

Affordable Renewable Wind Energy Generated in Mississippi

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Nations Energy Solutions

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- NES is a renewable energy developer focused on the southeastern United States since 2011, with projects and assets in 16 states.
 - Sean Roberts, CEO – Constructed over 3,700 wind turbines since 1983
 - Bob Bergstrom, President – Developed over 2,500MW of wind across the US.
- NES secured a wind energy lease with the State of Mississippi for the Parchman State Penitentiary lands in 2013
- Member of the Delta Council
- Member of the Mississippi Energy Institute (MEI)

Led by Sean Roberts, CEO & native of Starkville, MS:

- Born and raised in Starkville, MS
- Father was a professor at MSU
- Wife born and raised in Greenville
- Many friends and family in state

“I intend to bring wind energy to my home state of Mississippi”

- S. Roberts

Terra-Gen & Nations Energy Solutions

Terra-Gen has experience in all facets of power generation – development, financing, construction, and operations

- Terra-Gen and NES Principals
 - Randy Hoyle, Senior VP, Head of Wind and Solar Development, Terra-Gen Power
 - Sean Roberts, CEO, Nations Energy Solutions (NES)
 - Bob Bergstrom, President, NES
 - Team has developed the first wind projects in Kansas, Oklahoma, New Mexico, North Dakota, South Dakota, Puerto Rico, and 2nd wind project in Iowa
- Terra-Gen is a leading U.S.-based power generation and development company owned by Energy Capital Partners, a leading financial sponsor with a proven track record in the power generation market
 - Terra-Gen is focused on the North American market and owns 1051 MWs (net equity) of wind, geothermal and solar generating capacity in operation across 25 renewable power facilities throughout the United States
 - Operate and maintain of over 2,000 MW of renewable projects
 - Developed the nation's largest wind energy project, the Alta Wind Energy Center, a \$3 billion 1,546MW multi-phased wind project located in California

Overview of In-State Renewable Projects

Renewable projects (wind and solar) have been in development since 2011

- Several projects under development throughout the Mississippi Delta since 2011, chiefly the Parchman Wind
 - Projects in Sunflower, Tunica, Panola, Coahoma, and Washington Counties

Focus on Parchman: Key Dates

- **March 2012** – Successfully changed MS law to allow multi-year lease on state property for renewable energy projects
- **September 2013** – RFP issued by the Department of Finance and Administration for a Parchman Wind Energy lease
- **December 2013** – NES selected in DFA RFP
- **Spring 2014** – Finalized lease with financeable terms for roughly 14,000 acres
- **February 2015** – Executed lease received by NES and payment for year one received by DFA
- **April 2015** – Meteorological tower installed at Parchman

PARCHMAN WIND

Local Economic Impacts

Based on 150MW of Wind Energy:

** Requires NO investment from community. Terra-Gen NES can generate an economic impact model to depict full economic impact into specific communities of Mississippi*

Landowner (State of MS) Royalty – 150MW

- Landowner royalty payments of roughly \$32 million over 25 years
- Each turbine (75) takes approximately $\frac{1}{4}$ – $\frac{1}{2}$ an acre out of production

Property Tax – 150MW

- In-State Wind Energy investment of \$300 million into the local property tax base will yield roughly \$30 million in revenue over a 25-year period

Tourism & Development

- Demand to see projects will draw local residents and schools, including neighboring states without wind projects
- Wind tech training program can be implemented at a local tech college/school

Construction – 150MW

- Peak workforce of 250-300 people for 8-9 months of construction
- Ancillary spend of \$2-3 million (hotels, food, etc.) during construction

Permanent Jobs – 150MW

Attracts high performance work force of 12-15 individuals

Good for the Environment, the Economy, and the Energy Consumer

- Good for health of the citizens of Mississippi

Utility Benefits

- i. Promotes economic development in state – will bring hundreds of millions of dollars of tax base, landowner royalty payments and a high-performance workforce
- ii. Fixed-price hedge against future energy and commodity price volatility
- iii. Diversifies utility's in-state generation mix by procuring in-state renewables at a low cost

The Basics of Wind Energy

Four Basics of Wind Development

1) Land

- NES has secured 150+MW of wind potential at the Parchman State Penitentiary site
- Multiple other sites being pursued throughout the Delta since 2011

2) Wind

- Resource is comparable to other states with significant wind development
- Over 5 years of data at five locations indicate a commercially viable wind resource

3) Transmission

- Critical to initial project siting, multiple satisfactory options available
- Parchman project in MISO Queue

4) Market

- Emerging market

Required Elements

- ❖ Permitting
- ❖ Financing

Advances in Technology

Two significant changes:

1. Turbine hub heights were 65 meters 10 years ago – they can be 129m today
 - Substantial increase in wind resource -- Speeds increase significantly with height
2. Turbines are much more efficient than 10 years ago

Performance of a wind farm depends on:

- Hub height: Wind speed in the Rotor Swept Zone
- 8760: Shape of wind production profile
- Turbine selection: Low-gear turbines for lower wind speed areas

Blades

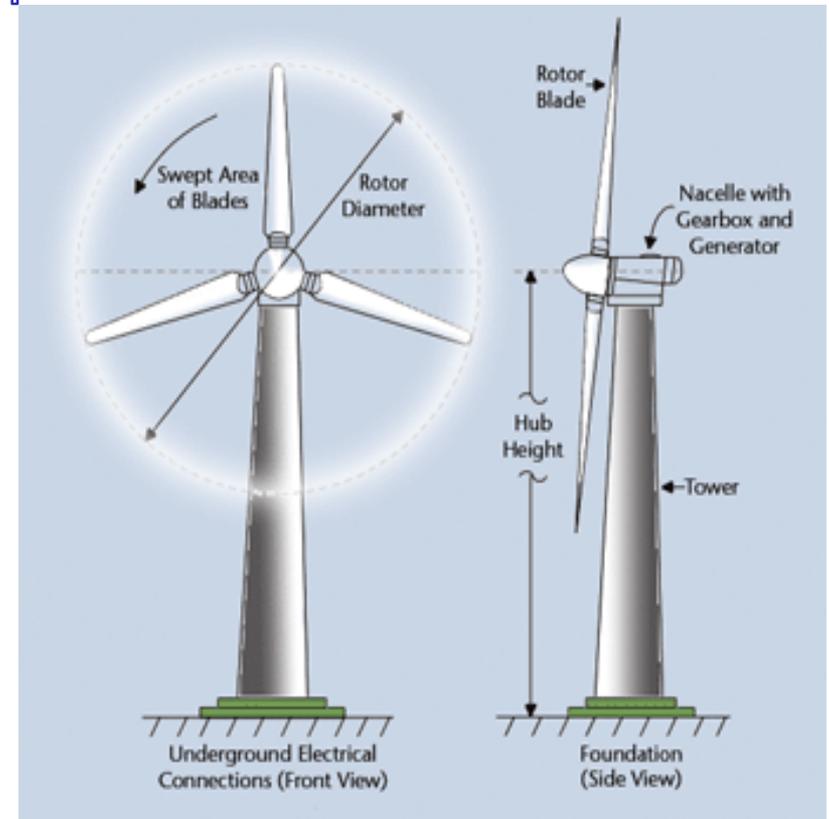
- Increased rotor diameter, lighter
- Evolution from 65m to 126m

Gearboxes

- More efficient, lower maintenance

Installation Engineering

- Better engineering to lower installation and capital costs



Wind in Mississippi?

Accepted wisdom has been that winds are not sufficient in Mississippi...

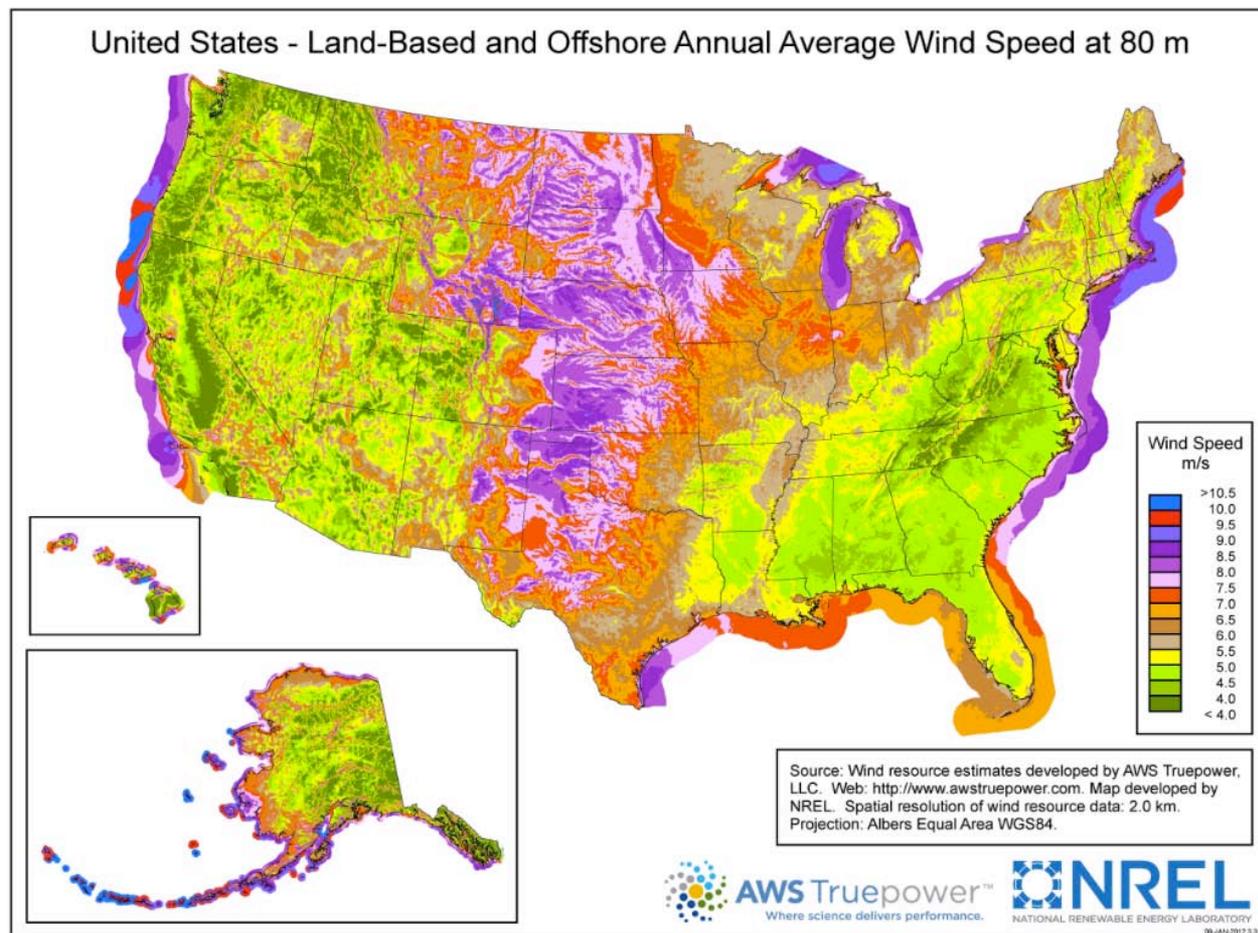
- So, what's changed?

Technology

- Taller towers & larger rotors
- Turbines specifically designed for low wind regimes
- Improved siting & layout modeling software

Economics of Wind

- Price is a function of capital costs, construction costs, and capacity factor (NCF)



Mississippi Wind Resource Evaluation



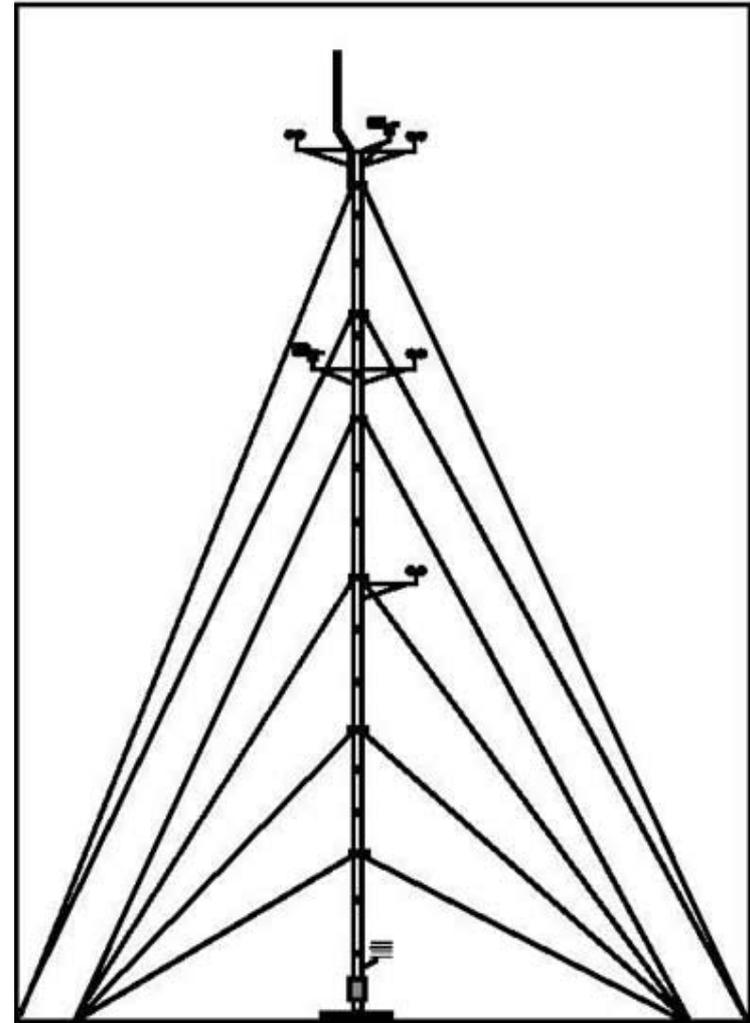
Meteorological Tower

Top
2 Anemometers + Vane

Mid
2 Anemometers + Vane

Lower
2 Anemometers

Ground
Temperature, Pressure
and Logger



Met Tower Schematic

Why Renewables?

Why should Utilities Invest in Renewables?

- Fixed-Price Hedge against future energy and commodity price volatility.
 - Price certainty for 20-25 years.
- Increased Diversity of utility's in-state generation mix by procuring in-state renewables at a low cost.
- Economic Development
 - Jobs, tax base, royalty payments
- Regulatory Hedge
 - Compliance with the Clean Power Plan, August 2015
- Added Rate Base – (assuming ownership)
- Declining Production Tax Credit (PTC) – Declines from 100% to zero over 5 years

Why should Communities Invest in Renewables?

- Abundant supply of locally generated, affordable electric energy
- Health benefits of zero-emitting electric generation are quantifiable
- Significant investment in rural communities no public funds required
- Job creation and training for a rapidly expanding industry

Photographic Introduction to Wind Energy



Road Construction



Trenching for Collection System



Turbine Foundation



Turbine Foundation



Turbine Foundation



Turbine Foundation



Turbine Foundation



Turbine Foundation



Tower Section



Tower Construction



Tower Construction



Tower Construction



Tower Construction



Tower Construction



Tower Construction



Tower Construction



Turbines Blades



Turbine Blades



Blade & Rotor Assembly



Final Assembly



Time to Examine Wind Generated in Mississippi

Now is the Time to Consider Wind in Mississippi

- Absent a safe harbor, 100% federal PTC value erodes 20% (about \$8/MWh) in 2017
 - PTC value drops 20% more in 2018
 - Safe Harbor for 100% value is still possible this year, however time expires very soon
- Price of natural gas is low and a wind is a natural hedge against future gas price volatility
- Low cost local wind today should be favored over the uncertainty and chance for a marginally cheaper wind product that could someday be imported from another state
- Regulatory uncertainty means prices for both major equipment suppliers and labor are low
- Significant support to the Department of Corrections Budget (at Parchman) with annual royalty payments from turbine production