREBY PROCLAIM the week of August 5 – 11, 2018 as

AMERICAN WIND WEEK

in Nebraska, and I do hereby encourage the residents of Nebraska to learn about and celebrate wind energy.

IN WITNESS WHEREOF, I have hereunto set my hand, and cause the Great Seal of the State of Nebraska to be affixed this Sixth day of August, in the year of our Lord Two Thousand Eighteen.

Attest:

[Signature]
Secretary of State

[Signature]
Governor



Special guests tour the Northeast Community College wind energy program



Rep. Don Bacon tours Upstream Wind Farm



Steele Flats Wind Farm Tour, Jefferson & Gage Counties



NECC is the only school in the state with a wind energy program



Enel Green Power presents a \$60,000 check to the Allen-Waterbury Fire District

EA

Letter, 2/10: LB373 literally tilts at

Nebraska Public Pulse: Harnessing wind

The Public Inpower: Omaha World-Herald Sherry Dorman, Wayne, Neb.

Jul 27, 2019

bi Land produces energy, too

ld-Herald AR

Feb 12, By Art Tander Neligh

Public Pulse: Iowa's beating us, bad;

Omaha World-Herald Madison Daley, Winside, Neb. Aug 31, 2019

REAL. FAIR. ACCURATE.

Corpo

energy grow Renewable energy potential great in capitalize on

By Bor Wayne Nebraska

The Grand Island Independent

INCOLN JURNAL STAR

Letter to the editor By Haley Mazour Hastings Oct 19, 2019

AWEA Paid Media Campaign

AMERICAN WIND ENERGY ASSOCIATION

WIND POWERS OPPORTUNITY

"I don't have to travel out of the community I was born and raised in."

CHELSEY BORER

Operations & Maintenance Planner at Invenergy



Paid for by the American Wind Energy Association

WIND CREATES JOBS

"The job opportunities are endless. Being able to stay where I grew up and where my family still lives is amazing."

SAM BECKER

Northeast Community College Wind Energy Program Graduate



Paid for by the American Wind Energy Association

WIND BUILDS NEBRASKA FUTURES

"We'll be building three state of the art science classrooms...a new middle school/junior high."

AMY SHANE

Superintendent, O'Neill Public Schools



To find out how new tax revenue from wind energy helps build new schools, visit newpowernebraska.org

New Power NEBRASKA

► Campaign also supplemented with radio and digital ads



https://www.youtube.com/watch?v=yv_sWCVbaA&t=57s

Grassroots Organization



Ask NE senators to oppose LB 155 & LB 700

This week state senators will consider two bills that unfairly penalize Nebraska wind energy. Lawmakers need to hear from supporters of wind energy across the state.

Please consider signing your name to the following letter to tell elected officials you support wind energy in Nebraska. Ask your friends to sign as well.

With Nebraska recently becoming the fastest growing state for wind energy development, it is crucial to continue this momentum into 2019. The more voices that call for more clean, low-cost energy production in our state, the stronger the message!

[View petition here.](#)

Fill out your information below to support wind energy in Nebraska.

Sign with Facebook

Title

Full Name

Address

Zip city and state not required

Phone

Email

Submit →

- Send me emails about this campaign
- Send me text messages about this campaign

Check the boxes to receive email and text updates from us. You can unsubscribe at any time.

+250
advocates
across
the state



138%
follower increase
in 2019

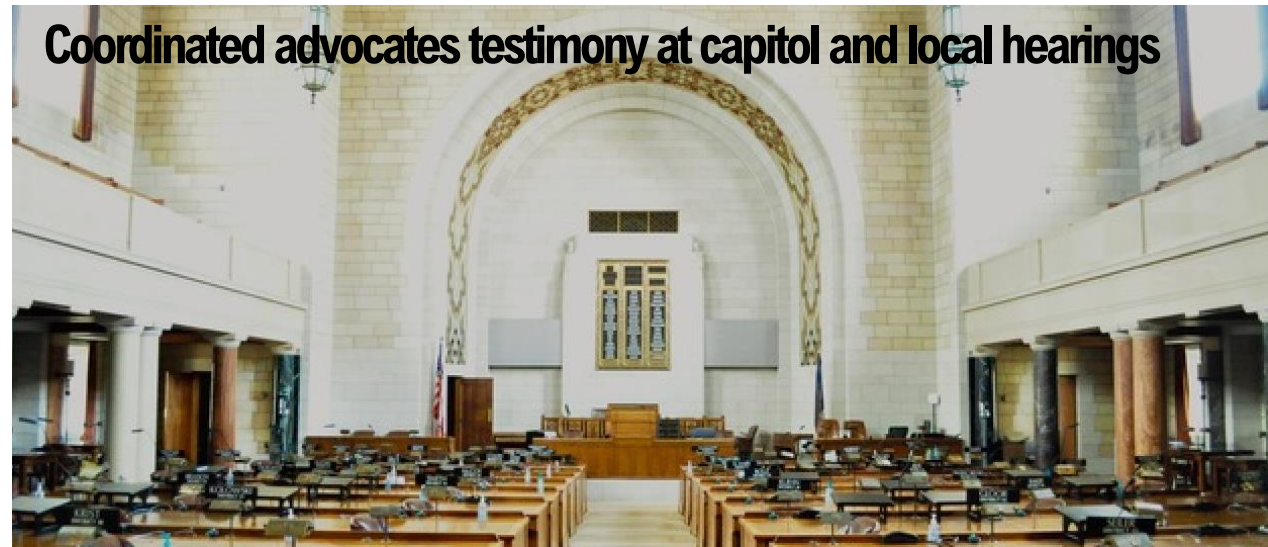
Policy Support

AWELA AMERICAN WIND ENERGY ASSOCIATION

- Provided testimony at county board meetings
- Engaged advocates on state legislative policies
- Petition signing / Letters of support
- Engaging the public & political leaders



Nebraska First Lady, Susanne Shore, addresses the crowd at the groundbreaking for the Sholes wind project in Wayne County.



Coordinated advocates testimony at capitol and local hearings

A

New Power NEBRASKA

www.NewPowerNebraska.org



Contact us:

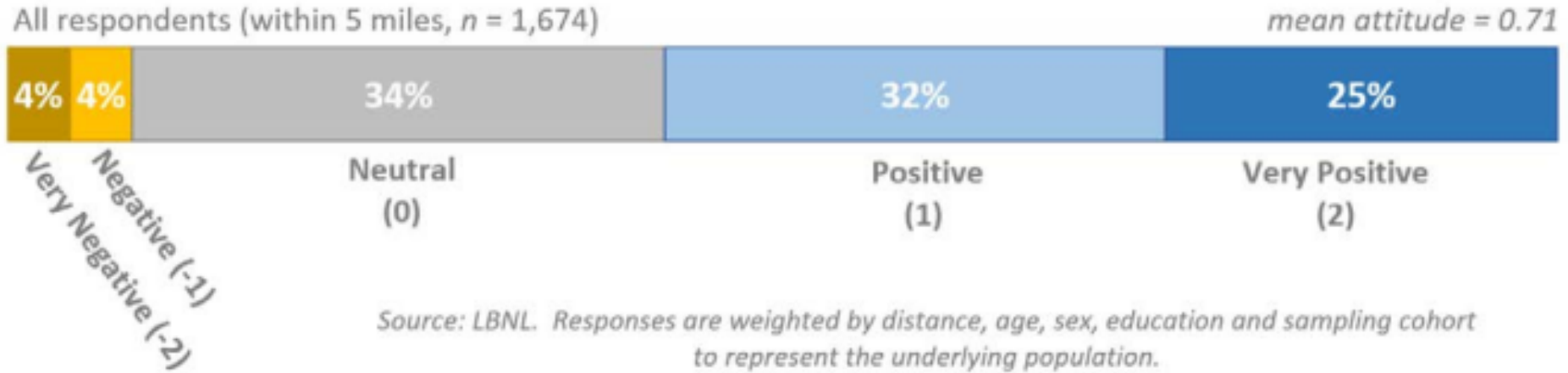
Josh Moenning, *Executive Director*
josh@NewPowerNebraska.org

Become an advocate today by signing up with New Power Nebraska!

A landscape photograph featuring several wind turbines in the distance, a body of water in the foreground, and a sky with soft, golden light from a low sun. The text 'Tools for Stakeholder Engagement' is overlaid in large white font.

Tools for Stakeholder Engagement

What is your attitude toward the local wind project now?



Results Indicate an Average Attitude of Positive, or at Minimum, Neutral Attitude towards Wind Energy *following* Construction.

Hoen, B., J. Rand, R. Wiser, J. Firestone, D. Elliott, G. Hübner, J. Pohl, K. Kaliski, M. Landis, and E. Lantz. 2018. National Survey of Attitudes of Wind Power Project Neighbors: Summary of Results. Lawrence Berkeley Laboratory.

What changes attitudes towards a Local Wind Project?

Positives

- Compensation
- Perception of the Planning Process
- General Attitudes toward Wind Power

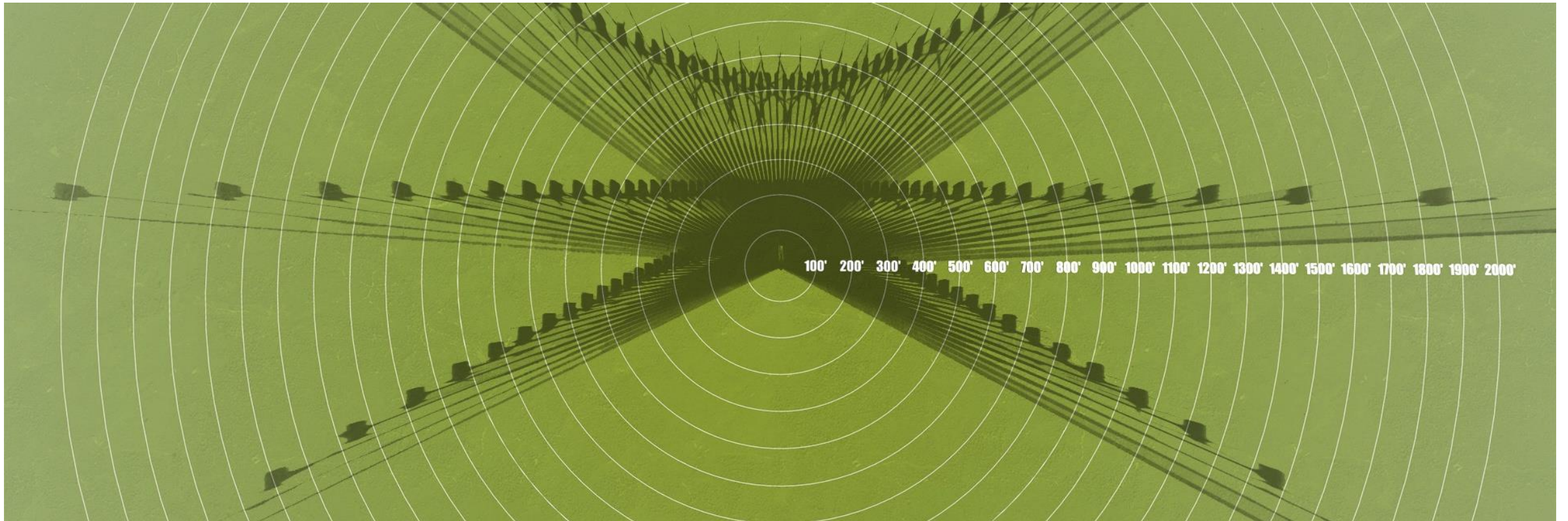
Negatives

- Sound
- How Turbines Fit Into the Landscape
- Stakeholders' Attachment to the Local Community

Hoehn, B., J. Rand, R. Wiser, J. Firestone, D. Elliott, G. Hübner, J. Pohl, K. Kaliski, M. Landis, and E. Lantz. 2018. National Survey of Attitudes of Wind Power Project Neighbors: Summary of Results. Lawrence Berkeley Laboratory.

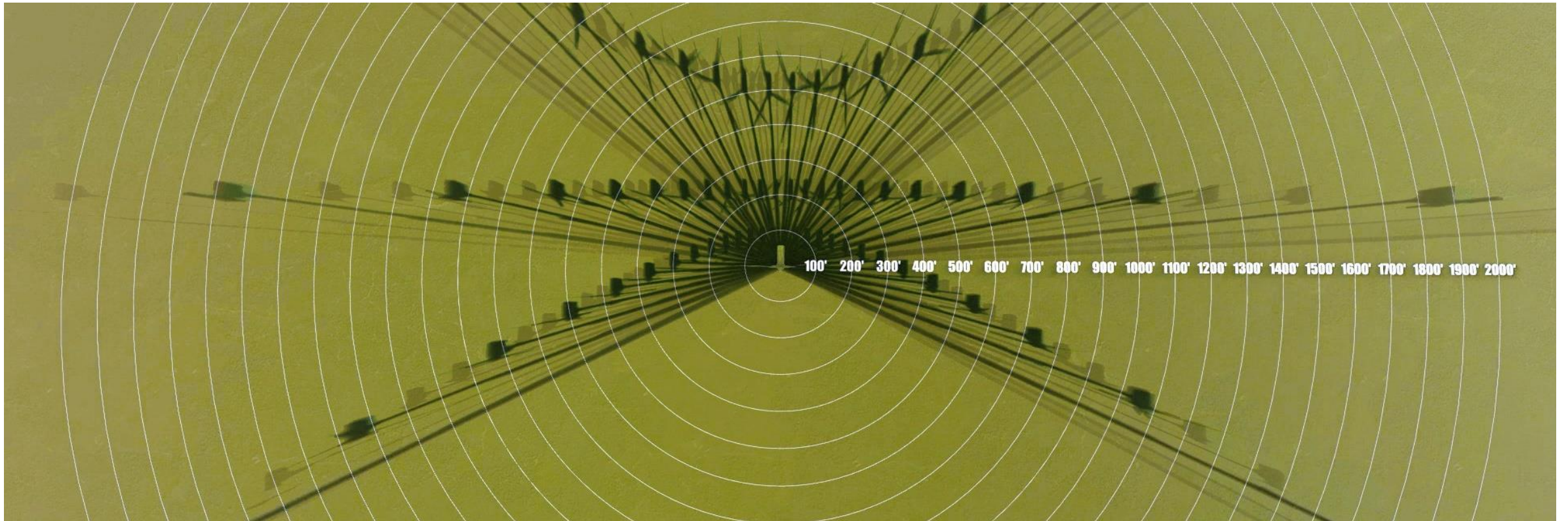


Noise & Shadow Flicker



Shadow Flicker Study – Central Nebraska

10-minute intervals



Shadow Flicker Study – Central Nebraska

30-minute and 10-minute interval for comparison



GLINT-AND-GLARE STUDY



SIMULATED GLINT-AND-GLARE



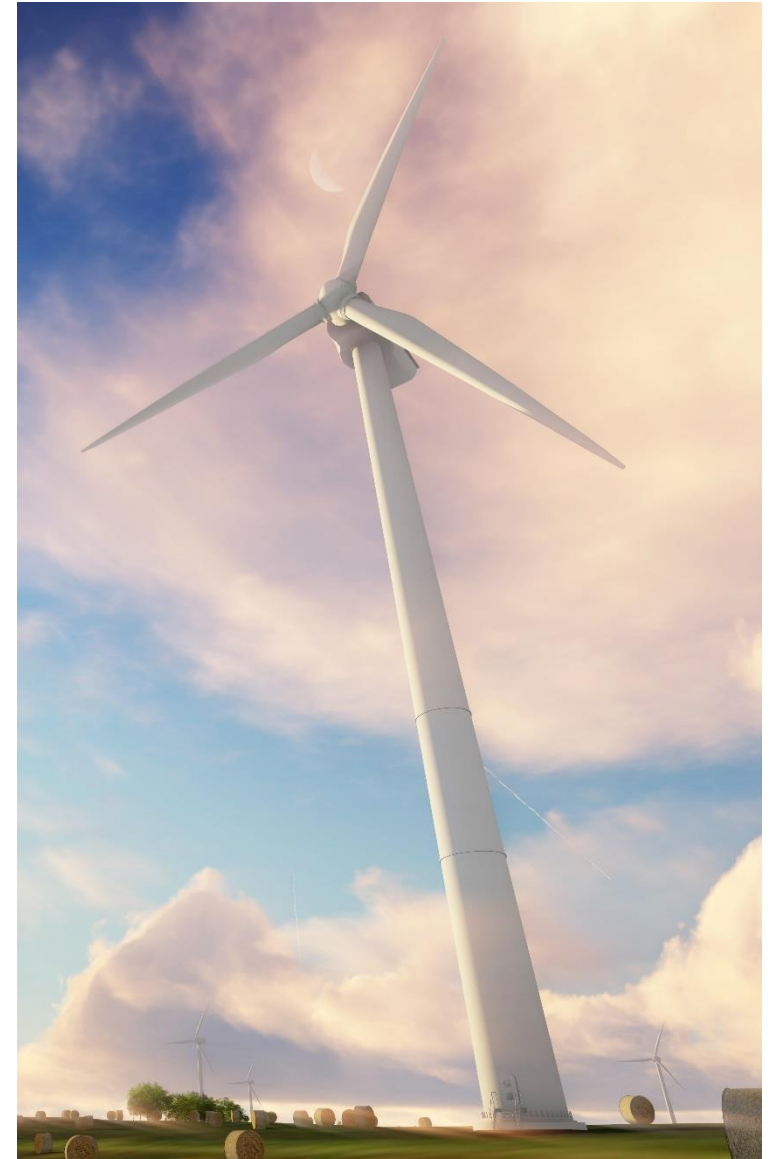
A landscape photograph featuring several wind turbines in the distance, silhouetted against a dramatic sky with large, golden clouds. The foreground shows a body of water with reeds and grasses. The overall scene is bathed in the warm light of a sunset or sunrise.

Turbines on the Landscape



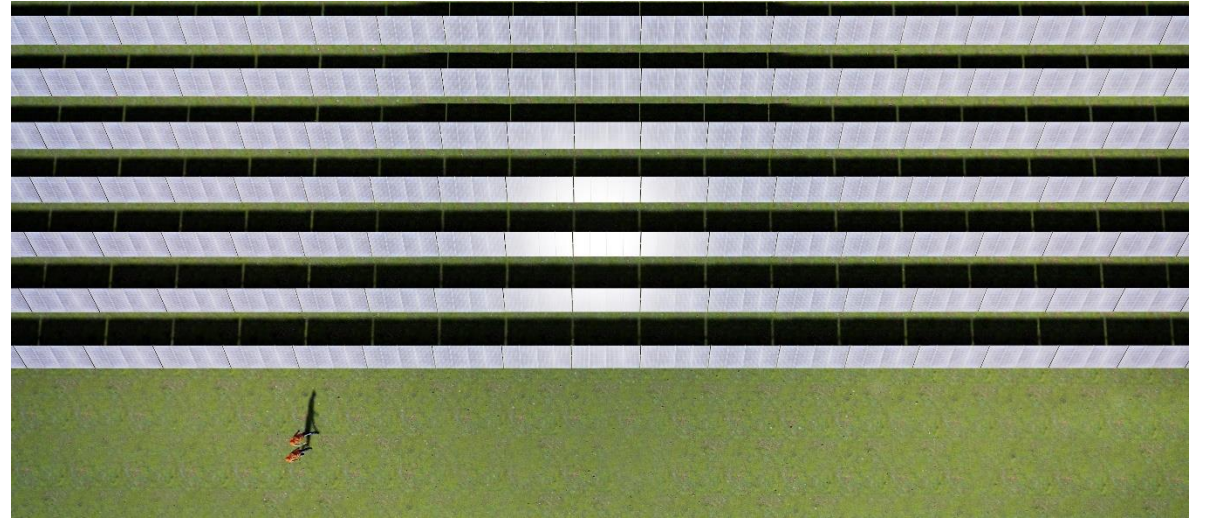
STATIC PHOTO ASSESSMENT

















3D MODELING OF PROJECTS



An aerial photograph of a wind farm in rolling green hills. The sun is low on the horizon, creating a warm, golden glow. The wind turbines are scattered across the landscape, with one prominent turbine in the foreground on the right. The hills are covered in green grass, and there are some dirt roads or paths winding through the terrain.

Stakeholders and the Land

Unmanned Aerial Vehicles (Drones)



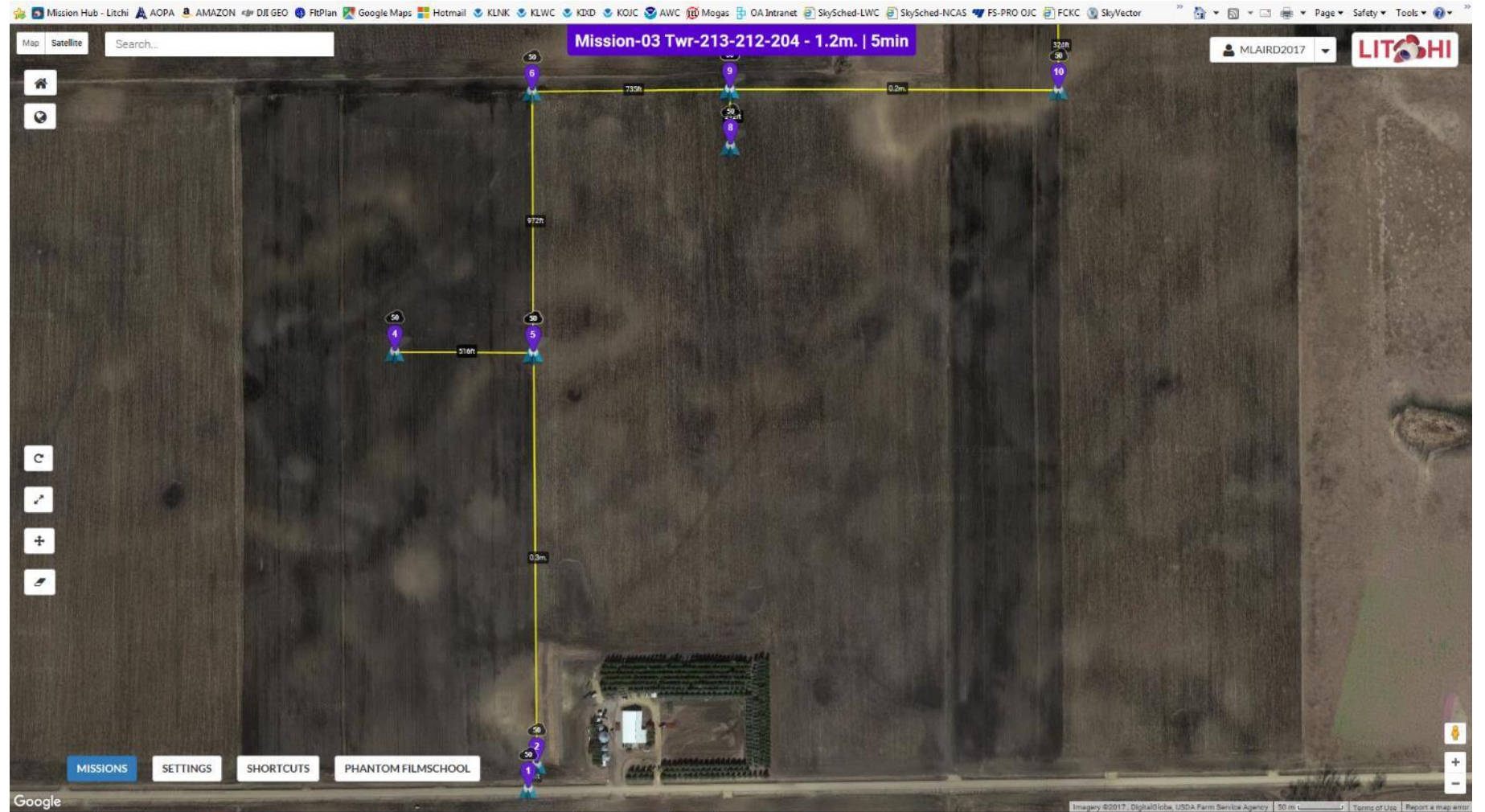
Equipment

- Draganflyer X4-ES
- Phantom 4 Pro
- Inspire Pro
- mdLiDAR3000
 - Riegl miniVUX-1DL



Software

- Pix4D
- Map Pilot
- Litchi-Waypoints
- Virtual Surveyor
- Cyclone



Renewable Energy UAV Applications

- Turbine Micro-Siting
- Survey and Mapping
- Crop Damage Mapping
- T&D Line Inspection
- Pre/Post Project Documentation
- Asset Inspection & Documentation
- Environmental Observation



Micro-Siting: Access Road & Turbines



Turbine Micro-Siting



Crop Damage Mapping





Crop Damage Mapping

Before Development



Crop Damage Mapping

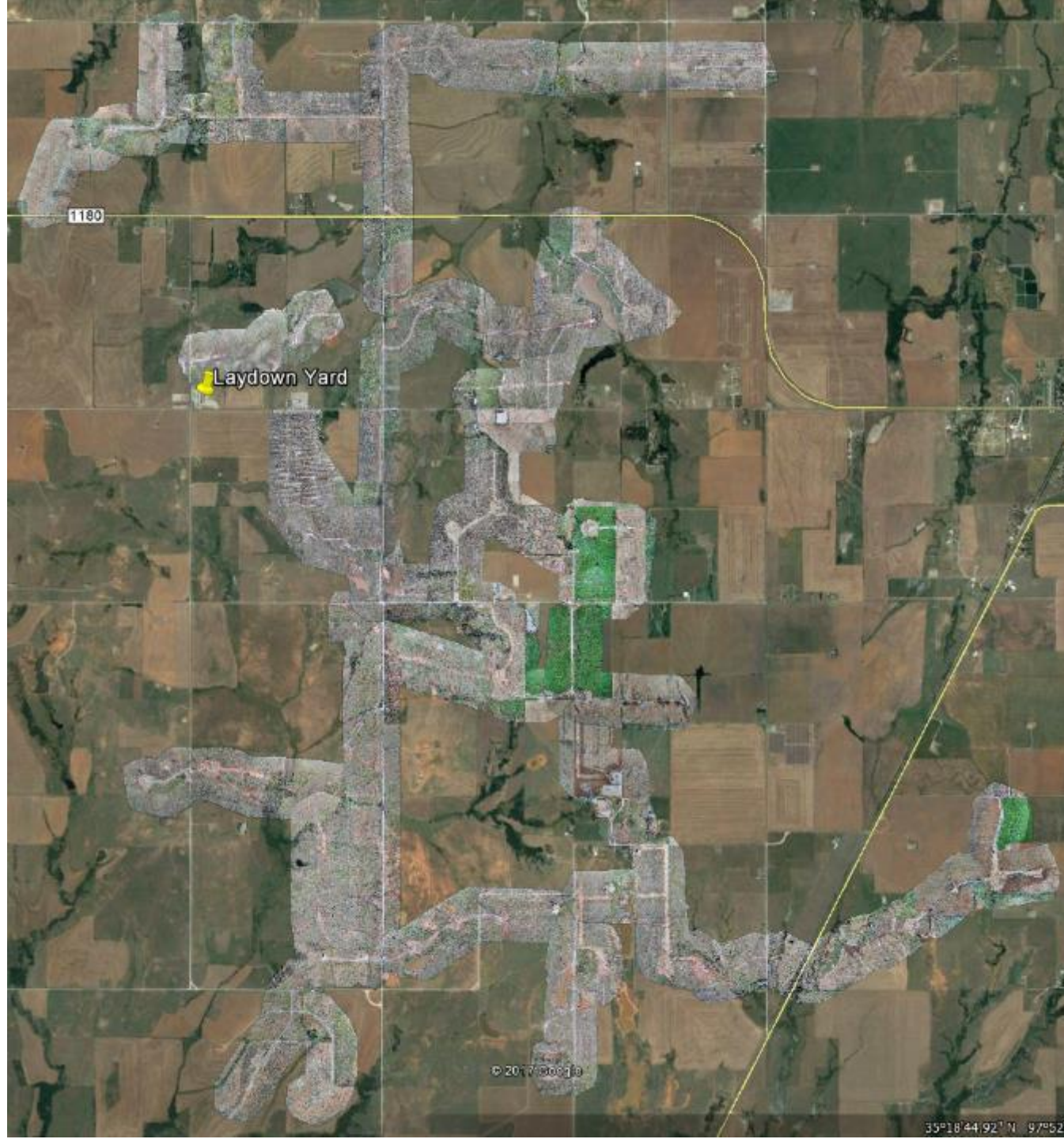
After Development



Crop Damage Mapping

Acreage

Completed Site





Project Progress: Rattlesnake Creek Windfarm

Northeast, NE



Post Project Marketing Photography: Golden Hills Windfarm
San Francisco, CA