

Economic Development from Power Sector Development in Wyoming



WIA Fall Board Meeting

Eric Lantz

**National Renewable
Energy Laboratory**

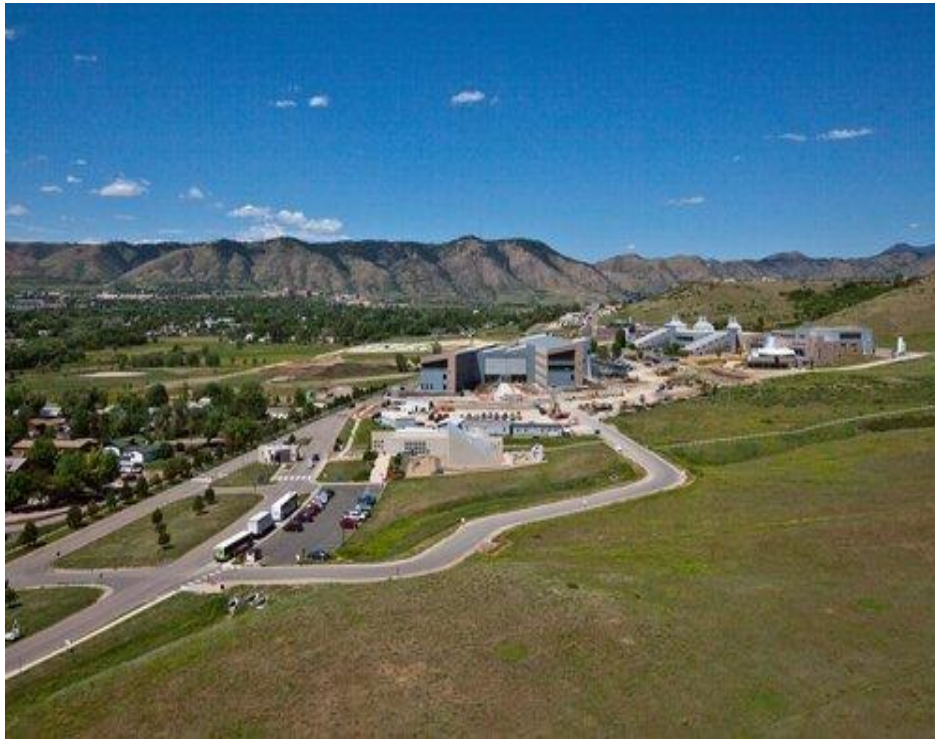
November 9, 2010

Presentation Overview

- NREL Background
- Capabilities and Past Research
- Defining Economic Development Results
- WIA Project Description
- Preliminary Results Sample
- Conclusions



NREL: a Research Laboratory of the U.S. DOE



Expertise includes:

- Basic Science R&D
- Technology, Policy, & Forecasting Analysis
- Technology Commercialization & Deployment

Offices in:

- Golden, CO, Boulder, CO, and Washington D.C.

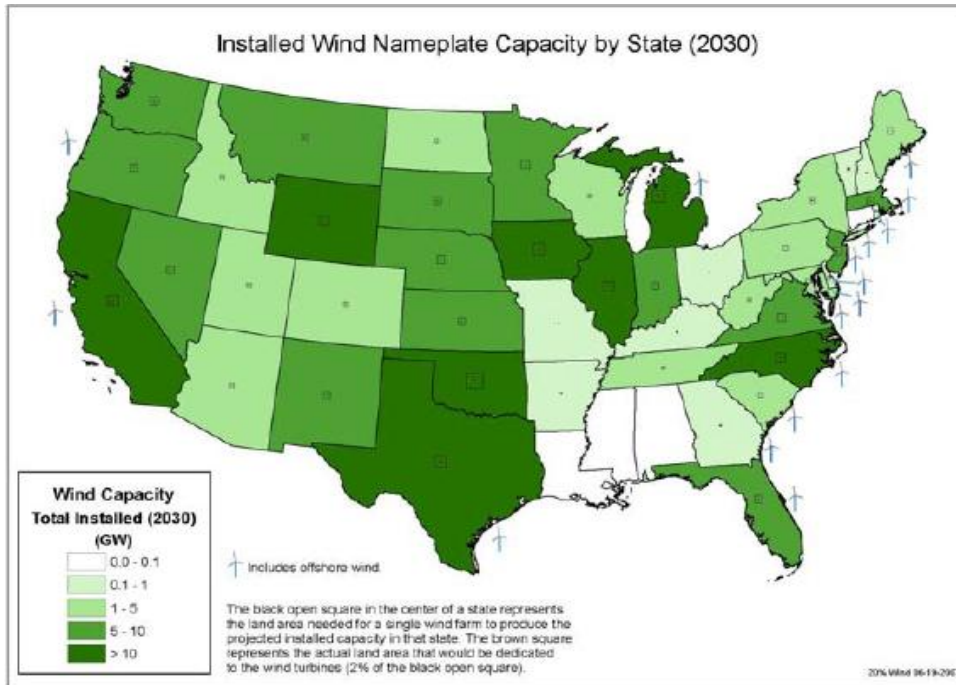
Laboratory staff of more than 1,500 with expertise across :

- Renewables, efficiency, and conventional energy technologies

NREL Analysis

Capabilities and Research

20% Wind by 2030: A Scenario Analysis



U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable.

20% Wind Energy by 2030
Increasing Wind Energy's Contribution to U.S. Electricity Supply

July 2008

Jobs to be Supported by Deployment of 300 GW

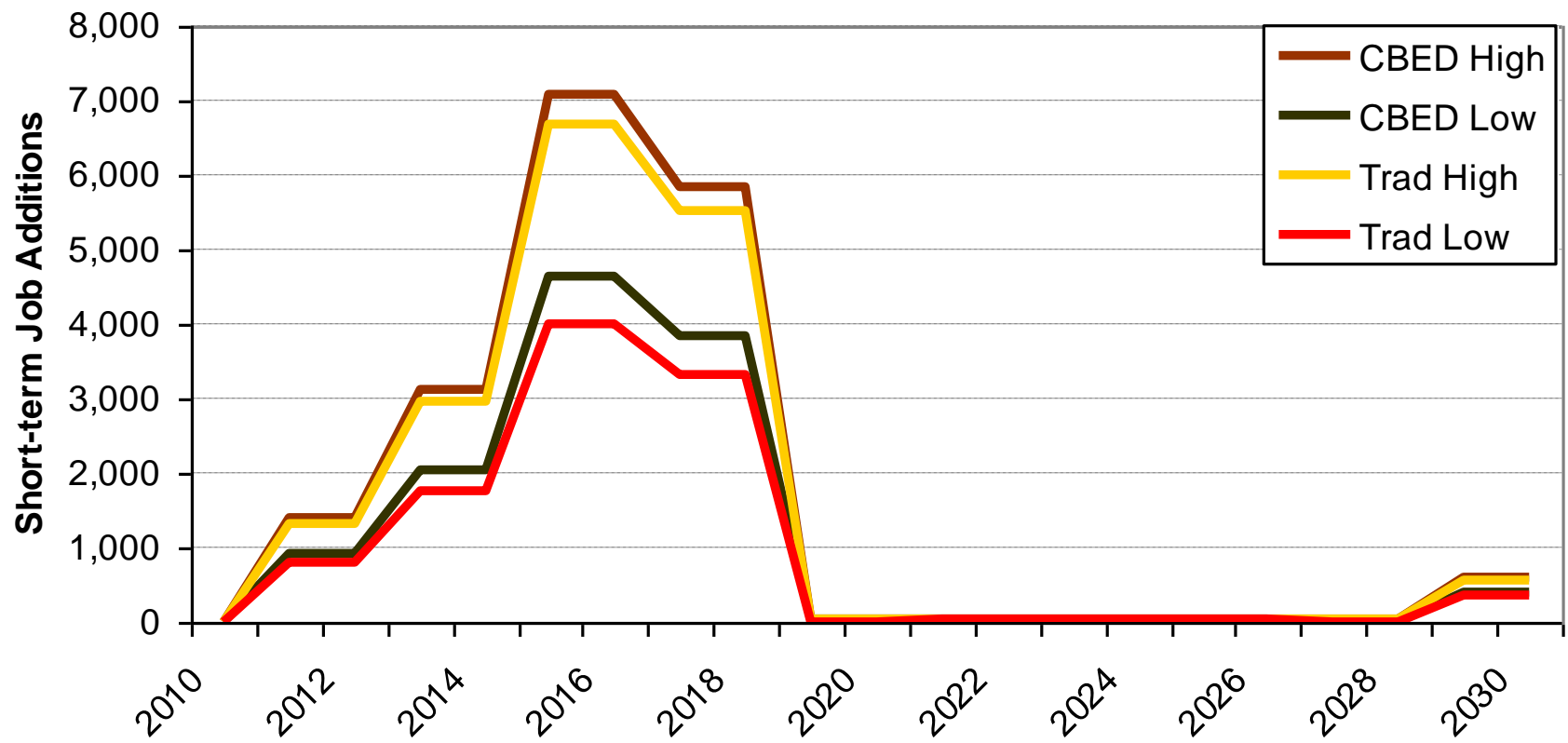
In the last ten years of the scenario, the wind industry could support 500,000 jobs, including over 150,000 direct jobs.



By 2017 total economic output is more than \$50 billion per year, in 2030 total economic output is nearly \$80 billion per year

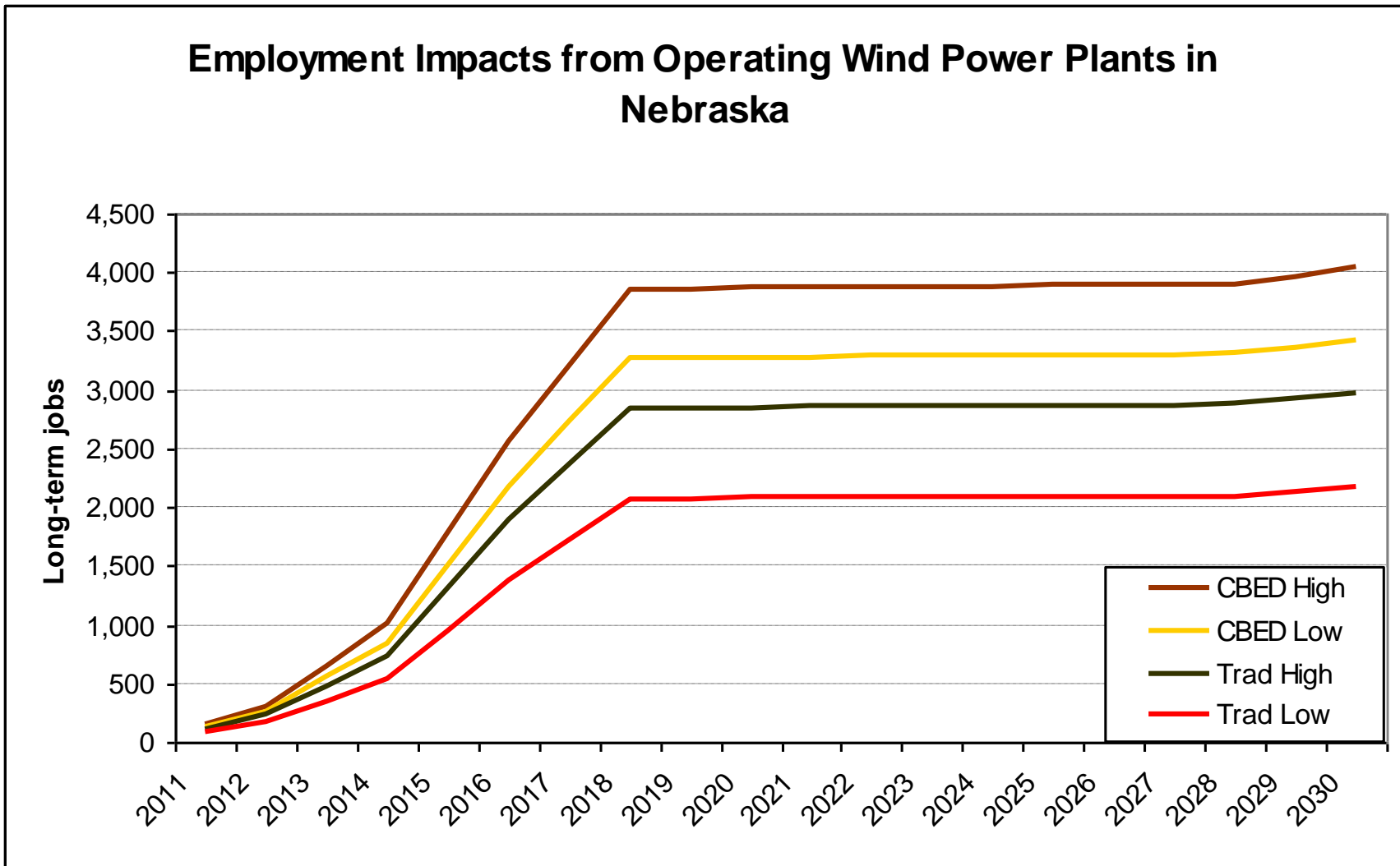
Wind Construction Jobs from 7,800 MW of new capacity in Nebraska

Construction Period Jobs Added to the Nebraska Labor Force from Building 7,800 MW of Wind Power



Total Economic Output: \$2.8 billion to \$5.2 billion

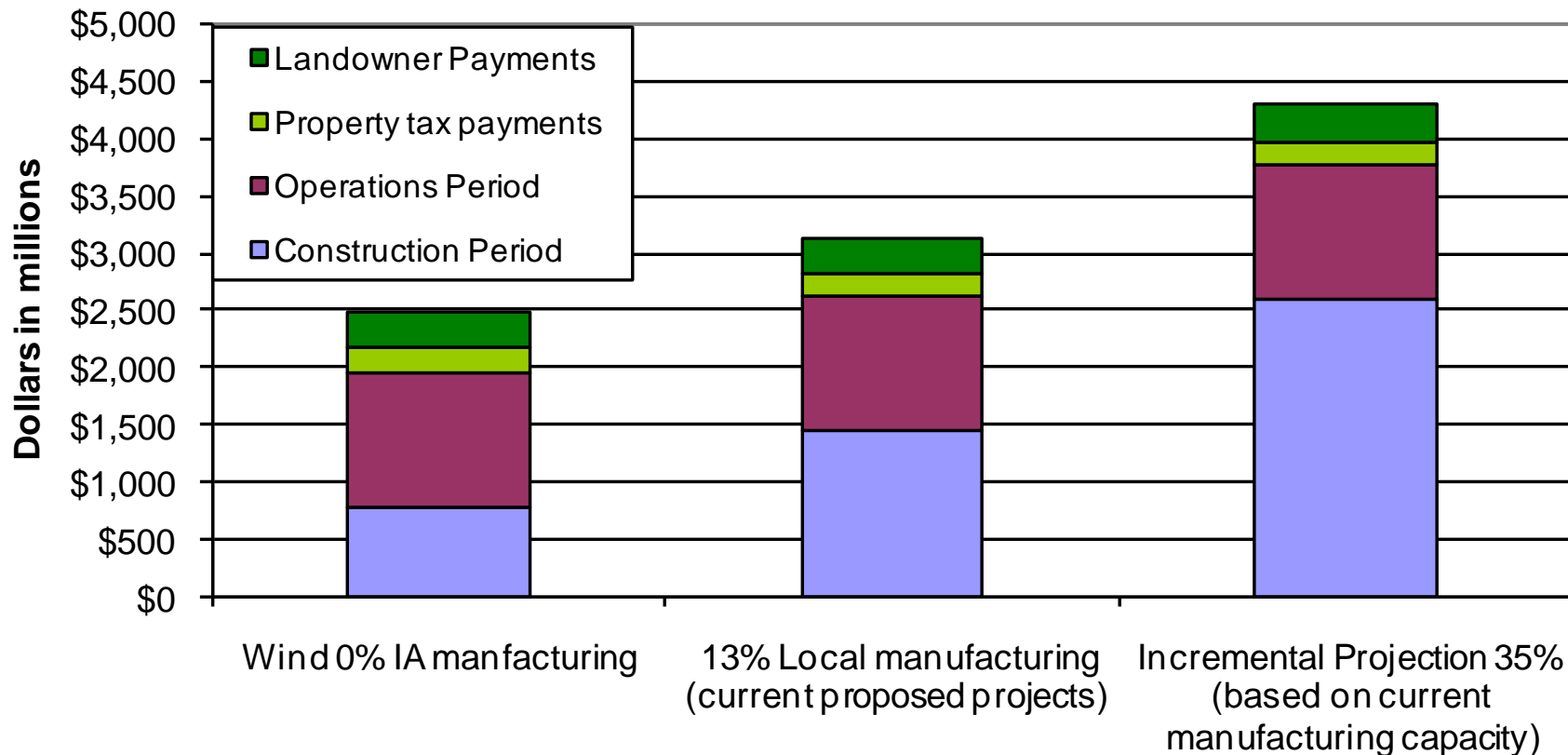
Wind O&M Jobs from operating 7,800 MW in Nebraska



Annual Economic Output by 2018: \$245 million to \$450 million

Critical Project Variables: Local Manufacturing

Manufacturing projections in Iowa (2,400 MW)



Retrospective Analysis of Wind Energy Deployment

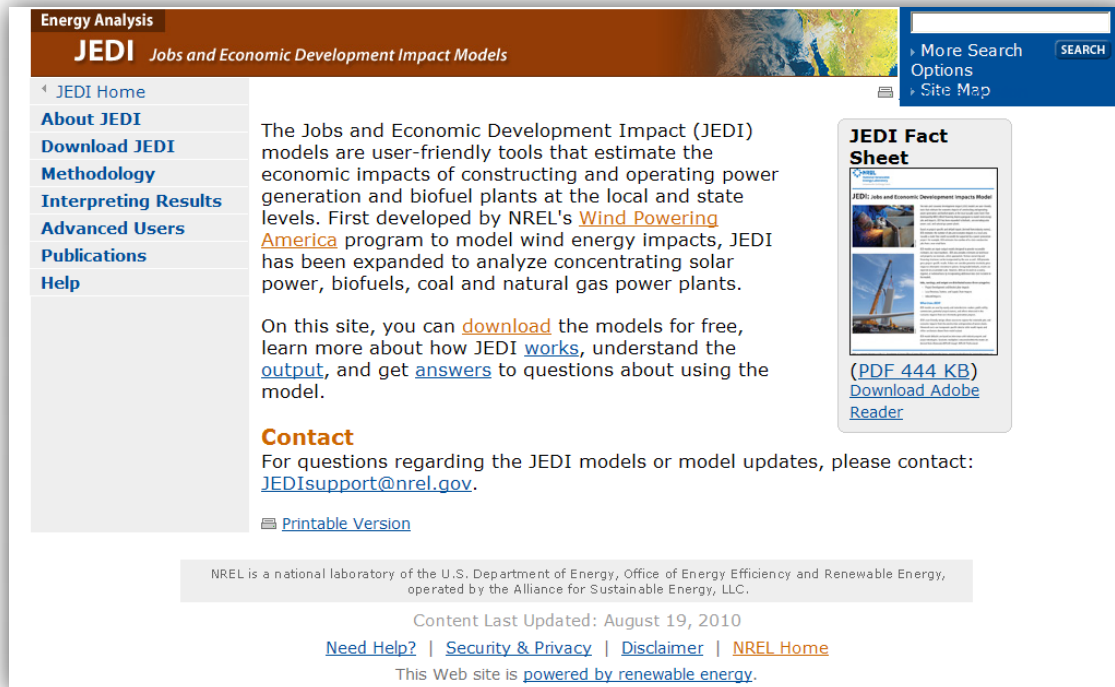
1,000 MW of Wind Power in Colorado:

- *1,700 full-time-equivalent jobs* from construction; total payroll of more than \$70 million
- *300 permanent jobs*; total annual payroll of more than \$14 million
- *\$226 million in economic activity* from the construction period
- *\$35 million in annual economic activity*
- *More than \$4 million in annual property tax payments*
- *More than \$2.5 million annually in income for farmers and ranchers* who lease their land to developers



Analyzing & Interpreting Results

The JEDI Analysis Tool(s)



The screenshot shows the JEDI website homepage. The header includes 'Energy Analysis' and 'JEDI Jobs and Economic Development Impact Models'. A search bar is located in the top right. The left sidebar contains navigation links: 'JEDI Home', 'About JEDI', 'Download JEDI', 'Methodology', 'Interpreting Results', 'Advanced Users', 'Publications', and 'Help'. The main content area features a description of the JEDI models, a 'Contact' section with the email 'JEDIsupport@nrel.gov', and a 'Printable Version' link. A 'JEDI Fact Sheet' PDF is also highlighted with a download link. The footer contains information about NREL's affiliation and the date of the last content update (August 19, 2010).

Energy Analysis
JEDI Jobs and Economic Development Impact Models

More Search Options Site Map SEARCH

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Help

The Jobs and Economic Development Impact (JEDI) models are user-friendly tools that estimate the economic impacts of constructing and operating power generation and biofuel plants at the local and state levels. First developed by NREL's [Wind Powering America](#) program to model wind energy impacts, JEDI has been expanded to analyze concentrating solar power, biofuels, coal and natural gas power plants.

On this site, you can [download](#) the models for free, learn more about how JEDI [works](#), understand the [output](#), and get [answers](#) to questions about using the model.

Contact
For questions regarding the JEDI models or model updates, please contact: JEDIsupport@nrel.gov.

[Printable Version](#)

JEDI Fact Sheet
(PDF 444 KB)
[Download Adobe Reader](#)

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

Content Last Updated: August 19, 2010
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This Web site is [powered by renewable energy](#).

Currently Public

- Utility Scale Wind
- Natural Gas
- Coal
- Geothermal
- Ethanol
- Solar (CSP, PV)

In process

- Water
- Biopower
- *Transmission*
- Offshore, small wind

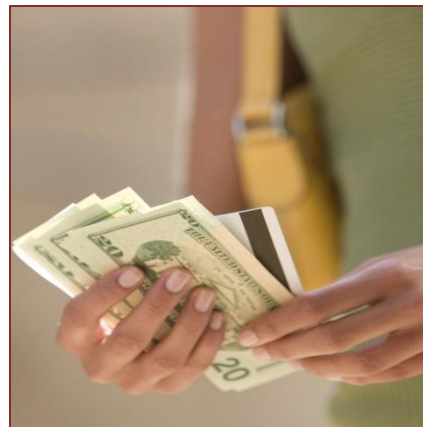
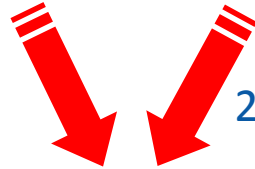
Economic Development at Multiple Levels



1. On-site Labor and Professional services



2. Turbine Production and Supply Chain



3. Induced Economic Activity
(Household purchases due to injection of income)

Project Development & Onsite Labor



Sample Jobs:
Truck Drivers
Crane Operators
Earth Moving
Cement Pouring
Management
Support



Local Revenues, Turbine, & Supply Chain

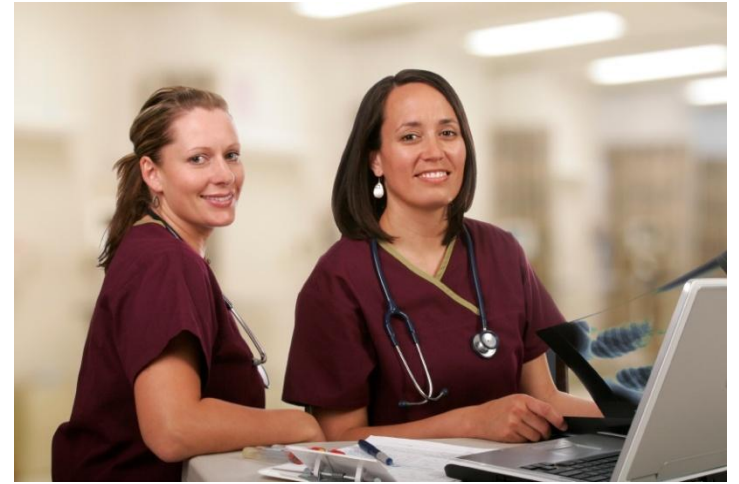


Steel mill jobs, parts, services - Equipment manufacturing and sales - Blade and tower manufacturers



Property taxes - Financing, banking, accounting

Induced Economic Activity



Money spent on local area goods and services from increased revenue: *sandwich shops, child care, grocery stores, clothing, other retail, public transit, new cars, restaurants, medical services*



JEDI Caveats

- Results are an estimate, not a precise forecast
- Results are not a measure of project profitability or viability
- Results report *gross jobs* as opposed to *net jobs*
- Assumptions around local sourcing and procurement are fundamental in determining local economic activity
- Jobs are reported as Full-Time Equivalent (FTE) jobs



WIA Project Overview

New Wind Generation

- 9,000 MW of new capacity
- \approx \$2,000/kW or \$18 billion total investment
- Economic development estimated from:
 - Development & permitting
 - Construction
 - Operations and maintenance
 - Sales tax, property tax, generation tax, landowner lease revenues, etc.



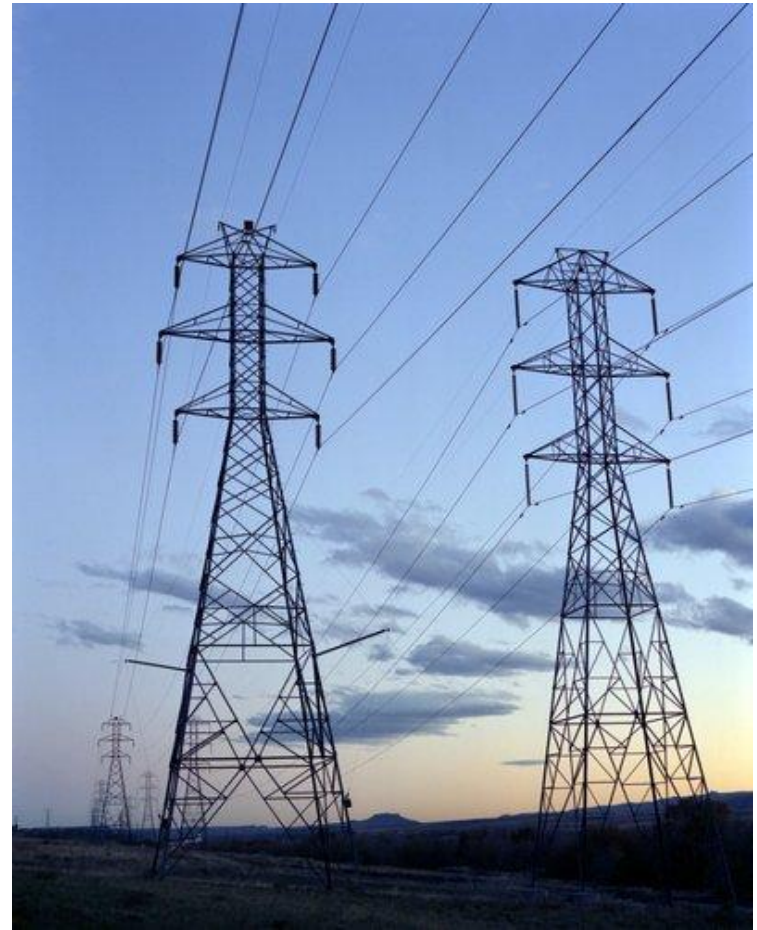
New Natural Gas Generation



- 1,800 MW of new capacity
- \approx \$1,300/kW or \$2.3 billion total investment
- Assumes 100% use of Wyoming Natural Gas
 - At 60% load factor this equates to approx. 15% of the gas flowing through the new Ruby Pipeline
- Economic development estimated from:
 - Development & permitting
 - Construction
 - Operations and maintenance
 - Fuel extraction
 - Sales tax, property tax, severance tax, lease revenues, etc.

Transmission and Collection

- 2 – 225 mile 500 kV HVDC lines
 - 1 converter/substation per line
 - ≈ \$2.2 billion total investment
- 2 – 300 mile single circuit 500 kV HVAC lines
 - 2 substations/line
 - ≈ \$1.5 billion total investment
- 300 miles of 230 kV lines
 - Required substations/transformers
 - Collects wind and natural gas generation
 - ≈ \$925 million total investment
- Economic development estimated from:
 - Development & permitting
 - Construction
 - Operations and Maintenance
 - Relevant Taxes, ROW payments, etc.



Jobs and Economic Development from 9,000 MW of New Wind in Wyoming

Wind energy's economic "ripple effect"

Project Development & Onsite Activity



During Construction

- 5000-5500 WY FTE jobs
- ~\$290M in earnings
- \$330M in econ activity

During Operations Period

- 450 permanent WY jobs
- Over \$25M/yr in earnings
- \$27M in econ activity/yr

WY property tax revenue

- \$58M/year

WY land lease revenue

- \$27M/year

Local Revenue, Turbine, & Supply Chain Activity

During Construction

- 22,000-25,000 WY jobs
- Over \$1B in earnings
- \$3.3 B total econ activity

During Operations Period

- Over 600 WY jobs
- Over \$25M /yr in earnings
- \$150M total econ activity/yr

Induced Activity

During Construction

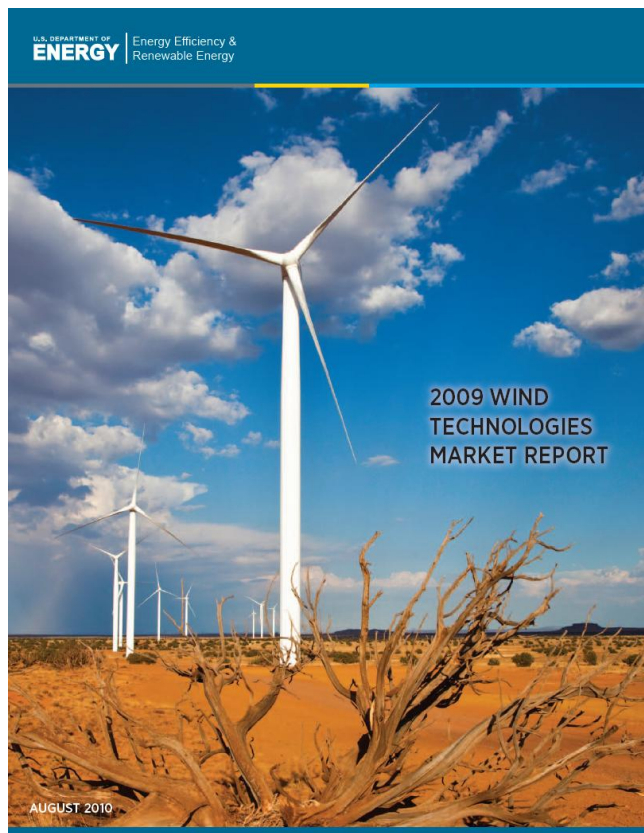
- ~4500 WY FTE jobs
- ~\$160M in earnings
- \$550 M in econ activity

During Operations Period

- ~270 WY jobs
- \$10M in earnings /yr
- \$36M in econ activity/yr

PRELIMINARY SAMPLE: BASED ON INDUSTRY NORMS

Analysis Status and Schedule



- Data collection and scenario building complete
- Currently reviewing, organizing and prepping data for model runs
- Public release of report in January
- Present full report results at February meeting in Jackson, WY



Questions

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<http://www.windpoweringamerica.gov/>

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