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

Wind power is one of the fastest-growing forms of new power generation in the United States. The nation's total wind power generating capacity increased by 50% in 2008, and new wind power installations constituted 42% 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 water consumption in the electric power sector, and reduces greenhouse gas production by displacing fossil fuels.

The U.S. Department of Energy's Wind Powering America Program is committed to educating state-level policy makers and other stakeholders about the economic, CO_2 emissions, and water conservation impacts of wind power. This analysis highlights the expected impacts of 1,000 MW of wind power in Tennessee. Although construction and operation of 1,000 MW of wind power is a significant effort, seven states have already reached the 1,000-MW mark. We forecast the cumulative economic benefits from 1,000 MW of development in Tennessee to be **$1.2 billion**, annual CO_2 reductions are estimated at **2.4 million tons**, and annual water savings are **1,321 million gallons**.

Economic Benefits

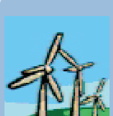
Building and operating 1,000 MW of wind power requires a significant investment. But this investment will generate substantial direct, indirect, and induced economic benefits for Tennessee. Direct benefits include jobs, land-lease payments, and increased tax revenues. Indirect benefits include benefits 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, operation and maintenance (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 childcare 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 O&M expenditures. The projected benefits for Tennessee could be greatly increased by the development of a local wind supply, installation, and maintenance industry within the state.

Tennessee 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:
- $6.9 million/year

Construction Phase:
- 1,677 new jobs
- $188.5 million to local economies

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

Indirect and Induced Impacts

Construction Phase:
- 1,489 new jobs
- $148.2 million to local economies

Operational Phase:
- 194 local jobs
- $20.1 million/year to local economies

Totals
(construction + 20 years)

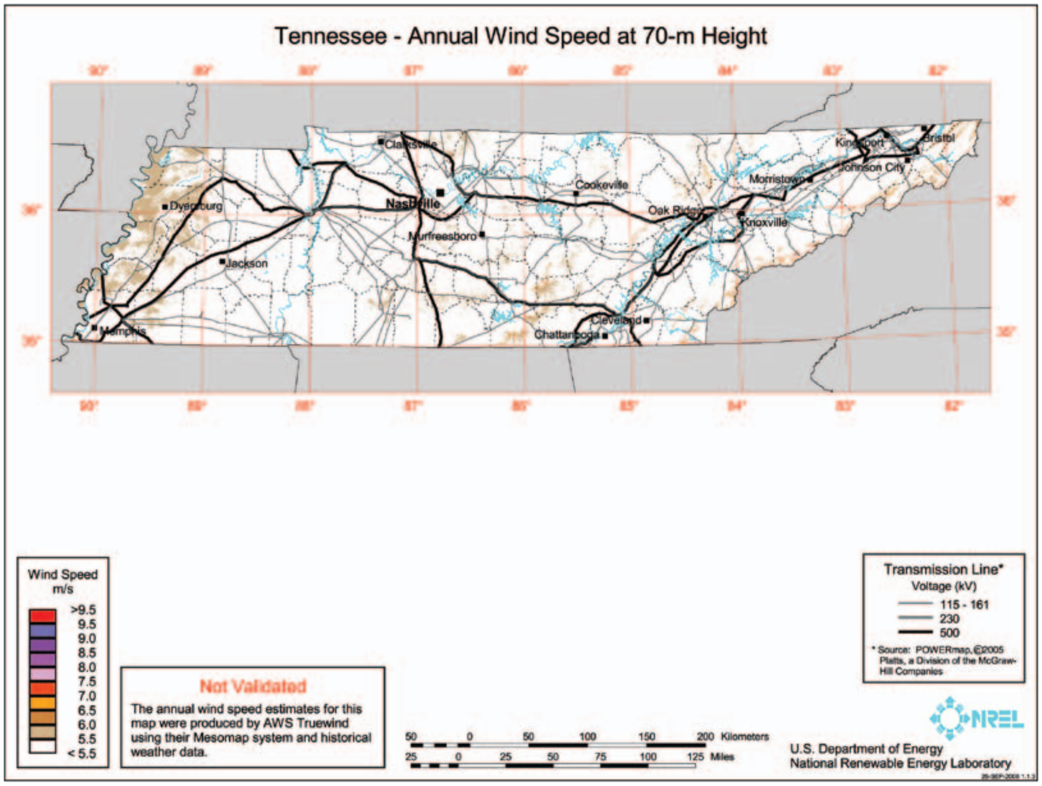
Total Economic Benefit: $1.2 billion

New Local Jobs During Construction: 3,166

New Local Long-term Jobs: 428

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

Distribution of Wind Resources in Tennessee



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 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).

Data Inputs	
Construction Cost	$1,650/kW
O&M	$24.70/kW
Property Tax	$6,864/MW/yr
Landowner Lease Payments	$2,667/MW/yr

CO_2 Emissions and Water Conservation Benefits

In 2004, the average Tennessee resident emitted approximately 10.5 tons of CO_2 from electricity consumption. As a state, Tennessee ranked 22nd in per capita CO_2 emissions from the electricity sector. CO_2 emissions are increasingly important factors as the state and federal government 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 Tennessee will result in CO_2 emissions reductions and water savings. Choosing to build wind 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 Tennessee from 1000 MW of New Wind Power	
Water Savings	CO_2 Savings
1,321 million gallons	2.4 million tons

For more information, contact:

Eric Lantz, Eric.Lantz@nrel.gov
Suzanne Tegen, Suzanne.Tegen@nrel.gov
Wind Powering America
National Renewable Energy Laboratory
1617 Cole Blvd. MS3811
Golden, CO 80401

Prepared by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy; NREL is operated by the Alliance for Sustainable Energy, LLC.

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 10% post consumer waste.

For more information contact:
EERE Information Center
1-877-EERE-INF (1-877-337-3463)
www.eere.energy.gov

DOE/GO-102009-2754
Revised December 2009