# Economic Benefits, Carbon Dioxide ($CO_2$) Emissions Reductions, and Water Conservation Benefits from 1,000 Megawatts (MW) of New Wind Power in Indiana

Wind power is one of the fastest-growing forms of new power generation in the United States. Industry growth in 2007 was an astounding 45%. New wind power installations constituted 35% of all new electric power installations. This growth is the result of many drivers, including increased economic competitiveness and favorable state policies such as Renewable Portfolio Standards. However, new wind power installations provide more than cost-competitive electricity. Wind power brings economic development to rural regions, reduces greenhouse gas production by displacing fossil fuels, and reduces water consumption in the electric power sector.

The U.S. Department of Energy's Wind Powering America Program is committed to educating state-level policymakers and other stakeholders about the economic, $CO_2$ emissions, and water conservation impacts of wind power. This analysis highlights the expected impacts of 1000 MW of wind power in Indiana. Although construction and operation of 1000 MW of wind power is a significant effort, six states have already reached the 1000-MW mark. We forecast the cumulative economic benefits from 1000 MW of development in Indiana to be $1.3 billion, annual $CO_2$ reductions are estimated at 3.1 million tons, and annual water savings are 1,684 million gallons.

## Economic Benefits

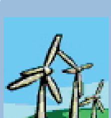
Building and operating 1000 MW of wind power requires a significant investment. But this investment will generate substantial direct, indirect, and induced economic benefits for Indiana. Direct benefits include jobs, land lease payments, and increased tax revenues. Indirect benefits include benefits to businesses that support the wind farm. Induced benefits result from additional spending on goods and services in the area surrounding the development.

Direct impacts result from investment in the planning, development, and operation of new wind facilities. Beneficiaries include landowners, construction workers, O&M staff, turbine manufacturers, and project managers. Indirect impacts reflect payments made to businesses that support the wind facility and include banks financing the project, component suppliers, and manufacturers of equipment used to install and maintain the facility. Induced benefits result from increased spending by direct and indirect beneficiaries. Examples include increased business to restaurants, retail establishments, and child care providers.

Drivers of economic benefits include the use of local construction companies, the presence of in-state component suppliers, local wage structures, local property tax structures, and operation and maintenance (O&M) expenditures. The projected benefits for Indiana could be greatly increased by developing a local wind supply, installation, and maintenance industry within the state.

### Indiana Economic Impacts
**from 1,000 MW of New WInd Development**

**Wind Energy's Economic "Ripple Effect"**



**Direct Impacts**

**Payments to Landowners:**
- $2.7 million/year

**Local Property Tax Revenue:**
- $15.8 million/year

**Construction Phase:**
- 1,555 new jobs
- $188.5 million to local economies

**Operational Phase:**
- 252 new long-term jobs
- $21.2 million/year to local economies

**Indirect and Induced Impacts**

**Construction Phase:**
- 1,475 new jobs
- $129.8 million to local economies

**Operational Phase:**
- 273 local jobs
- $25.3 million/year to local economies

**Totals** (construction + 20 years)

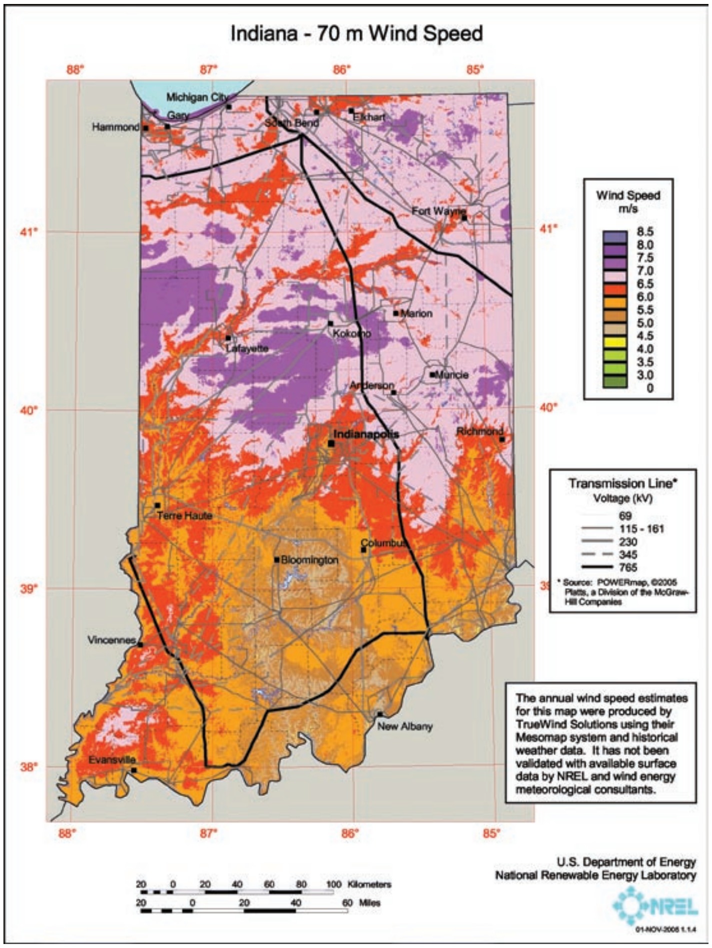
**Total Economic Benefit:** $1.3 billion

**New Local Jobs During Construction:** 3,030

**New Local Long-term Jobs:** 525

**Construction Phase = 1-2 years**
**Operational Phase = 20+ years**

## Distribution of Wind Resources in Indiana




## Methodology

The data for economic analysis are primarily from interviews with state-specific contacts, including developers, power plant operators, contractors, mining and gas associations, and state property tax assessors or administrators. When interviews were not possible, information was obtained from public Web resources, state tax reports, and federal databases for current power plants. Cumulative impacts are estimated for construction and 20 years of operations. Economic impacts are 2007 constant dollars and estimated by application of the National Renewable Energy Laboratory's (NREL's) Jobs and Economic Development Impacts (JEDI) model. Carbon estimates apply 2004 non-baseload $CO_2$ emissions rates (EPA eGRID2006 Version 2.1, April 2007). Water savings are calculated based on consumption rates for various generating technologies. Consumption rates were compiled by Western Resource Advocates and calculated from EIA form 767 data and EPRI publications. Consumption rates are applied to the NERC region generation mix as determined from EIA form 960/920 (2006).

| Assumptions | |
|---|---|
| Construction Cost | $1,650/kW |
| Operations and Maintenance | $24.70/kW |
| Property Tax | $15,790/MW |
| Landowner Lease Payments | $2,667/MW/year |

## $CO_2$ Emissions Reduction and Water Conservation Benefits

In 2004, the average Indiana resident emitted approximately 21.5 tons of $CO_2$ as a result of electricity consumption. As a state, Indiana ranked 6th in electricity sector per capita $CO_2$ emissions. $CO_2$ emissions are increasingly important factors as state and federal governments consider policies regarding climate change while drought in the Southeast has underscored the relevance of freshwater supply issues outside of the arid and semi-arid regions of the United States.

Developing wind power in Indiana will result in $CO_2$ emissions reduction and water savings. Choosing to build wind projects results in $CO_2$ reductions from fewer new coal plants built and less natural gas consumption. In addition, both fossil- and nuclear-based electricity generation consume large amounts of water. Wind power reduces our reliance on increasingly vital freshwater resources.

| Annual Impacts in Indiana from 1000 MW of New Wind Power | |
|---|---|
| Water Savings | $CO_2$ Savings |
| 1,684 million gallons | 3.1 million tons |

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**May 2008 • DOE/GO-102008-2562**