

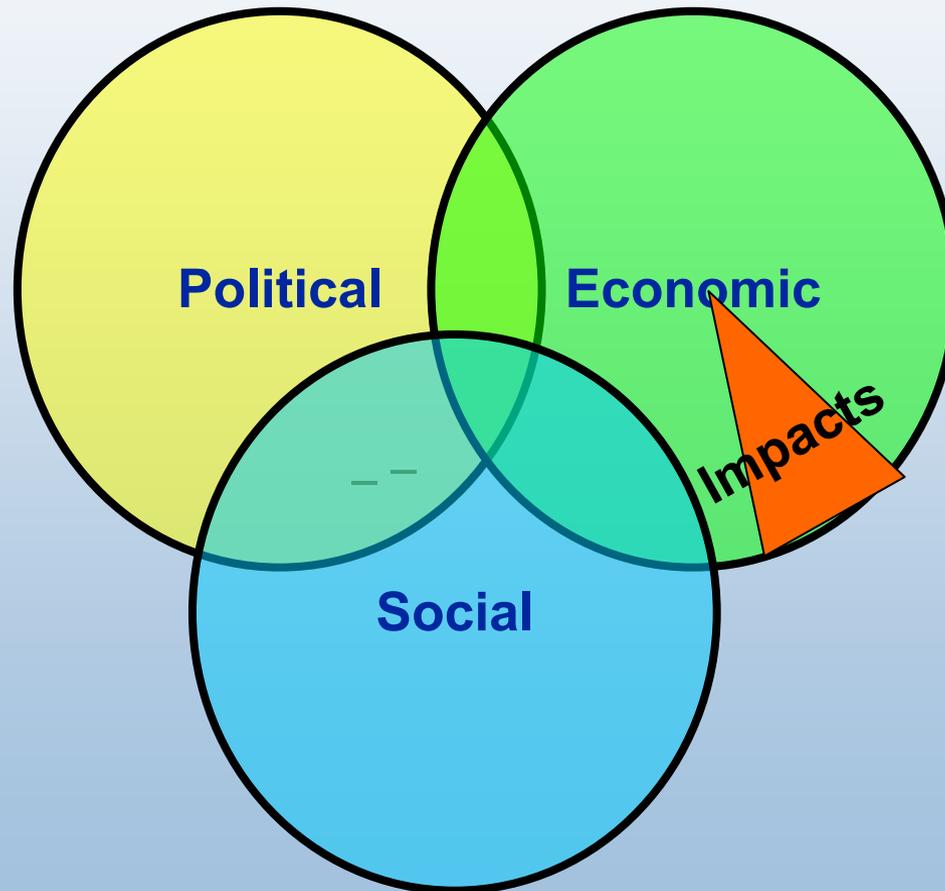
Economic Development: Wind vs. Coal



Suzanne Tegen, NREL
Wind Powering America State Summit
Los Angeles, California
June 7, 2007



Economic impacts are one part of energy decision-making

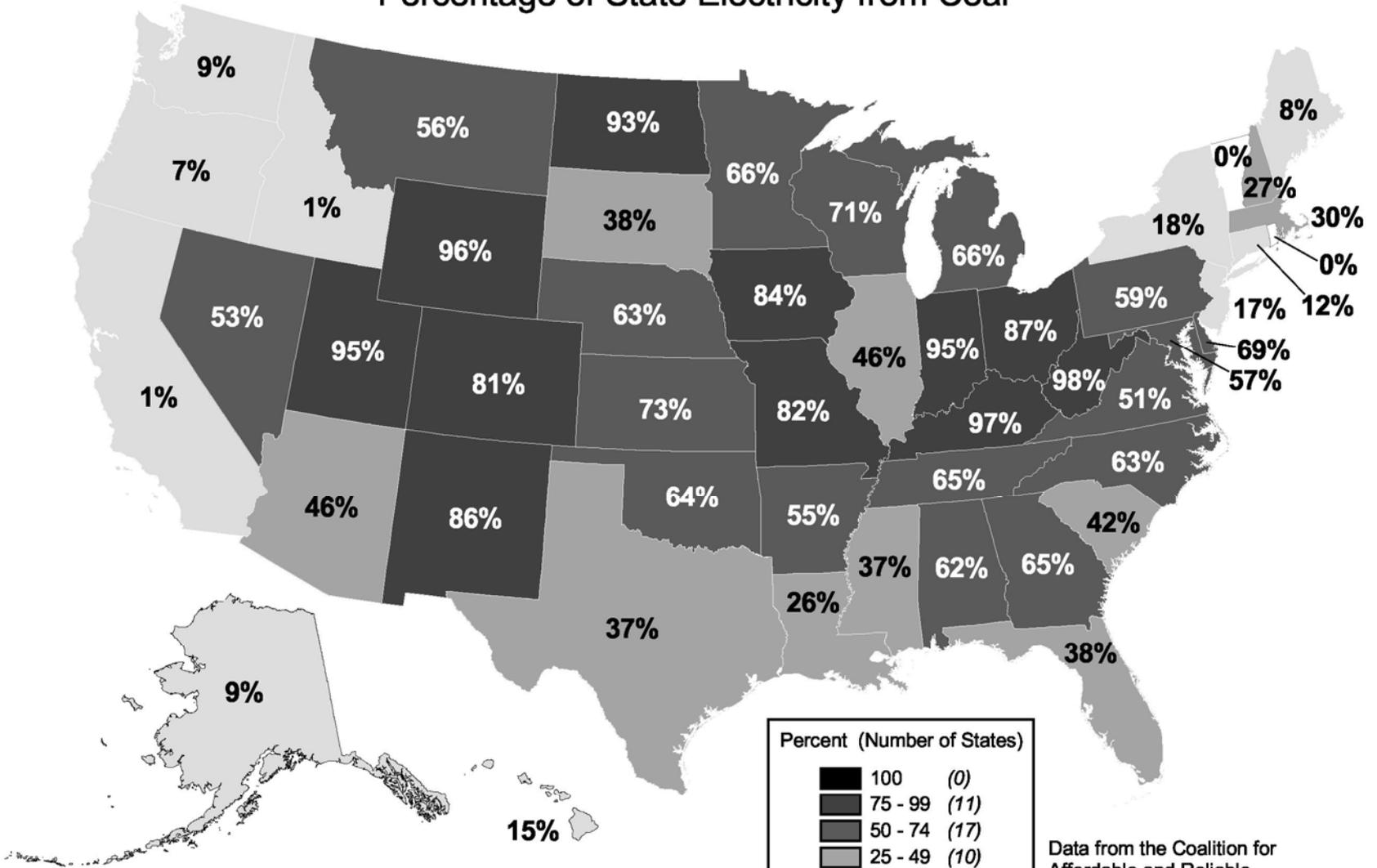


Overview

- Coal
- The JEDI model
- Wind vs coal results (CO, MI)
- Other wind benefits



Percentage of State Electricity from Coal



Percent (Number of States)

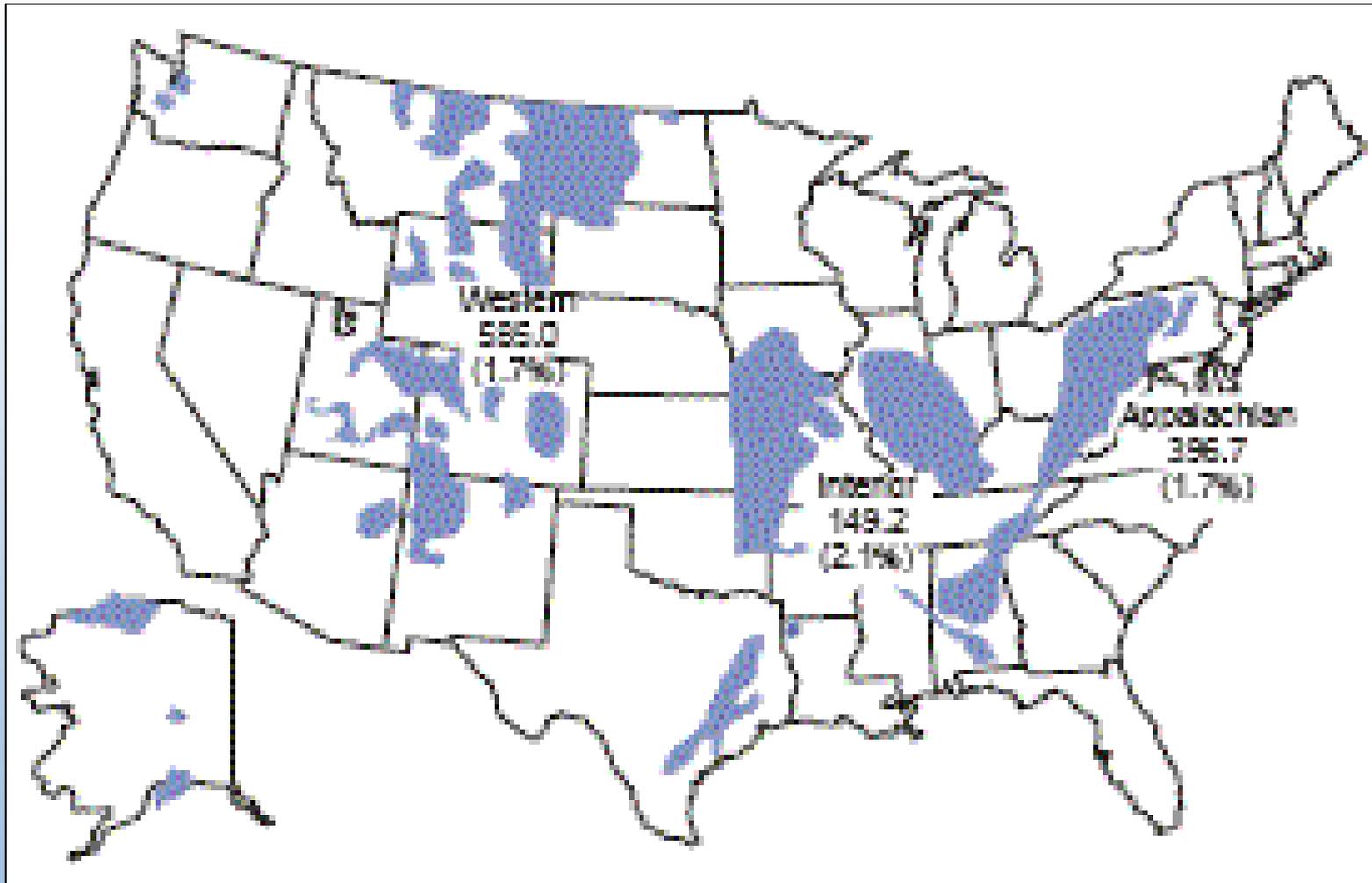
100	(0)
75 - 99	(11)
50 - 74	(17)
25 - 49	(10)
1 - 24	(10)
0	(2)

Data from the Coalition for Affordable and Reliable Energy (CARE).

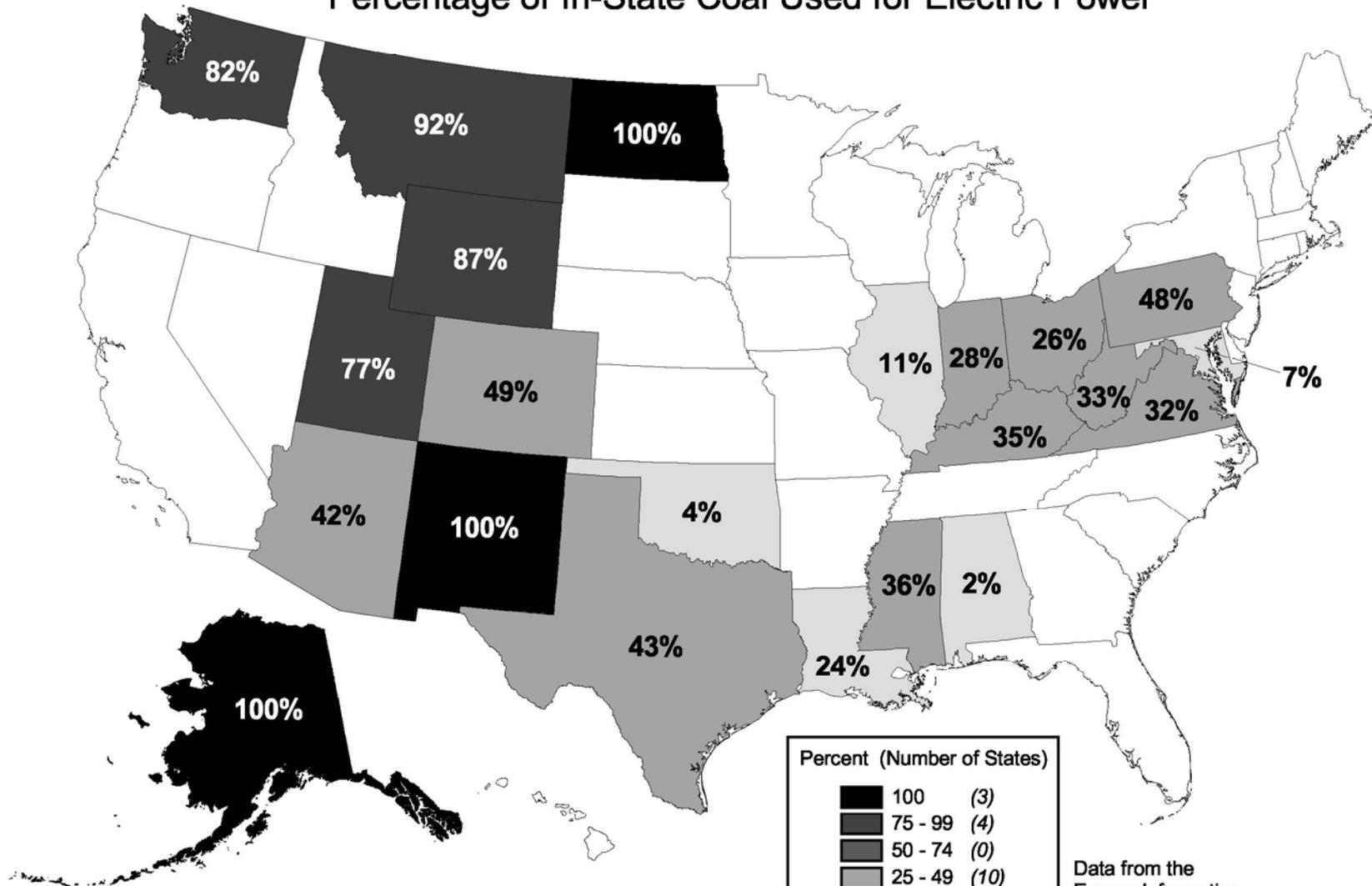
U.S. Department of Energy
National Renewable Energy Laboratory



Where does our coal come from?



Percentage of In-State Coal Used for Electric Power



Percent (Number of States)	
100	(3)
75 - 99	(4)
50 - 74	(0)
25 - 49	(10)
1 - 24	(5)
0	(28)

Data from the Energy Information Administration (2004)

U.S. Department of Energy
National Renewable Energy Laboratory





The JEDI model

Jobs and Economic Development Impacts

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

The better the inputs, the better the outputs!

- To download:
www.windpoweringamerica.gov



**The real reason
we call it JEDI**



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

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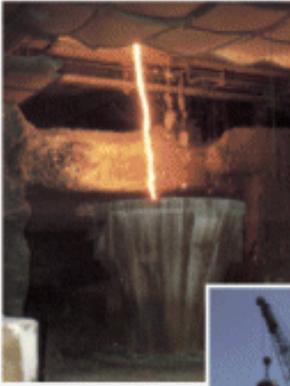
Indirect jobs, services, materials



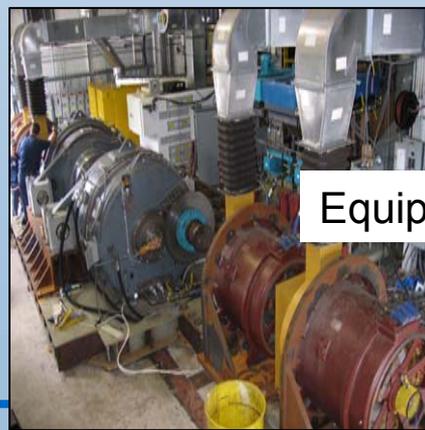
Property taxes



Financing, banking, accounting



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



Equipment manufacturing and sales

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Induced jobs, services, materials

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





Induced jobs, services, materials

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





Colorado inputs

Coal

250 MW

80% capacity factor

- Construction = \$1750/kW
- O&M=
 - fixed \$35.50/kW
 - var. \$1.70/MWh
- 0% and 40% in-state coal

Wind

607 MW

35% capacity factor

- Construction = \$1650/kW
- O&M =
 - \$24.70/kW
- Land royalty =
 - \$4,000/turbine/yr
- Property tax =
 - \$11,000/year

Inputs are based on developer interviews and existing projects.

Colorado – Total Economic Impacts

from 1,000 MW of new wind development

(No in-state manufacturing assumed)

Wind energy's economic "ripple effect"

Direct Impacts

Payments to Landowners:

- \$2.7 million/year

Local Property Tax Revenue:

- \$1.1 million/year

Construction Phase:

- 1360 construction jobs
- \$189M to local economies

Operational Phase:

- 90 new long-term O&M jobs
- \$21M/yr to local economies



Indirect Impacts

Construction Phase:

- 575-600 new jobs
- \$61M to local economies

Operational Phase:

- 45-55 new local jobs
- \$6M/yr to local economies

Induced Impacts

Construction Phase:

- 635-650 new jobs
- \$ 69M to local economies

Operational Phase:

- 70-80 new local jobs
- \$7.9M/yr to local economies

Totals (construction + 20 yrs)

Total economic benefit to Colorado = \$1.1 billion

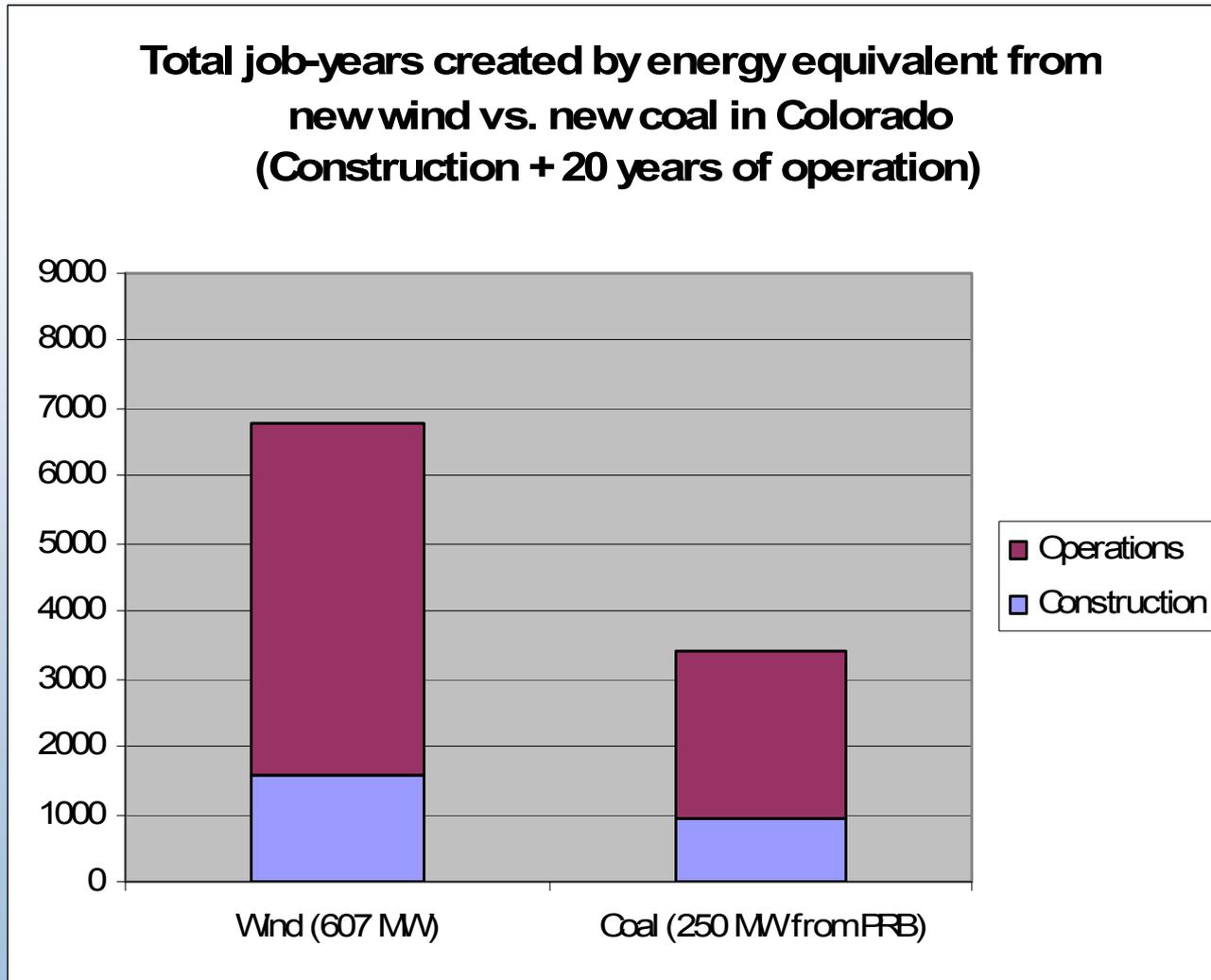
New local jobs during construction = 2600

New local long-term jobs = ~215

Construction Phase = 1-2 years

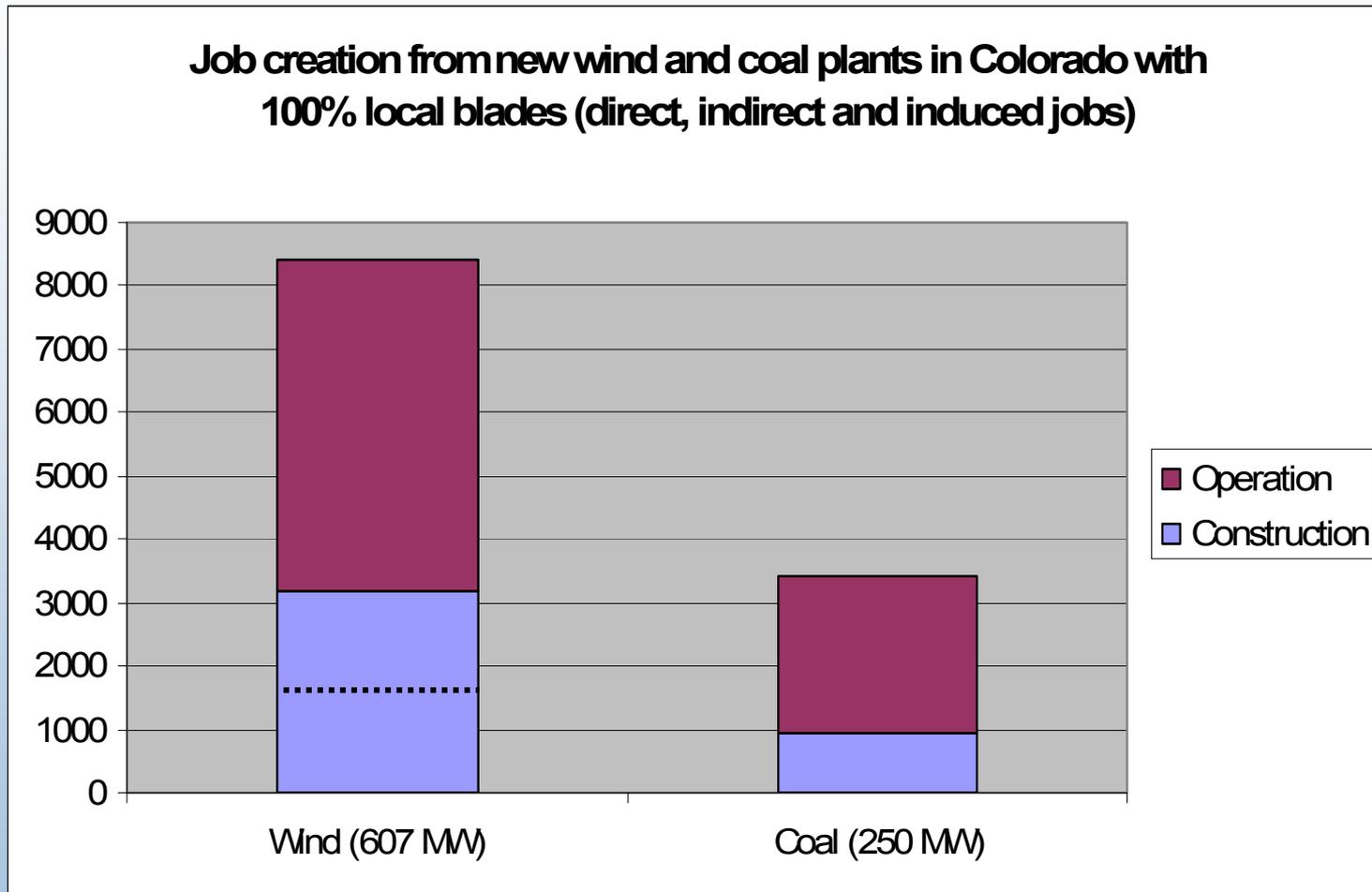
Operational Phase = 20+ years

Colorado results - jobs



Total includes direct, indirect and induced jobs

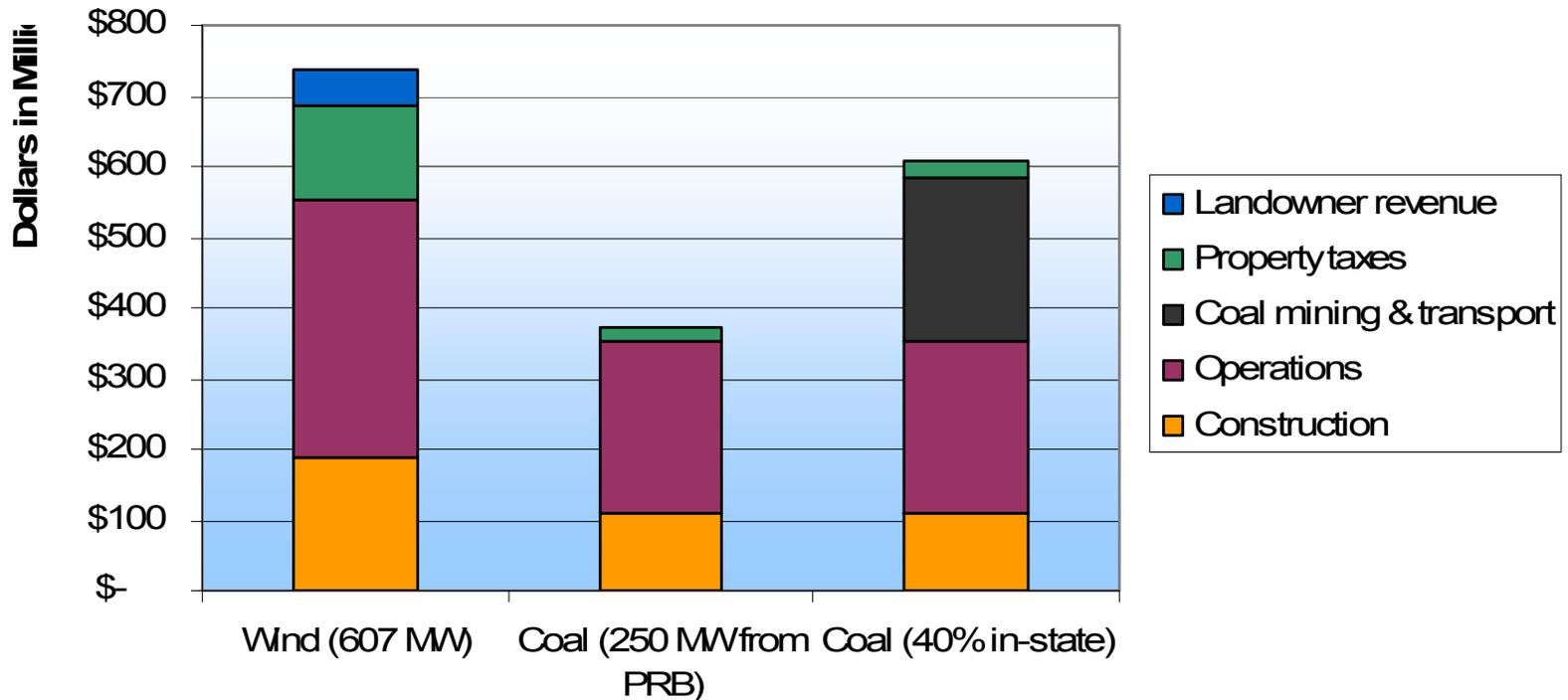
Colorado results - jobs



Sensitivity scenario: 100% local blade manufacturing

Colorado results

**Economic impacts of wind vs. coal in Colorado
(Direct, indirect and induced impacts for
construction + 20 yrs of operation)**





Michigan inputs

Coal

250 MW

80% capacity factor

Constr. = \$1750/kW

O&M =

fixed \$35.50/kW

var. \$1.70/MWh

0% in-state coal

Wind

715 MW

28% capacity factor

Constr. = \$1650/kW

O&M =

\$24.70/kW

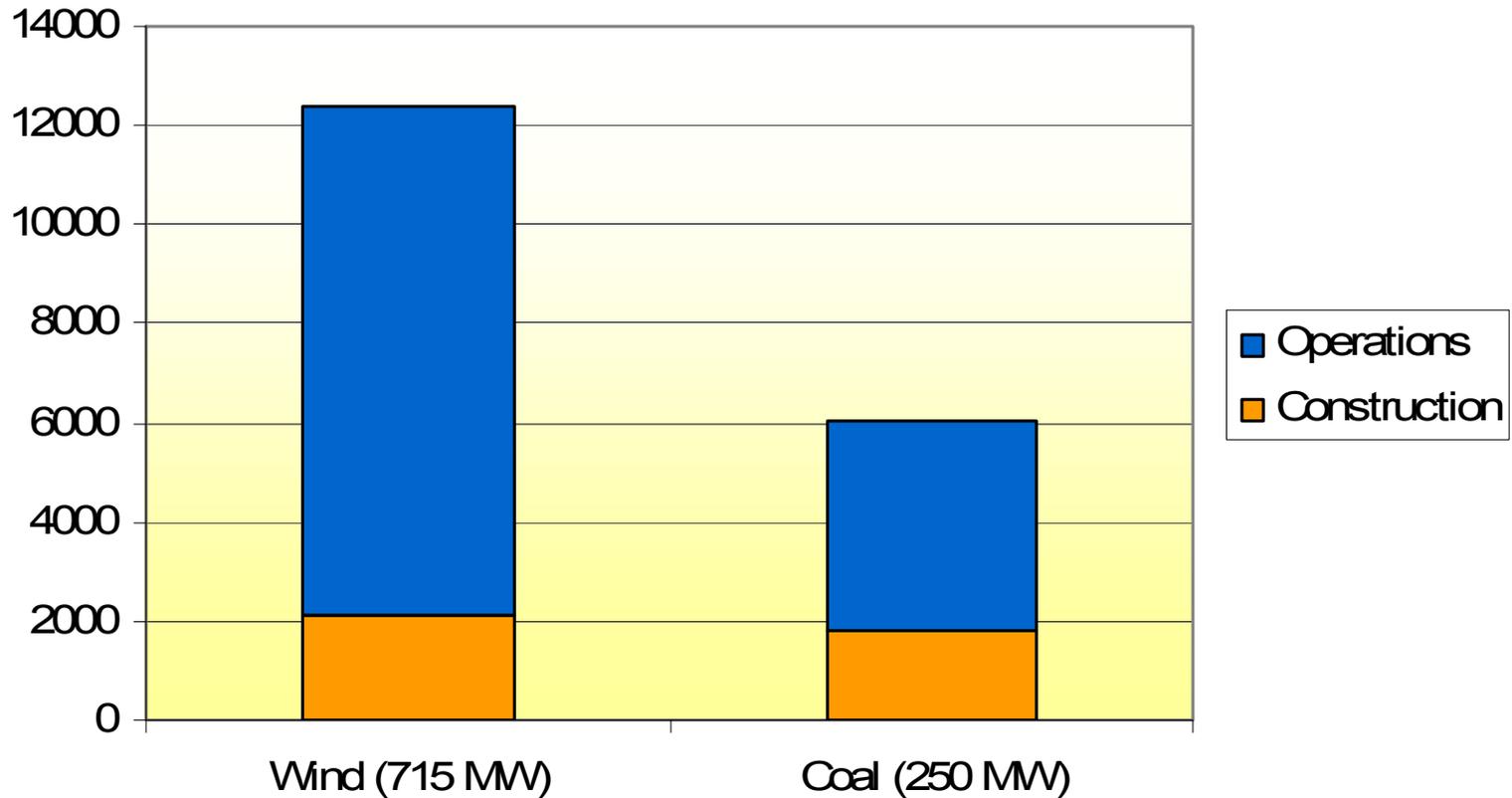
Royalties = \$4,000/1.5-MW turbine/yr

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Inputs are based on developer interviews and existing projects.

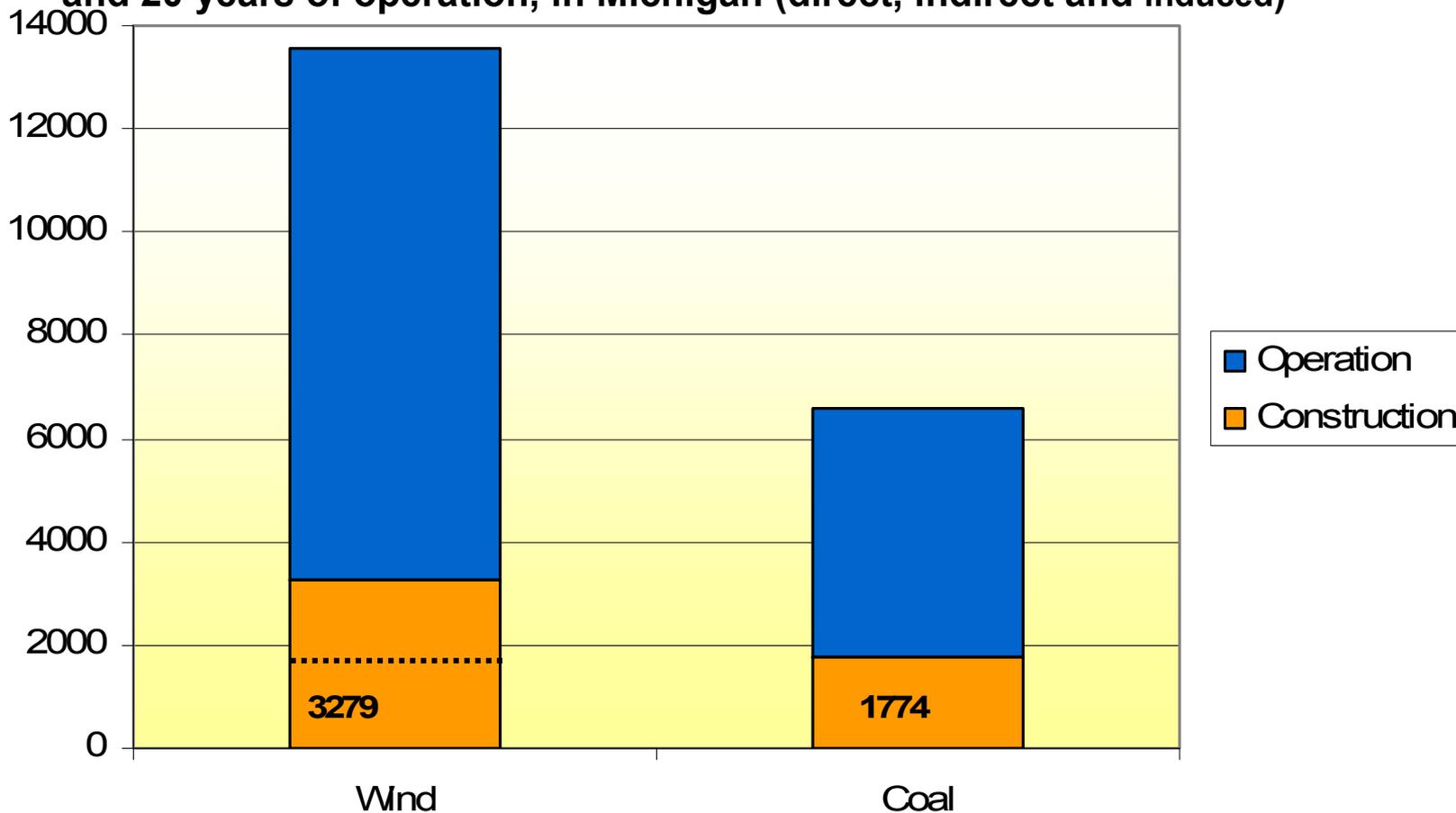
Michigan results - jobs

Job-years created from new wind and coal plants during construction and 20 years of operation, in Michigan (direct, indirect and induced)



Michigan results - jobs

Jobs created from new wind and coal plants during construction and 20 years of operation, in Michigan (direct, indirect and induced)

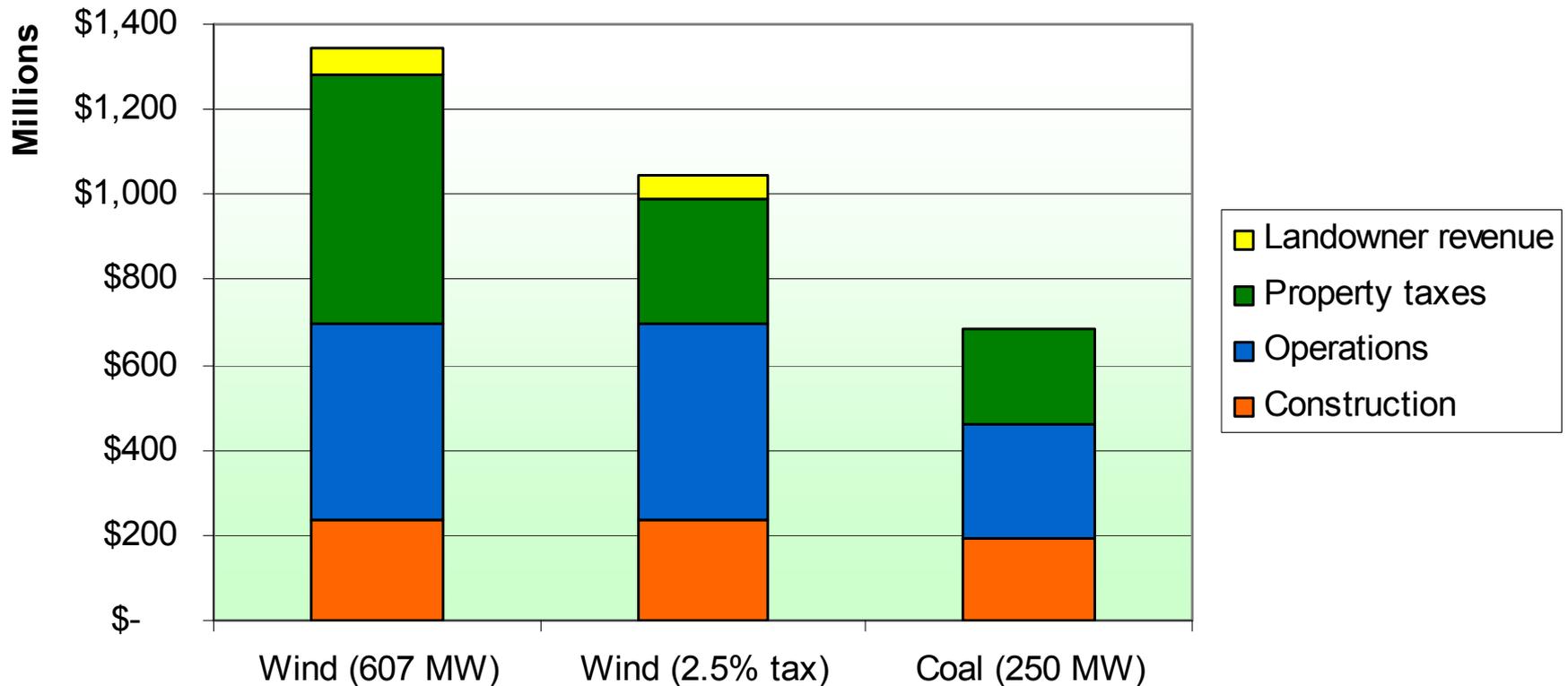


Sensitivity: 100% in-state towers



Michigan results

**Total economic impacts from new wind and coal plants in Michigan
(direct, indirect and induced)
Construction + 20 yrs of operation**





Major Rural Economic Impacts

- **Job creation**
- **Landowner revenues**
- **Property taxes**
(schools, roads, county services)
- **Coal benefits depend on resources**



Other benefits of wind...

- Climate concerns
- Emissions/ clean air
- Stable prices
- Healthier air and water





Discussing Water Rights, A Western Pastime

Thank you



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Wind Powering America
www.windpoweringamerica.gov

