

Wind Energy for Rural Economic Development



Suzanne Tegen, NREL
Indiana Wind Working Group
April 18, 2007

Overview

- Case studies from rural America
- Jobs and Economic Development Impacts (JEDI)
- Indiana wind power benefits
- Wind vs. coal
- 20% wind scenario



The Ag Opportunity

Economic security and prosperity for rural America through local production of energy



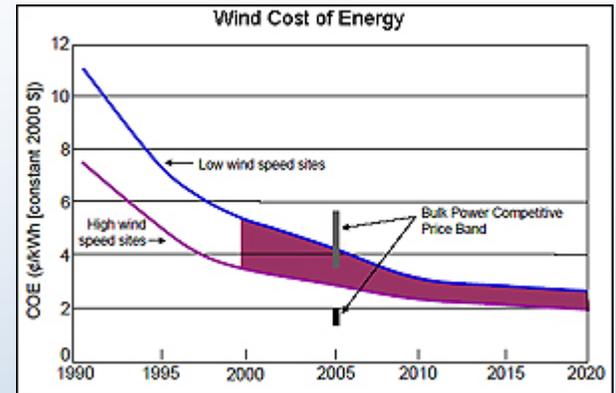
Rural Economic Challenges



- Low commodity prices
- Fuel price uncertainty
- High fertilizer prices
- Migration to cities
- Eroding local tax bases
- Water shortages

Drivers for Wind Power

- Declining wind costs
- Fuel price uncertainty
- Federal and state policies
- Economic development
- Environmental issues
- Energy security



Case Study: Texas



912-MW in Pecos County, TX resulted in:

- **2,500 quality jobs with a payroll of \$75M**
- \$13.3M in tax revenues for schools and counties
- \$2.5M in 2002 royalty income to landowners
- Another 2,900 indirect jobs as a result of the multiplier effect
- \$4.6M increase in Pecos County property tax revenue in 2002

Case Study: Minnesota

107-MW Minnesota wind project

- **\$500,000/yr in lease payments to farmers**
- \$611,000 in property taxes in 2000 = 13% of total county taxes
- 31 long-term local jobs
- \$909,000 in income from O&M (includes multiplier effect)



Case Study: Iowa

240-MW Iowa wind project

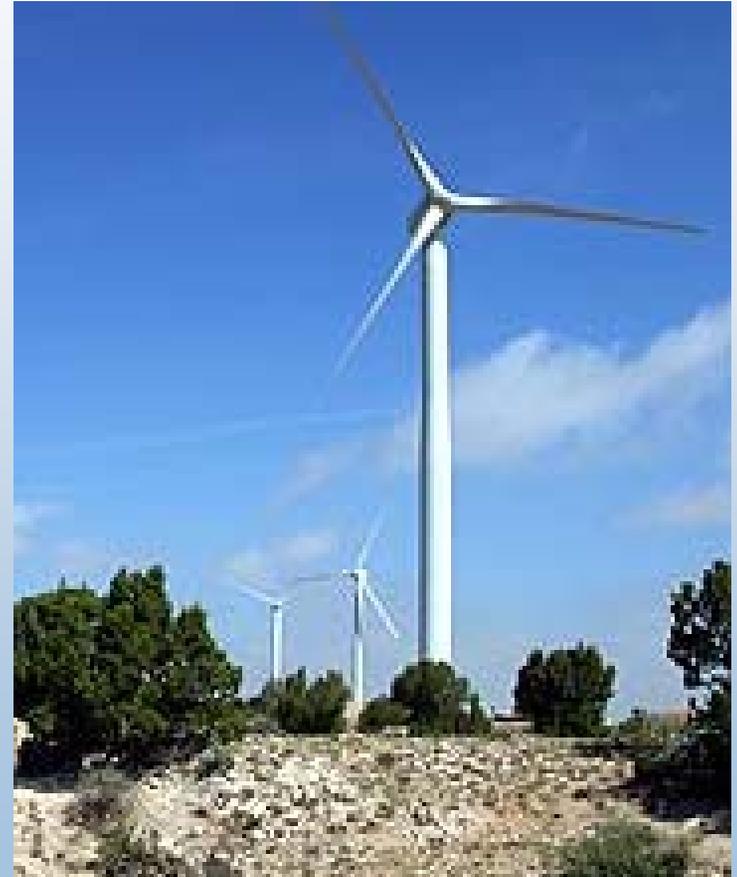
- \$640,000/yr in lease payments to farmers (\$2,000/turbine/yr)
- \$2M/yr in property taxes
- \$5.5M/yr in O&M income
- **40 long-term O&M jobs**
- **200 short-term construction jobs**
- Doesn't include multiplier effect



Case Study: New Mexico

204-MW wind project built in 2003 in DeBaca and Quay counties for PNM

- 150 construction jobs
- 12 permanent jobs and \$550,000/yr in salaries for operation and maintenance
- \$550,000/year in lease payments to landowners
- **\$450,000/year in payments in lieu of taxes to county and school districts**
- Over \$40M in economic benefits for area over 25 years



Source: PNM, New Mexico Wind Energy Center Quick Facts, 2003

Case Study: Hyde County, South Dakota

40-MW wind project in South Dakota creates \$400,000 - \$450,000/yr for Hyde County, including:

- More than \$100,000/yr in annual lease payments to farmers (\$3,000 - \$4,000/turbine/yr)
- \$250,000/yr in property taxes (25% of Highmore's education budget)
- 75 -100 construction jobs for 6 months
- 5 permanent O&M jobs
- Doesn't include multiplier effect



Case Study: Prowers County, Colorado



162-MW Colorado Green Wind Farm \$200M+ investment

- 400 construction workers
- 14-20 full-time jobs
- Land lease payments \$3000-\$6000 per turbine
- Prowers County 2002 assessed value \$94M; 2004 assessed value +33% (+\$32M)
- **Local district will receive tax reduction**



“Converting the wind into a much-needed commodity while providing good jobs, the Colorado Green Wind Farm is a boost to our local economy and tax base.”

John Stulp, County Commissioner, Prowers County, Colorado

Major Rural Economic Impacts

- **Job creation**
- **Landowner revenues**
- **Property taxes**
(schools, roads, county services)



The JEDI model

Jobs and Economic Development Impacts

- Necessary inputs:
 - Year and location of project construction
 - Construction cost (\$/kW)
 - O&M cost (\$/kW)

The better the inputs, the better the outputs!

- More information:
www.windpoweringamerica.gov

Wind Energy's Economic impacts

On-site direct, off-site direct, Indirect, Induced

Wind energy's economic "ripple effect"

Direct Impacts

On-site

Construction workers
Management
Administrative support

Cement truck drivers, road crews, maintenance workers

Off-site

Boom truck & management, gas and gas station workers, blades and towers & workers

Hardware store purchases and workers, spare parts and their suppliers

Indirect Impacts

These are jobs in and payments made to supporting businesses, such as **bankers** financing the construction, **contractor**, **manufacturers** and **equipment suppliers**.

Induced Impacts

These jobs and earnings result from the spending by people directly and indirectly supported by the project, including benefits to **grocery store clerks**, **retail salespeople** and **child care providers**.



Direct on-site jobs and parts during construction



Truck drivers, crane operators



Earth moving, cement pouring



Management and support



Construction

Direct wind project jobs during operations

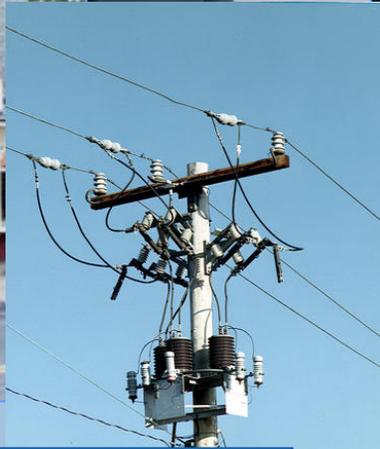


Operations and maintenance, management

Landowner royalties



Parts and materials purchased



Utility services and subcontractors



Wind Energy's Economic impacts

On-site direct, off-site direct, Indirect, Induced

Wind energy's economic "ripple effect"

Direct Impacts

On-site

Construction workers
Management
Administrative support

Cement truck drivers, road crews, maintenance workers

Off-site

Boom truck & management, gas and gas station workers, blades and towers & workers

Hardware store purchases and workers, spare parts and their suppliers

Indirect Impacts

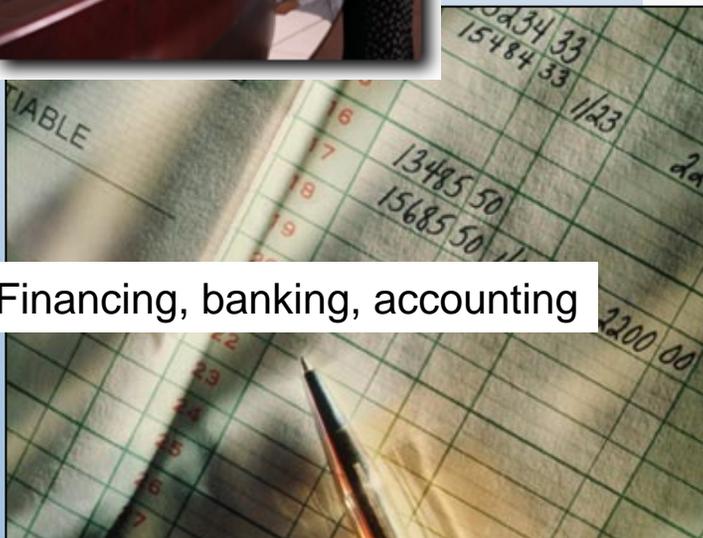
These are jobs in and payments made to supporting businesses, such as **bankers** financing the construction, **contractor**, **manufacturers** and **equipment suppliers**.

Induced Impacts

These jobs and earnings result from the spending by people directly and indirectly supported by the project, including benefits to **grocery store clerks**, **retail salespeople** and **child care providers**.

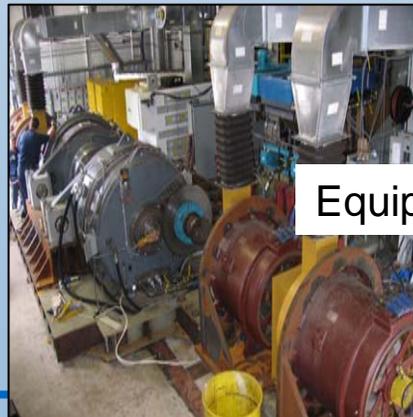


Indirect jobs, services, materials



Financing, banking, accounting

Steel mill jobs, parts, services
Photos: E.C.Levy, Inc, Detroit, MI



Equipment manufacturing and sales

Wind Energy's Economic impacts

On-site direct, off-site direct, Indirect, Induced

Wind energy's economic "ripple effect"

Direct Impacts

On-site

Construction workers
Management
Administrative support

Cement truck drivers, road crews, maintenance workers

Off-site

Boom truck & management, gas and gas station workers, blades and towers & workers

Hardware store purchases and workers, spare parts and their suppliers

Indirect Impacts

These are jobs in and payments made to supporting businesses, such as **bankers** financing the construction, **contractor**, **manufacturers** and **equipment suppliers**.

Induced Impacts

These jobs and earnings result from the spending by people directly and indirectly supported by the project, including benefits to **grocery store clerks**, **retail salespeople** and **child care providers**.

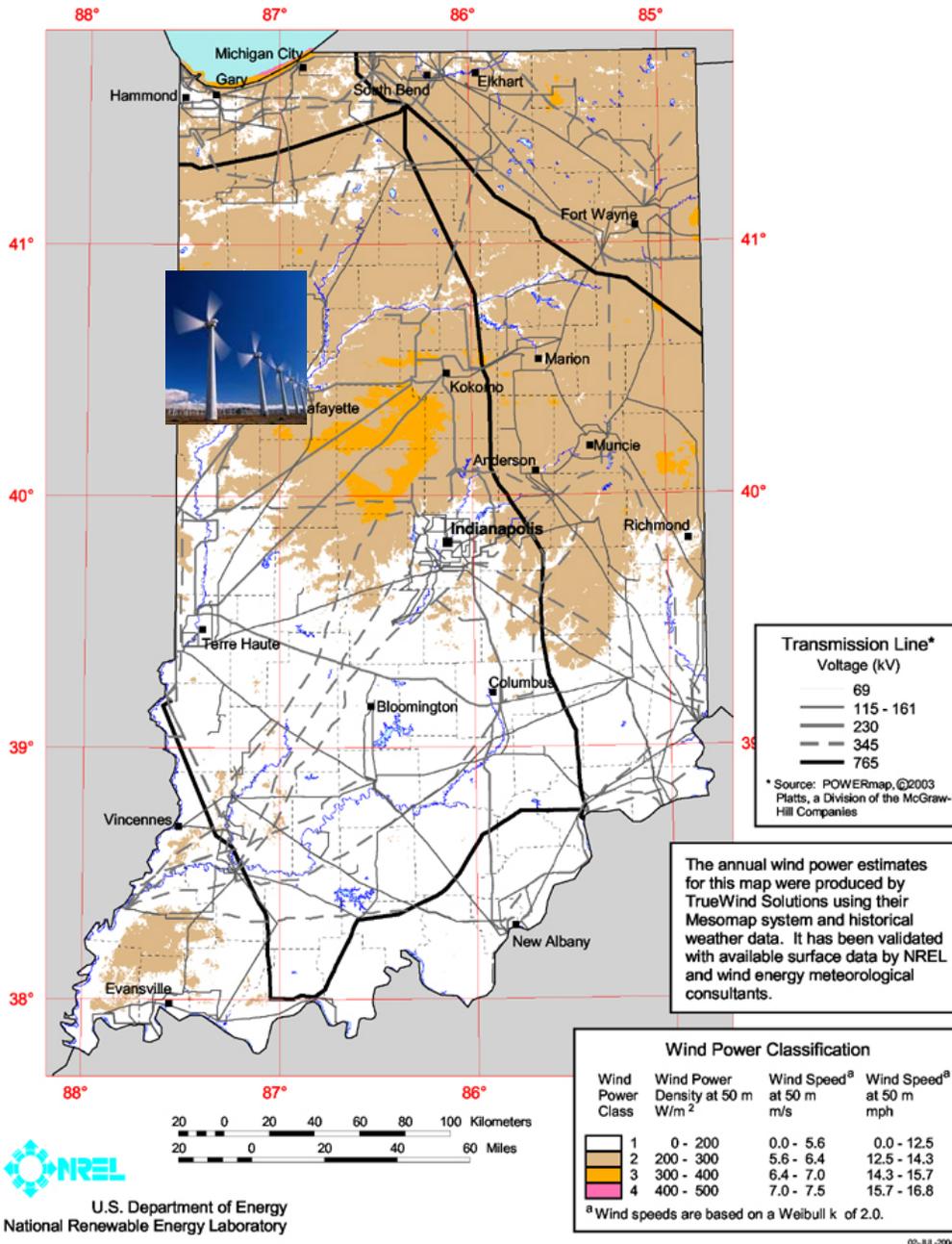


Induced jobs, services, materials

Child care, grocery store, clothing, other retail, public transit, new cars, restaurants, medical services



Indiana - 50 m Wind Power



Indiana wind resource map

"Our state energy plan calls for maximizing Indiana's wind power potential, so news that Indiana Michigan Power is pursuing this clean source of energy is a welcome development."

- Governor Mitch Daniels

Jobs from new wind in Indiana

Local Economic Impacts – Job creation from 100 MW of new wind	
	Jobs
During construction period	
On- and off-site direct jobs	156
Construction workers, management and support only	151
Indirect jobs	64
Induced jobs	84
Total Jobs (Direct, Indirect, Induced)	304
During operating years (annual) : Permanent jobs for the life of the plant	
Direct jobs	27
On-site Plant Workers Only	9
Indirect Impacts	6
Induced Impacts	13
Total Impacts (Direct, Indirect, Induced)	47

Wind Energy's Economic impacts in Indiana

from 100 MW of new wind development (50 2MW turbines)

Wind energy's economic "ripple effect"

Direct Impacts¹

Landowner Payments:

- \$400,000/yr

Construction Phase:

- 150 construction jobs
- \$18.5M to local economies

Operational Phase:

- 9 O&M jobs/yr
- \$2.3M/yr to local economies



Indirect Impacts²

Local Property Tax Benefits:

- \$450,000/yr

Construction Phase:

- 64 jobs
- \$5.3M to local economies

Operational Phase:

- 6 jobs/yr
- \$610,000/yr to local economies

Induced Impacts³

Construction Phase:

- 84 jobs
- \$7.4M to local economies

Operational Phase:

- 13 jobs/yr
- \$1.2M/yr to local economies

Totals

Over 220 jobs during construction

25-30 permanent jobs

\$113+ million over 20 -yr life of plant

Construction Phase = 1-2 years

Operational Phase = 20+ years

Wind vs. Coal



Indiana coal



Pennsylvanian system coal – green

Underground coal mines – blue

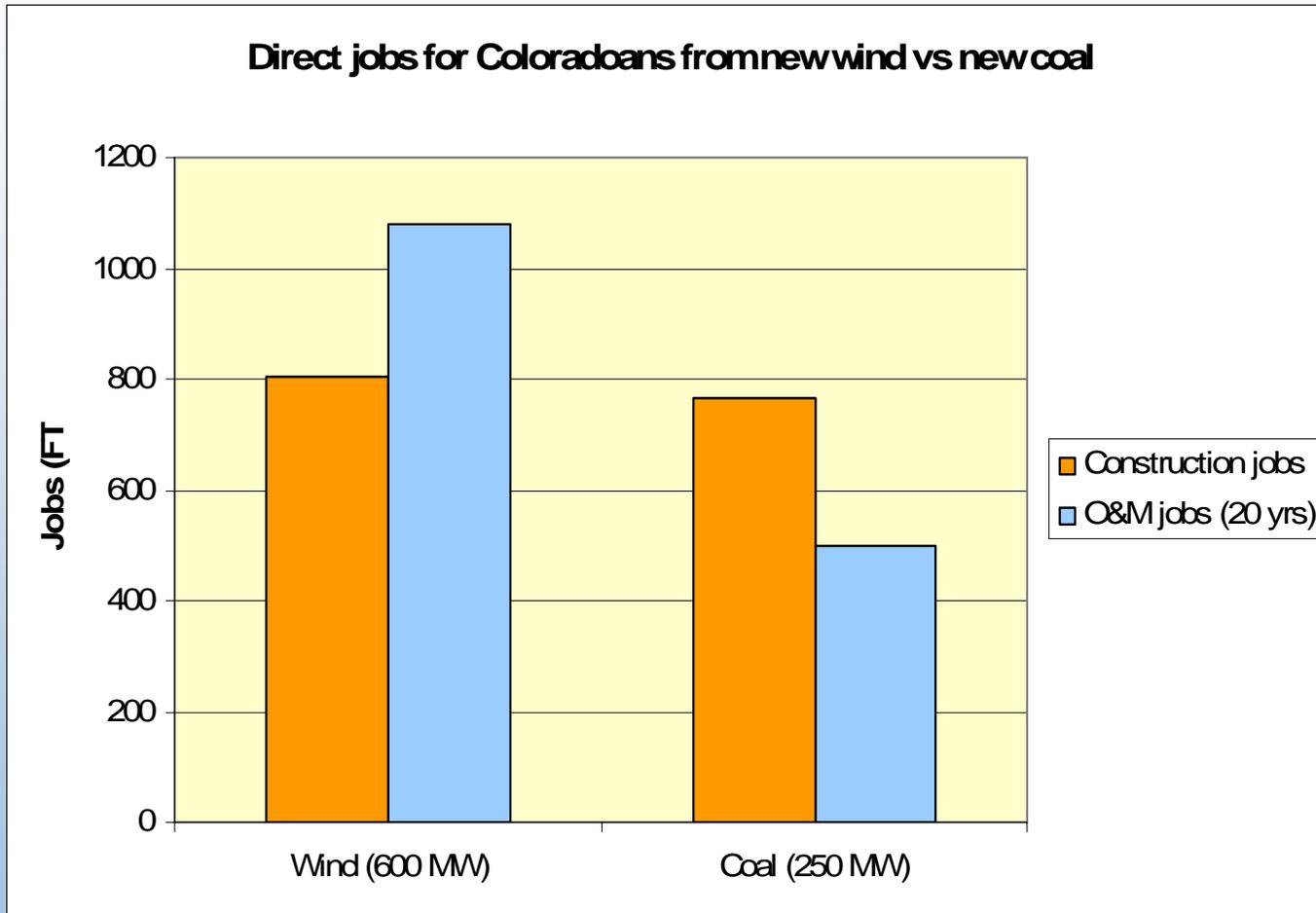
Surface coal mines – brown

- Indiana uses ~45-49% Indiana coal
- Bituminous coal
- Out-of-state coal used for emissions concerns
- Some state agencies (universities) must burn Indiana coal

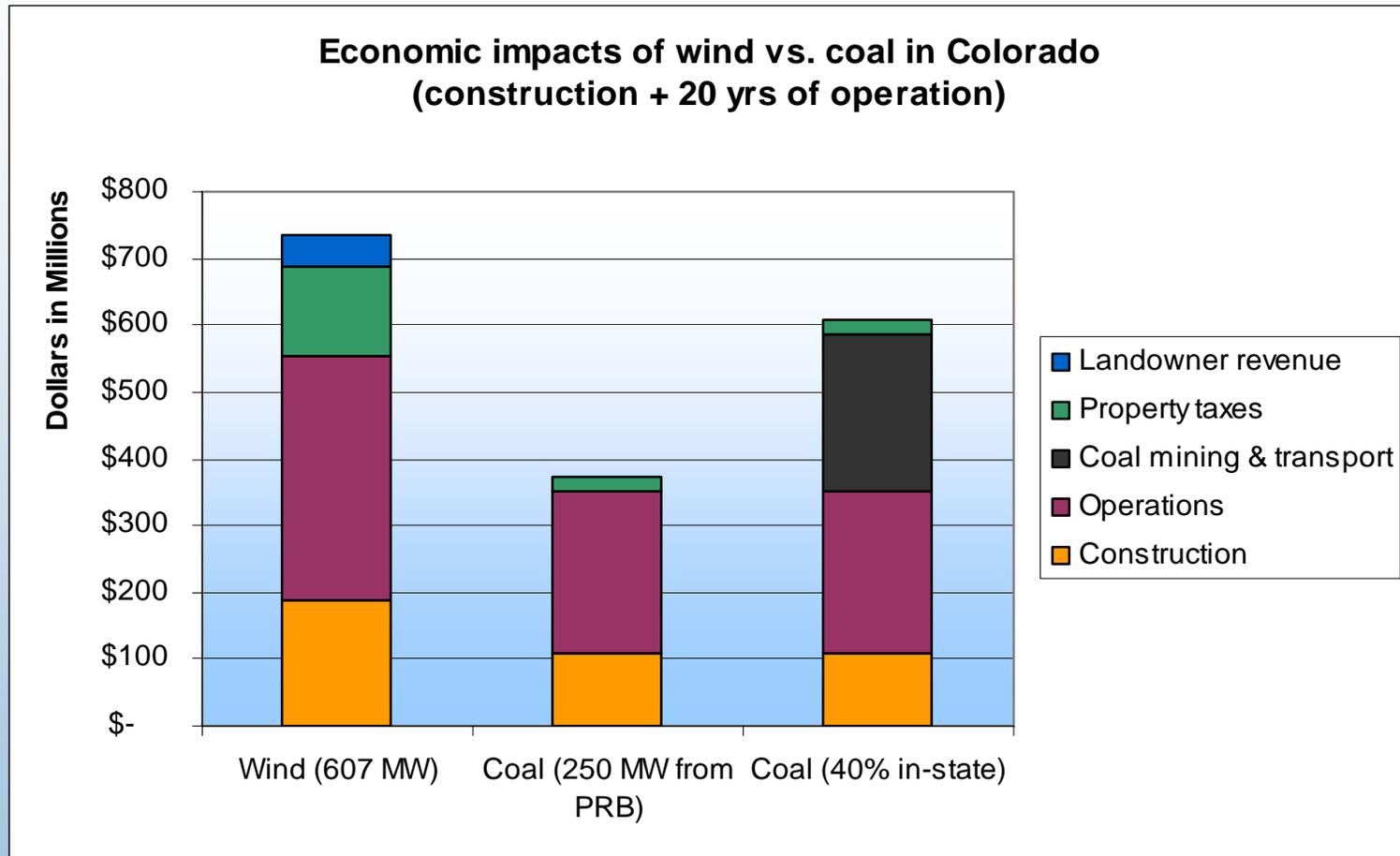
INDIANA COAL COUNCIL

*to foster, promote and defend the
interests of Indiana's coal industries*

Job creation in Colorado



Economic benefits to Colorado



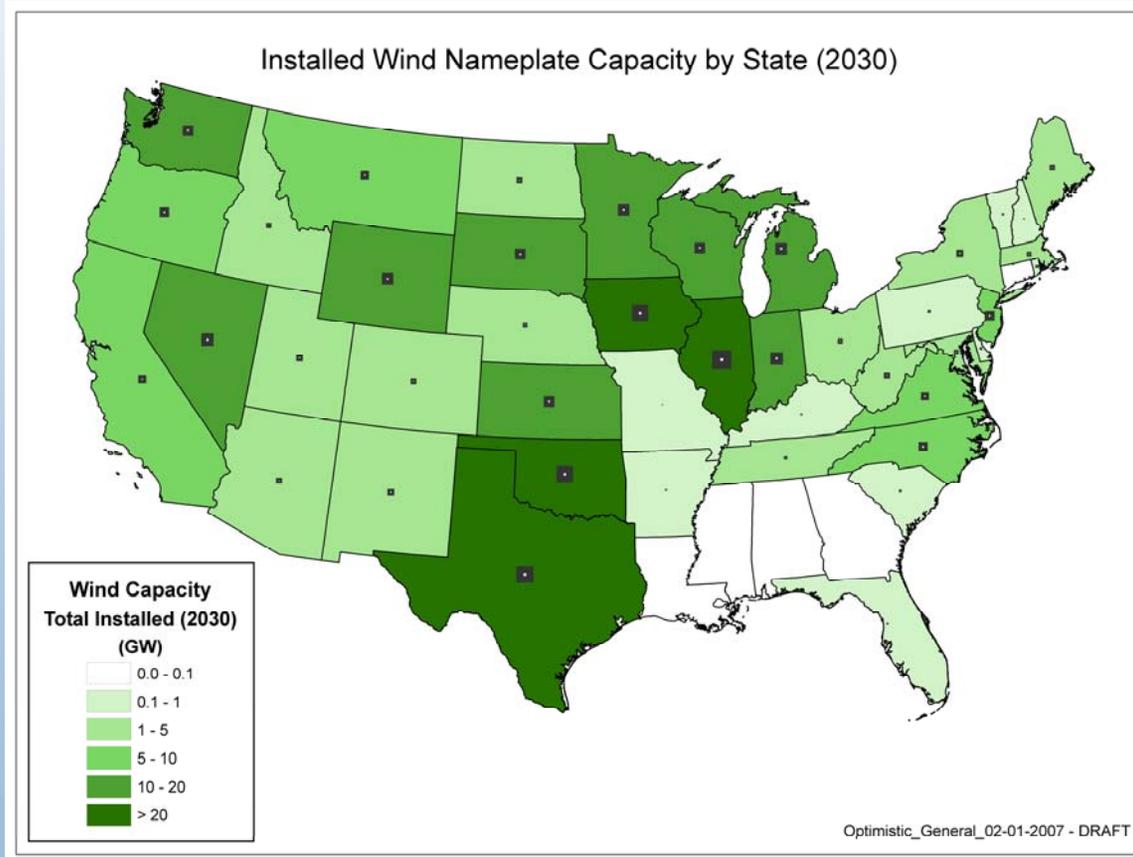
Economic Development Impacts

- Construction
- O&M
- Property tax revenues
- Landowner revenues
- Manufacturing
- Multiplier effect
- Net economic development impacts of wind vs. fossil fuels



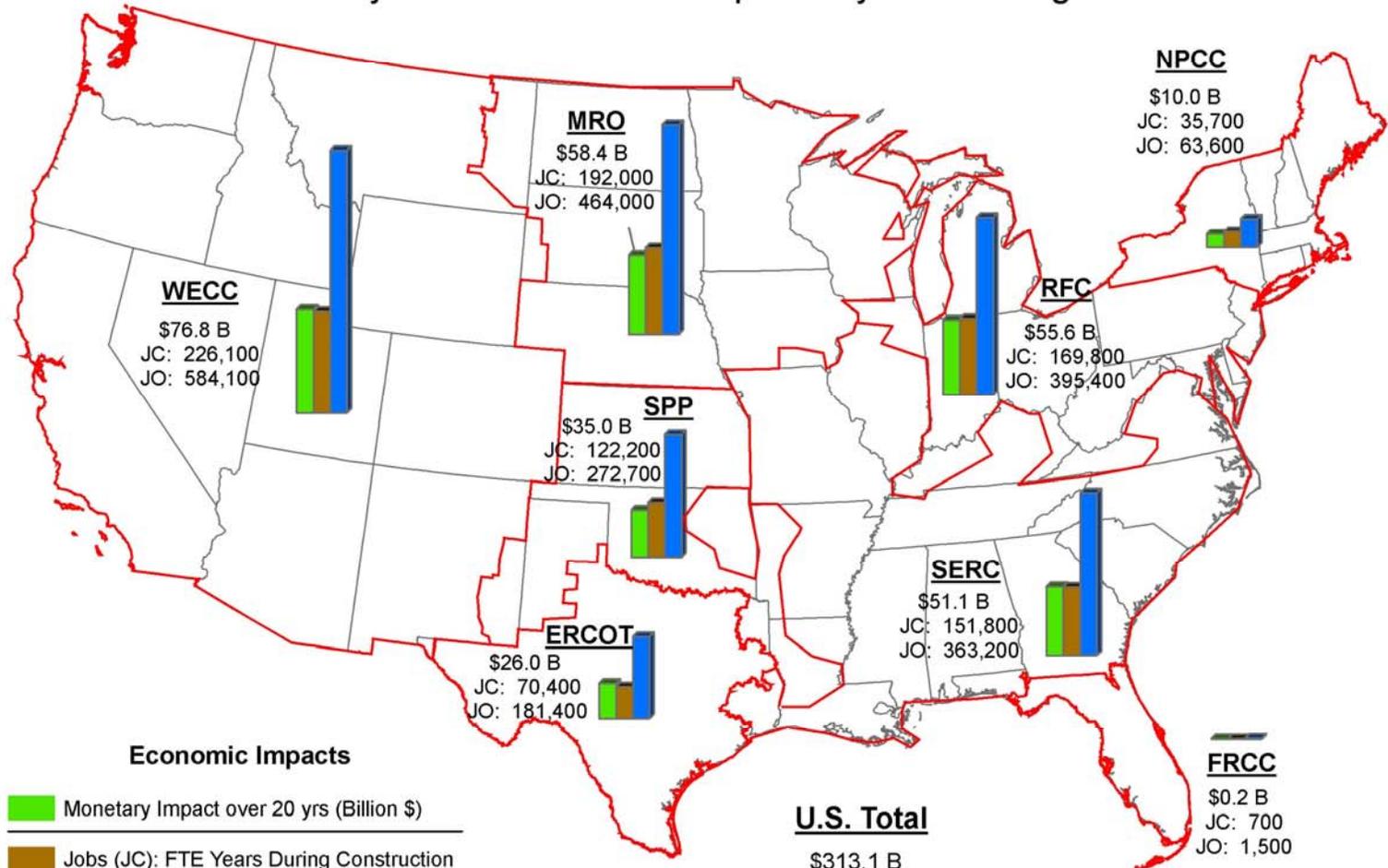
It's not just our idea...

The 20% scenario from DOE and industry has the goal of **producing 20% of the nation's energy from wind by 2030.**



Economic impacts by 2030

20% by 2030 - Economic Impacts by NERC Region



Economic Impacts

- Monetary Impact over 20 yrs (Billion \$)
- Jobs (JC): FTE Years During Construction
- Jobs (JO): FTE Years over 20 yrs Operation

Optimistic case = 323 GW of wind capacity.
All job values rounded to the nearest 100.

U.S. Department of Energy
National Renewable Energy Laboratory



20% Scenario for Indiana



- **15,000 MW by 2030**
- **Over 45,000 new construction jobs**
- **Over 6,000 permanent jobs (20+yrs)**
- **\$4.8 billion in economic output during construction**
- **\$10 billion in economic output over 20 years**

20% Scenario for Indiana

(20 years of operation)

- **Over \$1.4 billion in property tax payments** to counties (for roads, schools, county services)
- **\$8 million In landowner royalties**
- **Manufacturing in Indiana??**



“Wind is a **homegrown energy** that we can harvest right along side our corn or soybeans or other crops. We can use the energy in our local communities or we can export it to other markets. We need to look carefully at wind energy as a source of **economic growth** for our region”

David Benson, Farmer and County Commissioner, Nobles County, Minnesota

Carpe Ventem



E-I-E-I-O



www.windpoweringamerica.gov

Thank you



Suzanne_Tegen@nrel.gov
Wind Powering America
www.windpoweringamerica.gov





Discussing Water Rights, A Western Pastime

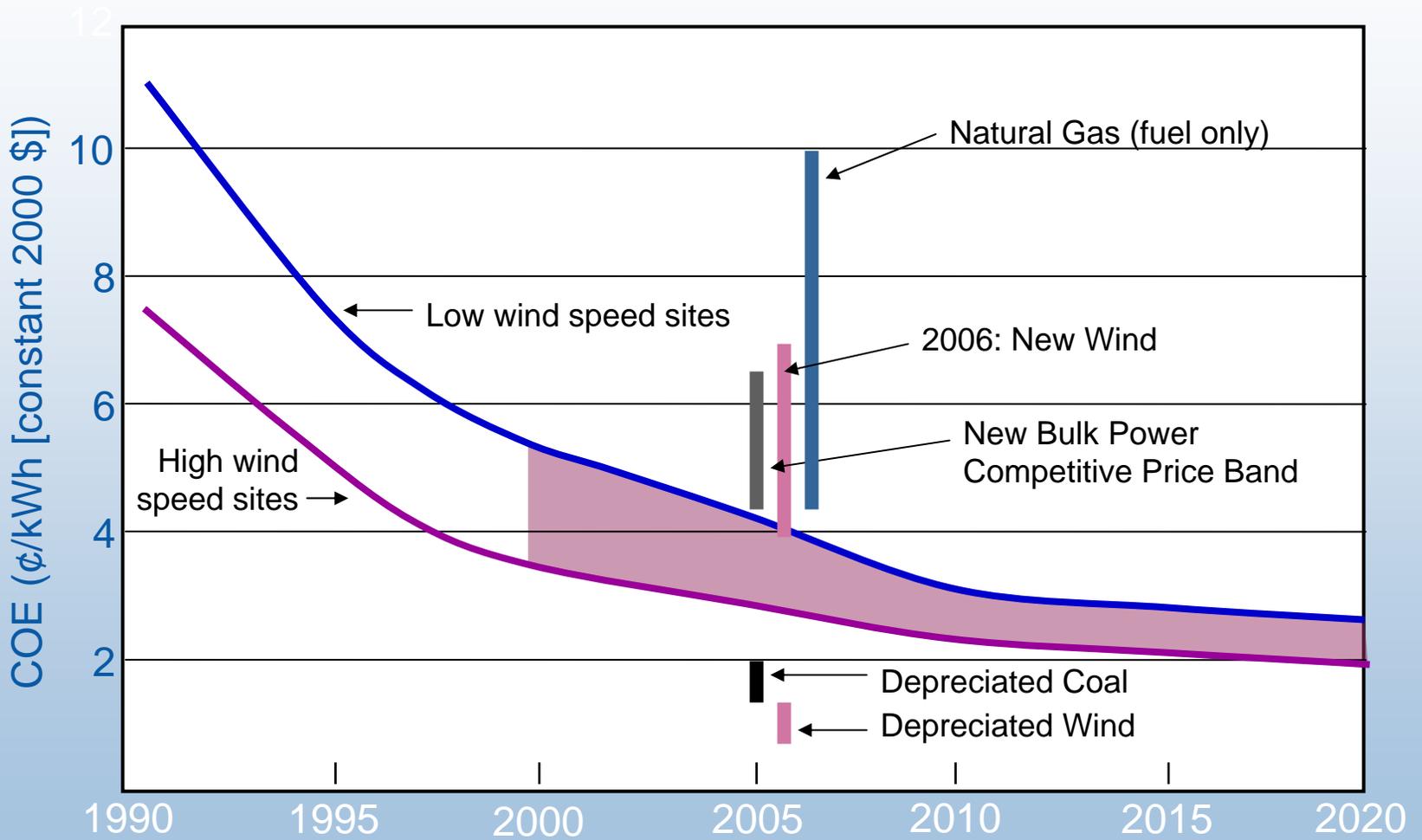
Water rights, air quality, emissions, domestic production



“It seems only natural for rural utilities to do everything they can to advance both farm-based renewable energy development and rural economic development in a cost-effective way. In my opinion, wind energy is the **next great chapter in the rural electrification** story.”

*Aaron Jones, Washington Rural Electric Cooperative Association;
Olympia, WA*

Wind Cost of Energy



Summary: Economic Development Impacts



- Land Lease Revenue: 2-3% of gross revenue or \$4,000 - \$5,000/ turbine/ year
- Local property tax revenue
- 150 jobs per 100 MW during construction
- 8-10 permanent O&M jobs per 100 MW
- Local industry: concrete, roads, electrical services, construction management
- Manufacturing and Assembly plants expanding in U.S. (e.g., IL, SD, ND, PA, CO, Indiana?)

Direct, Indirect, and Induced Activity

1. Examples of **direct** jobs include construction and others who work on construction, such as cement truck operators and road crews.
2. **Indirect** refers to the increase in economic activity that occurs when a contractor, vendor or manufacturer receives payment for goods or services and is able to pay others who support their business, e.g., a banker financing the construction contractor, the manufacturers and other suppliers that meet their material and equipment needs.
3. **Induced** jobs and earnings result from the spending by people directly and indirectly supported by the project, including benefits to grocery store clerks, retail salespeople and child care providers.

The JEDI model

Jobs and Economic Development Impacts

- Traces linkages in the economy: what are economic impacts from dollars spent on the wind project?
- Economic development impacts include **jobs created, wages and salaries earned, and increases in overall economic activity.**
- JEDI uses data from MIG's IMPLAN (Impact Analysis for Planning) based on state spending patterns.