



Advancing Wind Power in Illinois Conference 2011

Larry Flowers

American Wind Energy Association

Wind for Schools

Plenary Session

Friday, July 22, 2011, 9:15 AM



Wind for Schools
**“An investment in knowledge
always pays the highest dividends”:**
Ben Franklin

Larry Flowers

American Wind Energy Association



“Eighty percent of success
is showing up.”

Woody Allen

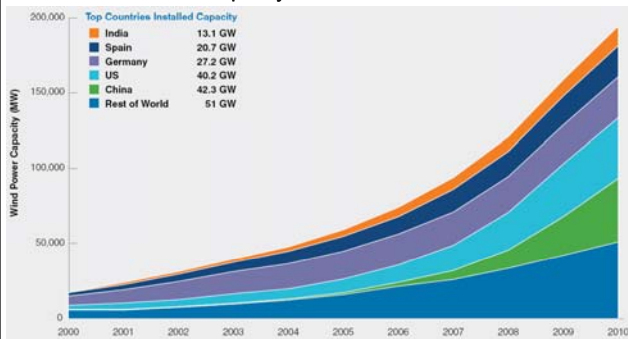


One Size Doesn't Fit All



Global Wind Power Capacity Growth

Global Wind Power Capacity Growth

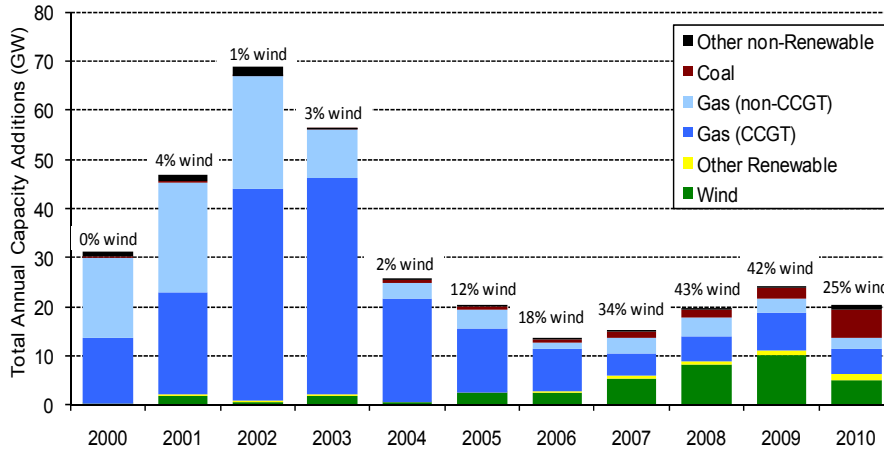


- 35,800 MW installed globally in 2010, for a growth rate of 22.5%.
- Total Global Installations stand at 194,390 MW globally.
- China was the largest market for new installations with 16,500 MW installed in 2010; posting 20% growth.
- The European Union market remained roughly stable with 9,300 MW of new wind power installed in 2010.
- U.S. wind installations represent over 21% of global wind capacity.

Source: AWEA U.S. Wind Industry Annual Market Report Year Ending 2010

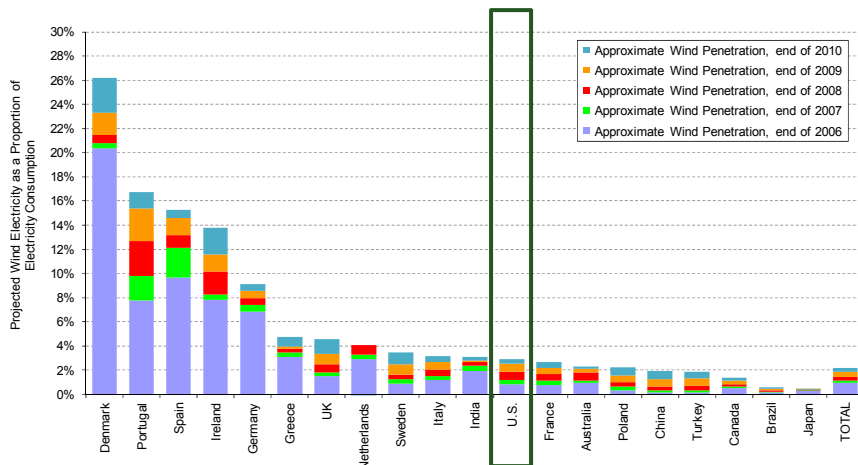


Wind Is a Major Source of New Capacity: 25% in 2010, a Drop From Earlier Years



Source: LBL draft

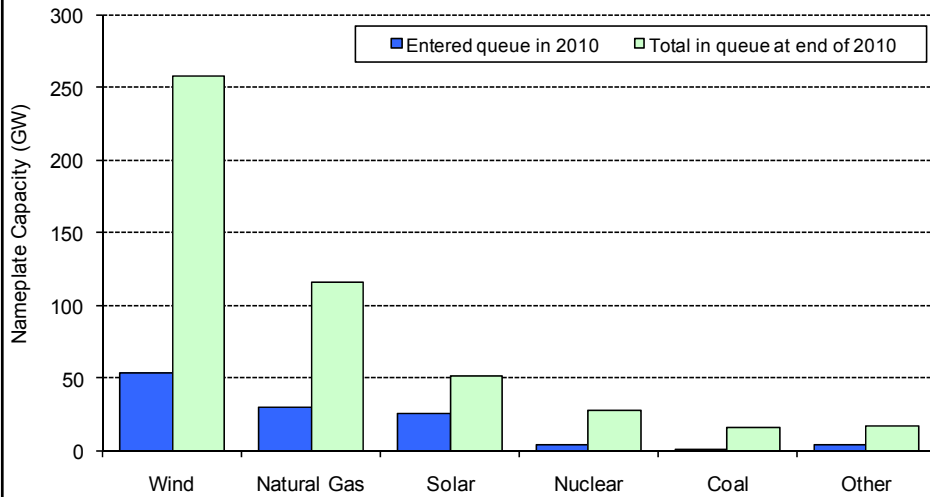
Wind Capacity at End of 2010 Equates to ~2.9% of U.S. Electricity Consumption



Note: Figure only includes the 20 countries with the most installed wind capacity at the end of 2009

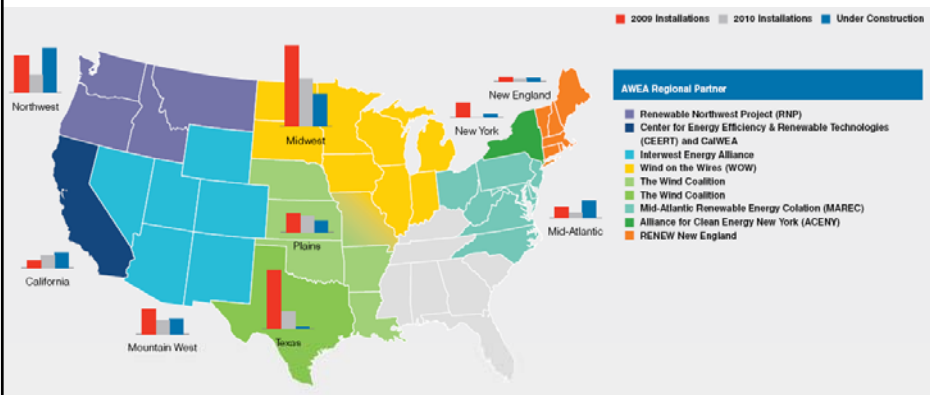
Source: LBL draft

Interconnection Queues Are Clogged with Wind Projects: 260 GW



Source: LBL draft

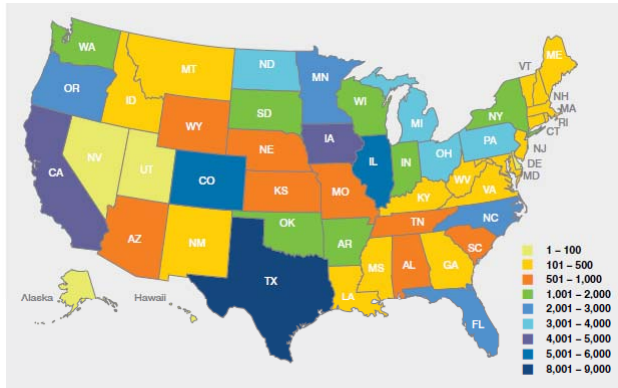
Wind Power Capacity Installations and Under Construction, by Region



Source: AWEA U.S. Wind Industry Annual Market Report Year Ending 2010



U.S. Wind Industry Jobs by State

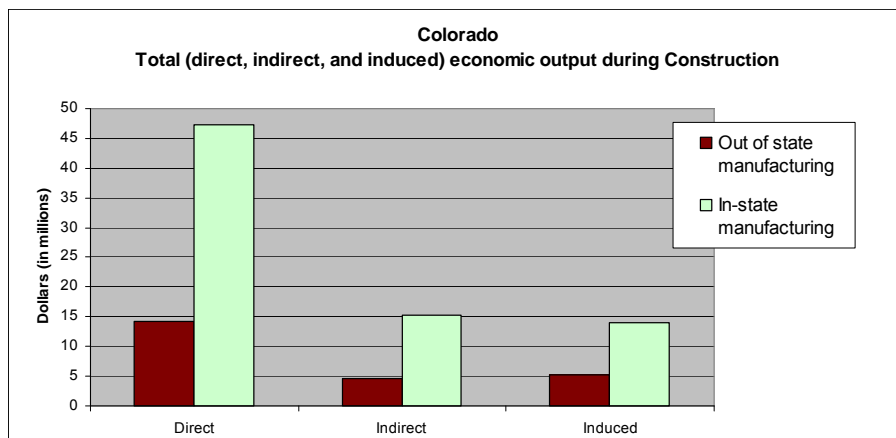


- Of the 75,000 jobs across the wind industry, Texas ranked No.1 with the largest amount of new capacity in 2010, energy-hub and offices in Houston and strong manufacturing across the state.
- Illinois took the No. 2 spot with strong 2010 installations and growing manufacturing base.
- With the recent heavy manufacturing investment in Colorado, the state ranked No. 3 in terms of wind jobs.

Source: AWEA U.S. Wind Industry Annual Market Report Year Ending 2010



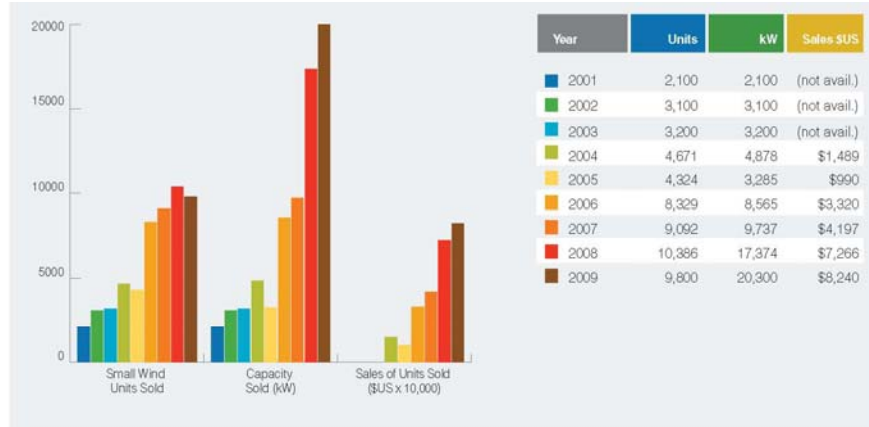
Potential Economic Activities Impact of Installing a 100-MW Wind Farm Using Local Blades vs. Out-of-State Blades



Source: NREL (National Renewable Energy Laboratory)

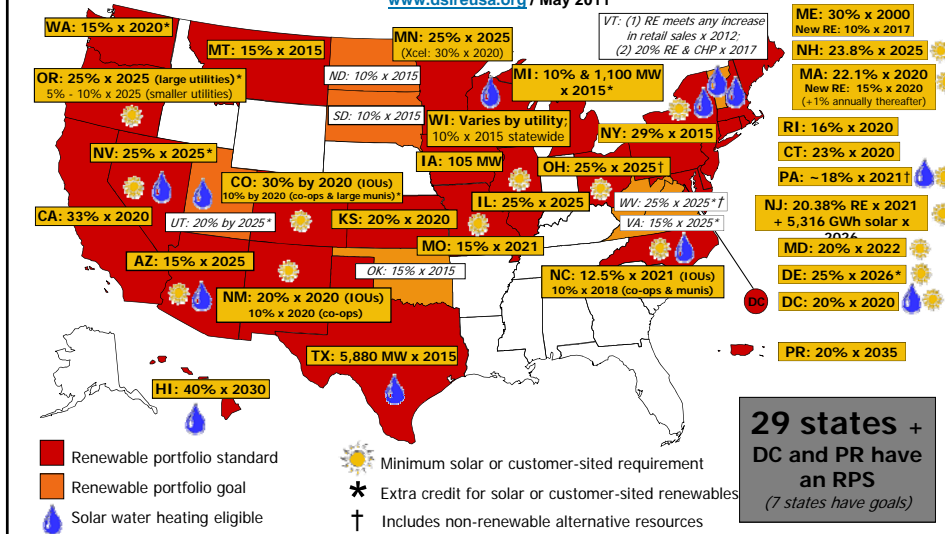


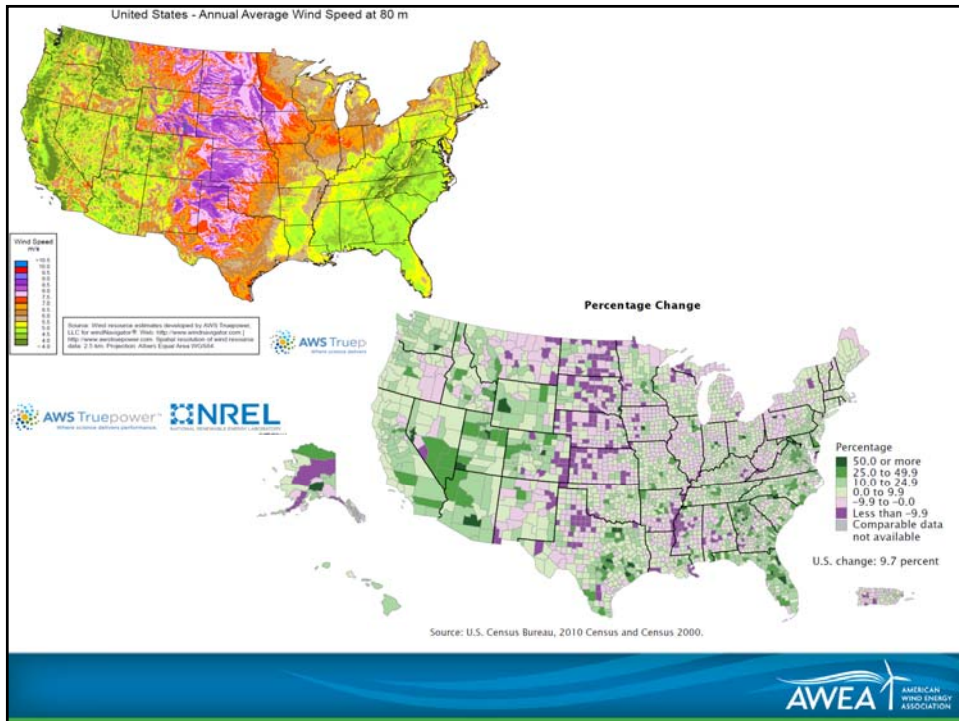
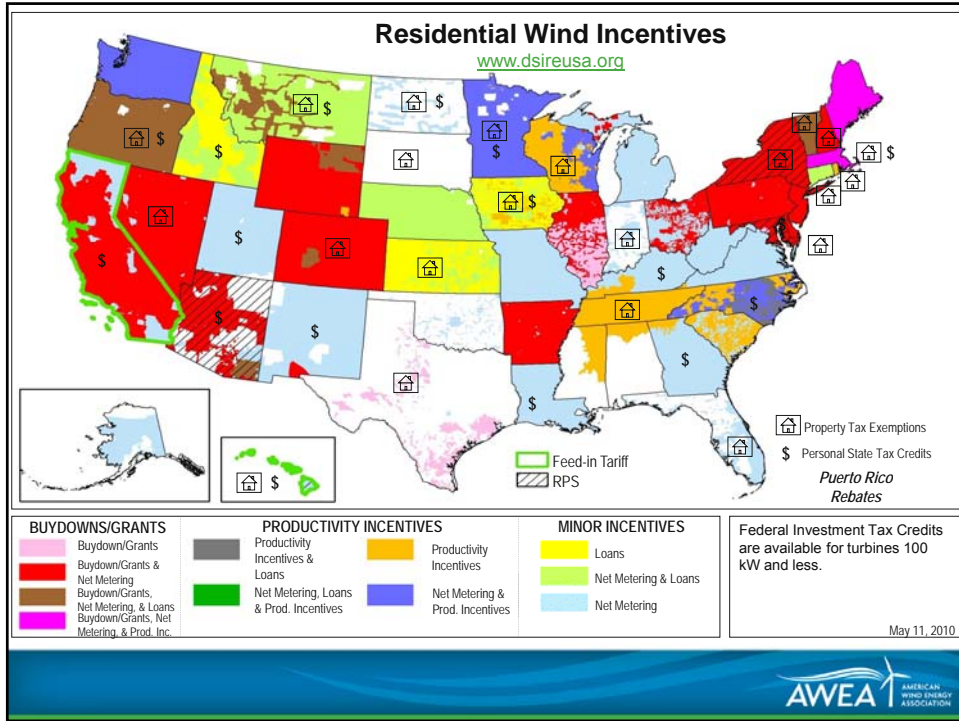
Growth of U.S. Small Wind Market

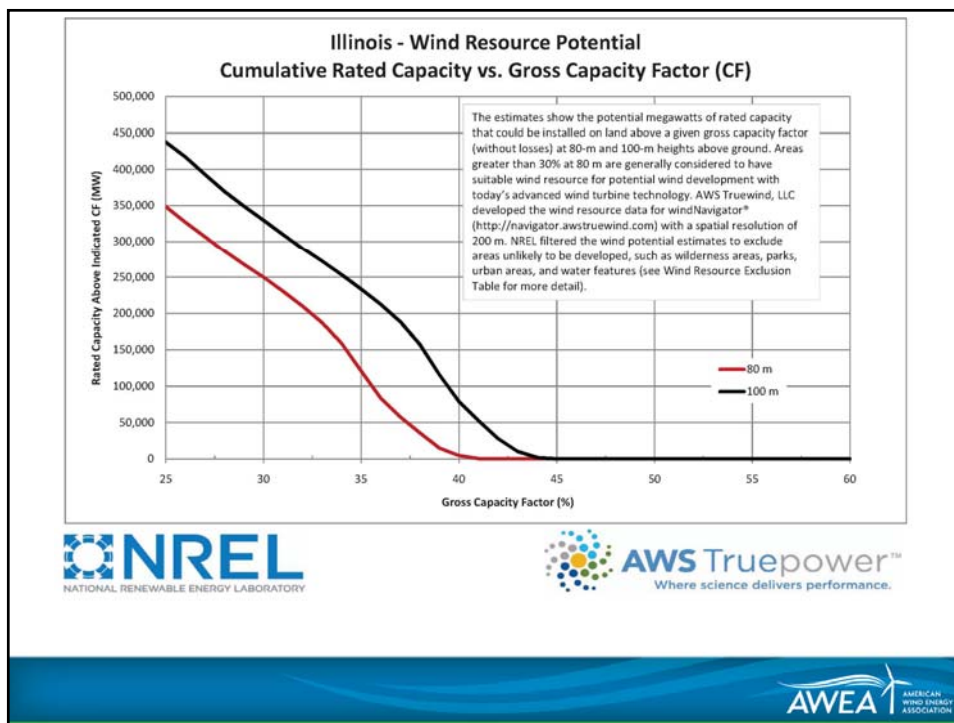
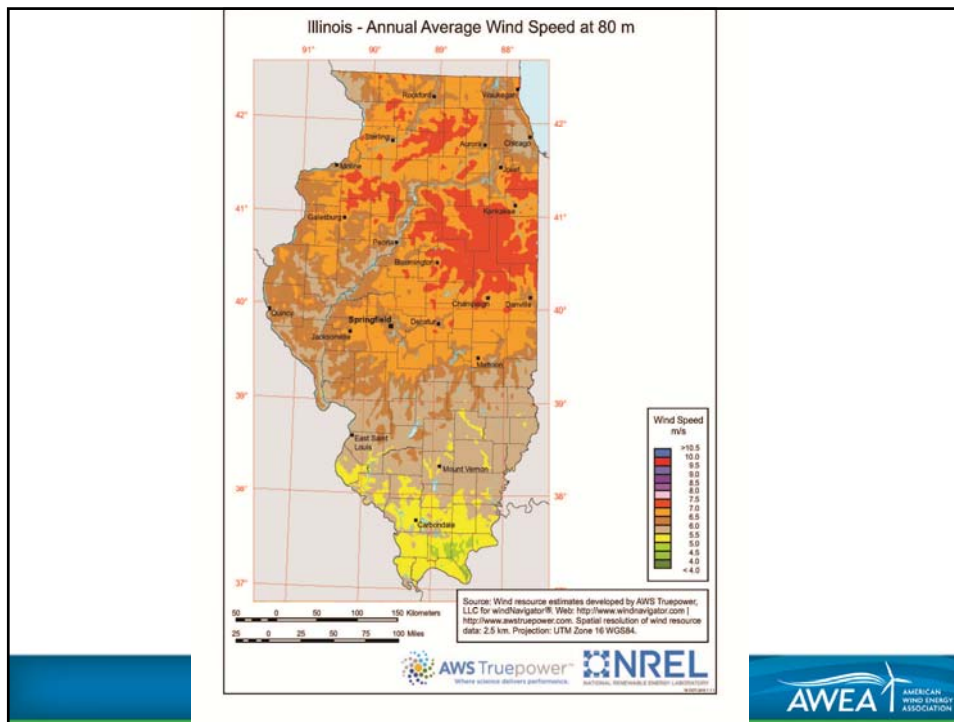


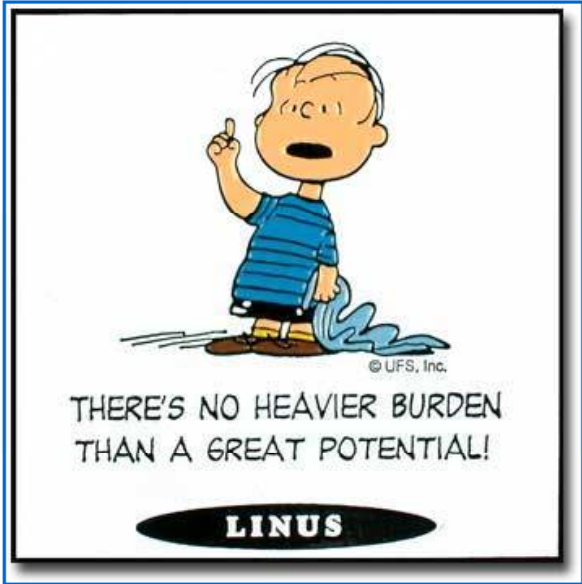
RPS Policies

www.dsireusa.org / May 2011

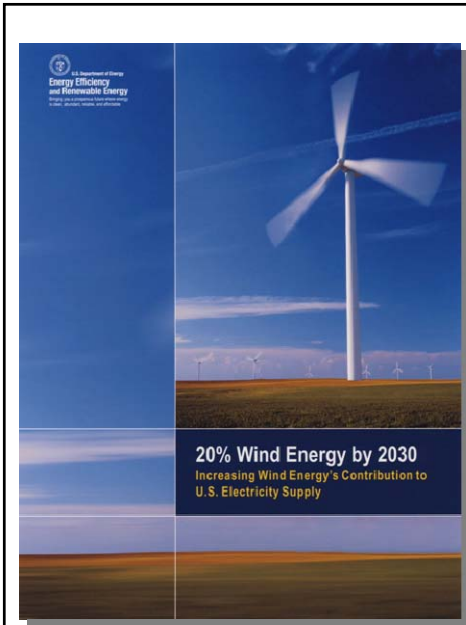








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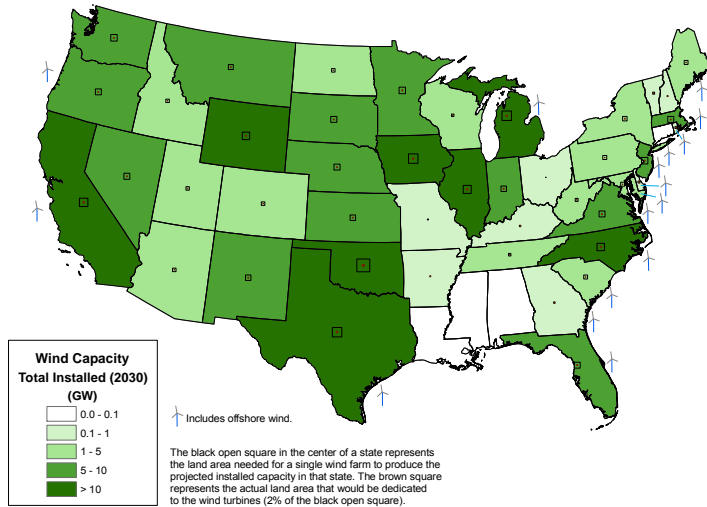


“The future ain't what it used to be.”

- Yogi Berra

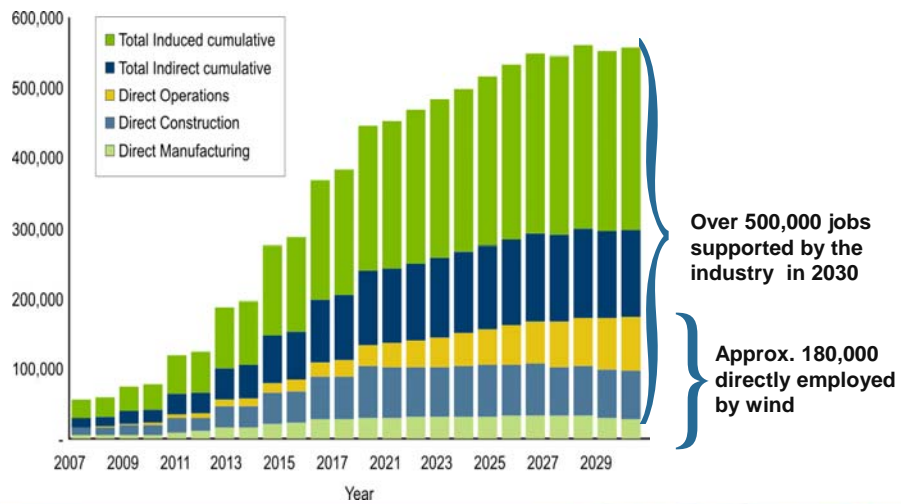


46 States Would Have Substantial Wind Development by 2030



Jobs Supported by the 20% Scenario

Over 500,000 jobs would be supported between 2007 and 2030

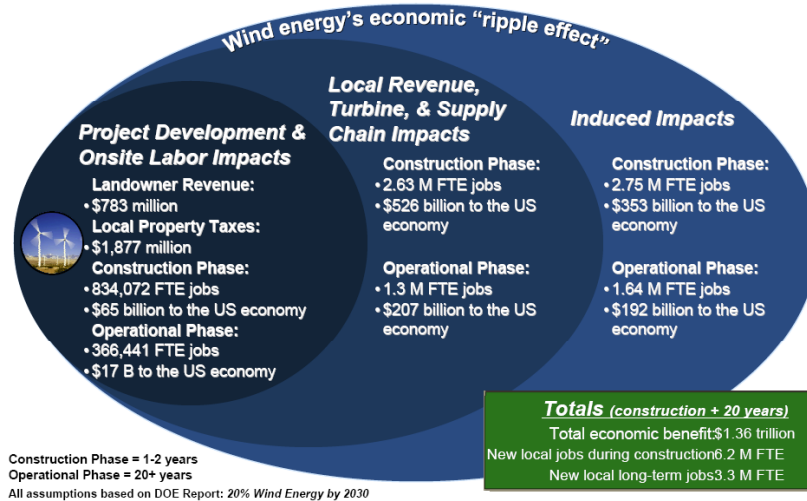


Source: U.S. DOE, 20% Wind Energy by 2030



National (U.S.) Economic Impacts Cumulative Impacts from 2007-2030 From the 20% Scenario – 300 GW New Onshore & Offshore Development

JEDI Model Version W1.09.03e

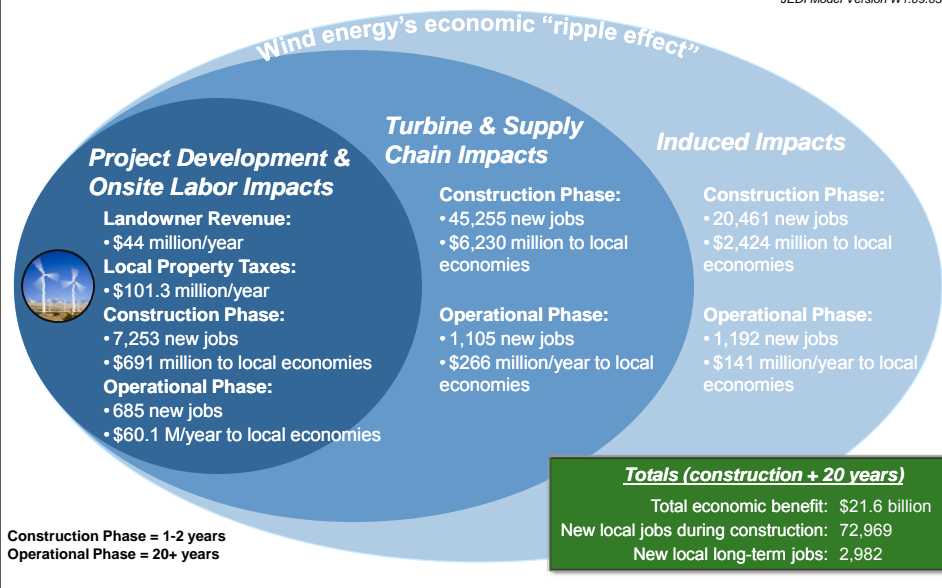


Jobs and Economic Impacts from the JEDI Model



- 20% Scenario – 14,678 MW of New Wind Power in Illinois

JEDI Model Version W1.09.03e





“Tell me and I forget.
Teach me and I remember.
Involve me and I learn.”

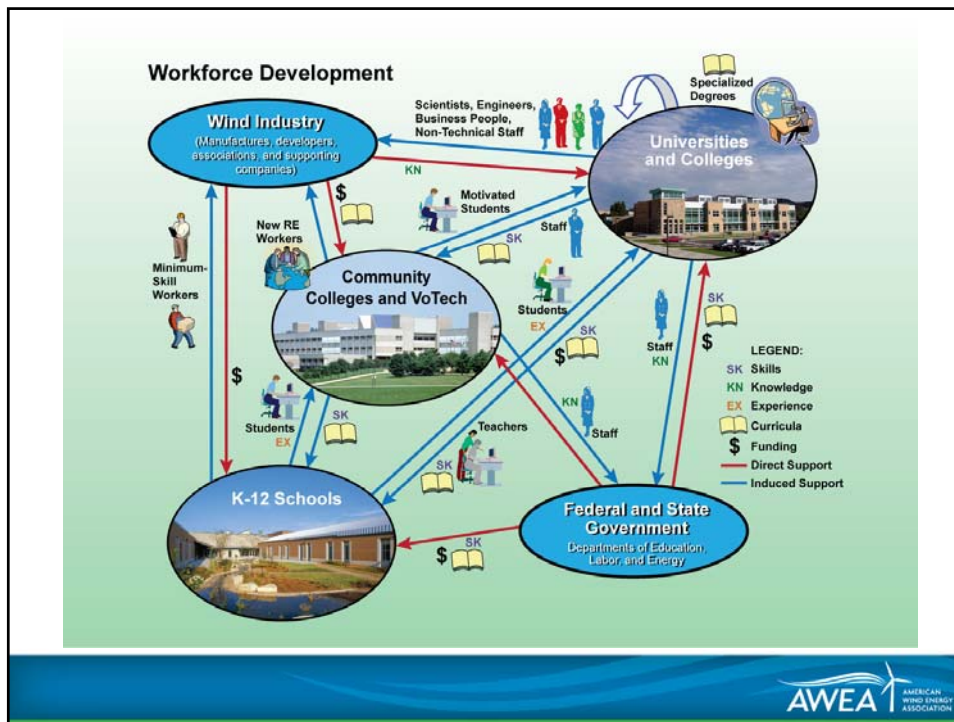
Benjamin Franklin



U.S. Training Needs

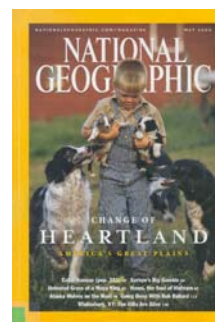
- to support 15GW/yr new installation
- Annual new construction and manufacturing personnel:
 - 5,000 construction
 - 2,200 manufacturing
 - 350 other construction sector jobs
 - 6,500 indirect positions
- Annual new plant operation personnel:
 - 1,000 to 1,500 new plant operators
 - 3,500 to 4,500 new personnel in induced markets

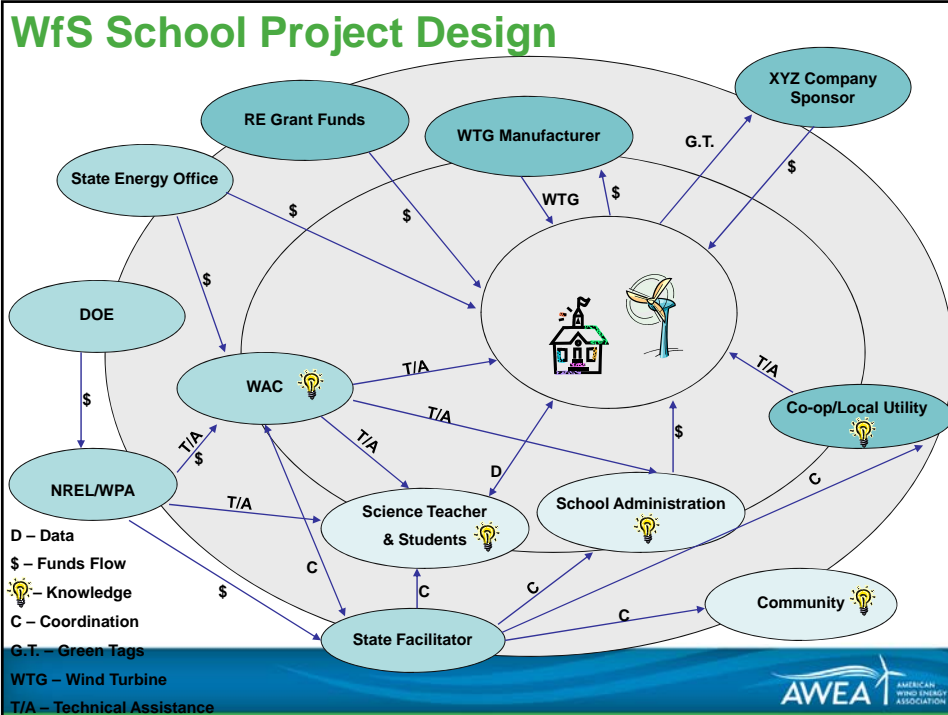




Wind for Schools

- **Project Objectives:**
 - **Engage rural America:** wind energy offers a more secure economic future for rural America
 - **Engage rural school teachers and students** in wind energy education and workforce opportunities
 - **Equip and inspire college juniors and seniors** in wind energy education and applications, and career opportunities





Project Approach

- **Work with State Universities** on college-level programs and curricula to train students in wind energy deployment
 - Build in-state capacity to provide technical assistance for community-scale projects
- **Assist local school stakeholders**, community, university, and local utility to implement a sustainable school wind project
 - Low-cost replicable wind system that is easy to handle
- **Develop and implement a K-12 curriculum** for schools
 - Teacher training on wind curricula
 - Incorporate WfS turbines into the classroom curriculum

Wind Application Centers

A training and implementation center to educate engineers in wind applications:

- Modeled after the DOE Industrial Application Centers
- Develop a long-term program on wind energy applications; NREL/DOE provides technical and financial support for 3 – 5 year start up phase
- Provide data analysis, technical assistance and implementation support for Wind for Schools projects
- Become the “go-to place” for technical assistance for school and community wind applications
- Train engineers to enter the wind industry



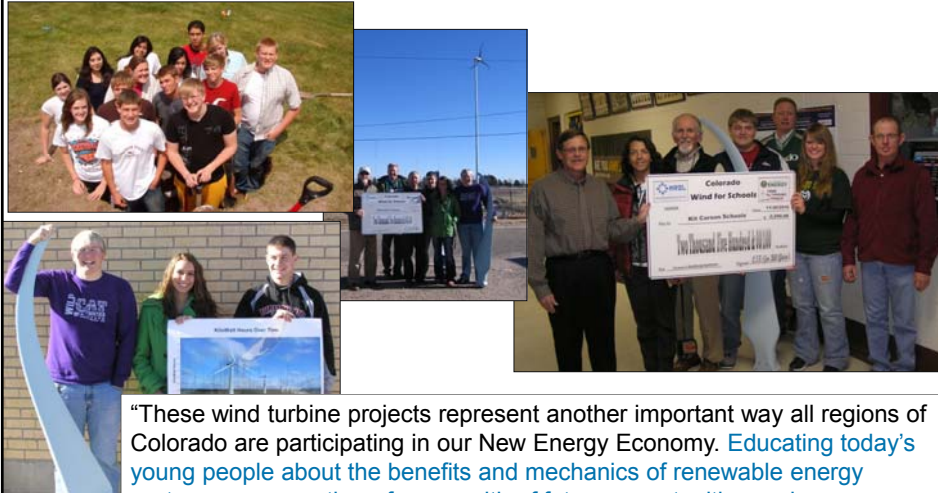
State Facilitators

In-state person with knowledge of local issues and organizations to engage with the variety of stakeholders needed for successful school projects

- Engage with the variety of stakeholders needed for successful school projects: community, school, science teachers, local co-op/utility, WAC, NREL
- Help assemble financial package that will work
- Goal: Install 3 to 5 systems per year at rural schools
- Assist in the development of the Wind Applications Center



Colorado



"These wind turbine projects represent another important way all regions of Colorado are participating in our New Energy Economy. Educating today's young people about the benefits and mechanics of renewable energy systems prepares them for a wealth of future opportunities and demonstrates the crucial role our rural communities can play in mapping out a new energy future for Colorado and the country." - Colorado Gov. Bill Ritter



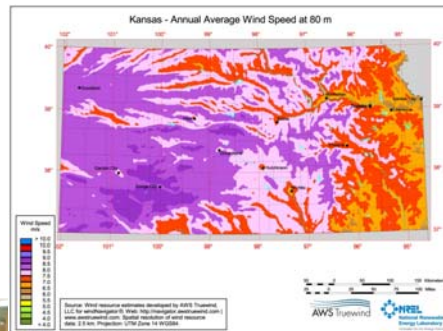
Nebraska



"We started joking around about it, what if we got a turbine at our school," said senior Zach Foster. "After awhile we starting taking it seriously and we thought, why can't we get a wind turbine for our school? So we formed a group of students and then actually went about making it happen."



Kansas



Project Finances

Sample Project Costs (Skystream Turbine; 2.3 kW)

- Cost depends greatly on the type of tower used – lattice, 60ft monopole or 45ft monopole
 - Turn key system cost: ~\$18,000
 - Total equipment costs: ~\$13,500
 - Minimum equipment costs: ~\$10,000
- Expected Funding Arrangement
 - **\$2,500 from the school**
 - \$2000-2,500 from green certificate sponsor (for CO: NREL)
 - \$5,000 - \$10,000 from a buy-down or other grant sources (USDA, State grants, SEP funds, USBC, local foundations)
 - \$6,000 provided in-kind by the local utility and community businesses
- Payback – the real payback is the education
 - Skystream @ 45ft in a class 4 wind resource will produce about 3500kWh/year
 - At a retail rate of \$0.10/kWh this amounts to ~\$350/year in reduced energy costs
 - **Simple payback to school ~ 7 years**



Project Funding Sources

- State (energy office or legislature)
- USBC fund
- Utility
- USDA (RBEG, Rural facilities)
- Supplemental Environmental Projects
- Foundations
- Community
- Host School
- RE Certificates/Green tags: industry/local business//gov't. agencies
- In kind: WAC; local utility; local concrete; electrician; wind distributor; installer



WfS Program Curricula

University programs:

- University school turbine project teams
- Short course in wind energy
- Each WAC has tailored courses
- Developing expert series video for lectures
- WAC's sharing curricula

K-12 host schools:

- NEED developed curricula (www.need.org)
- Developing student project guide
- Collaborative use of data from other WfS sites
- NEED and KidWind teacher training programs
- KidWind project challenge



Wind for Schools Auxiliary Activities

- States can implement a Wind for Schools program using the DOE WfS as a program model and TA source:
 - Access to project implementation documents, such as system designs, interconnection specifications, green tag documents
 - National program-produced publications
 - Experience of other states that have implemented the program
 - Hardware developed for the WfS project at costs similar to other host schools
 - Limited NREL technical assistance in the implementation of projects
 - Access to program-sponsored meetings, training programs, and informational summits
 - Full access to WfS system database
 - Any current or new curricula developed as part of the program



KidWind Challenge



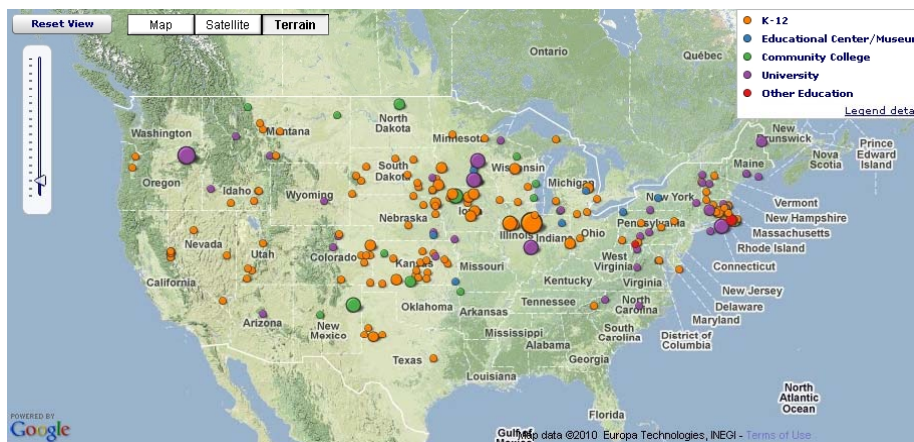
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Wind for Schools Project Locations



Challenges

- Economics/Funding
- Keeping it Simple
- Engaging Rural Utilities
- Starting up University Wind Application Centers
- Selecting Candidate Schools
- Developing Curricula
- Implementing Curricula K-12
- Expanding the Program



Milford, Utah



Wind for Schools





“Right now counts forever.”

R. C. Sproul, theologian