

Wind for Schools (Workforce Development)



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Technology Center**

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National (U.S.) Economic Impacts

Cumulative Impacts from 2007-2030

From the 20% Scenario – 300 GW new Onshore and Offshore Development

Wind energy's economic "ripple effect"

Project Development & Onsite Labor Impacts

Landowner Revenue:

- \$783 million

Local Property Taxes:

- \$1,877 million

Construction Phase:

- 834,072 FTE jobs
- \$65 billion to the US economy

Operational Phase:

- 366,441 FTE jobs
- \$17 B to the US economy



Local Revenue, Turbine, & Supply Chain Impacts

Construction Phase:

- 2.63 M FTE jobs
- \$526 billion to the US economy

Operational Phase:

- 1.3 M FTE jobs
- \$207 billion to the US economy

Induced Impacts

Construction Phase:

- 2.75 M FTE jobs
- \$353 billion to the US economy

Operational Phase:

- 1.64 M FTE jobs
- \$192 billion to the US economy

Totals (construction + 20 years)

Total economic benefit: \$1.36 trillion

New local jobs during construction: 6.2 M FTE

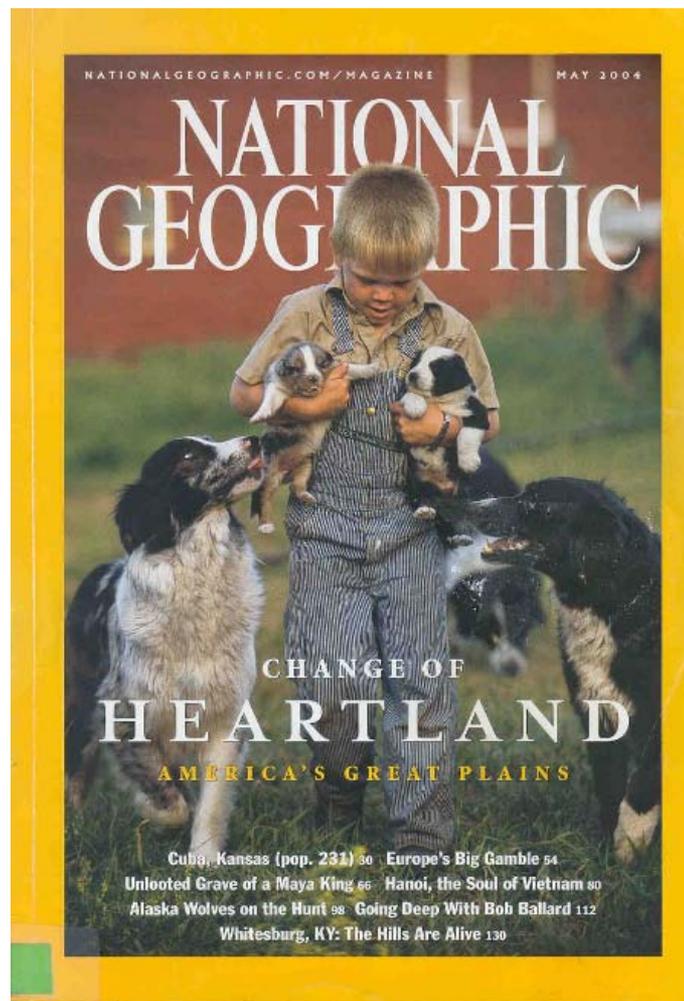
New local long-term jobs: 3.3 M FTE

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

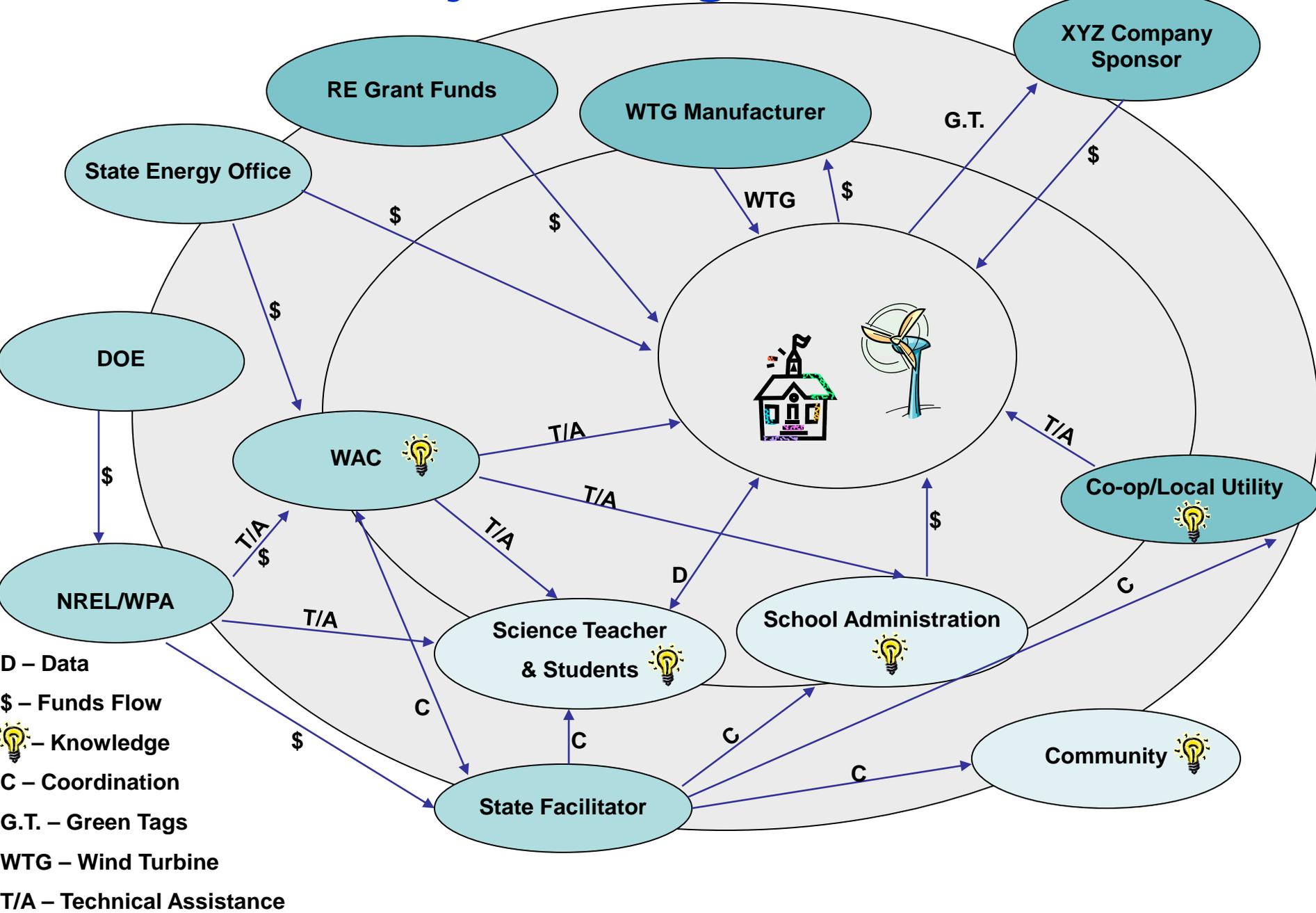
All assumptions based on DOE Report: 20% Wind Energy by 2030

Project Objectives:

- *Engage rural America: wind offers a robust economic future for rural Americans.*
- *Expand rural education to include wind energy.*
- *Equip college upper classmen in wind energy applications (to provide the growing U.S. wind industry with new talent).*
- *Establish community wind technical assistance centers.*



WfS School Project Design



- Work with State Universities on curricula and projects to train students in wind energy deployment

Builds in-state capacity to provide technical assistance for community-scale projects

- Form teams of schools, communities, universities and local utilities to implement sustainable wind projects

Low-cost wind systems that are easy to install and maintain

- Collaborate with AWEA, NEED, and KidWind to develop and implement K-12 curricula

Teacher training on wind curricula



Walsenburg, CO

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

- Modeled after the DOE Industrial Application Center
- Develop a long-term program on wind energy applications; NREL/DOE will help for first 3 years but additional funding will be need
- Provide data analysis, technical assistance, implementation support for Wind for Schools Program
- Become the “go-to place” for technical assistance for school and community wind
- Train engineers to enter the wind marketplace/industry
- Maintain met towers conduct wind energy assessments

Colorado State University

Boise State University

Kansas State University

Montana State University

University of Nebraska, Lincoln

South Dakota State University



South Dakota State University
You can GO ANYWHERE from here.®

- University of Alaska Fairbanks
- Appalachian State University
- James Madison University
- Penn State University
- Northern Arizona University



NORTHERN
ARIZONA
UNIVERSITY



FOUNDED 1899



In-state person with knowledge of local issues and organizations:

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

Colorado: **Tom Potter**, All American Energy

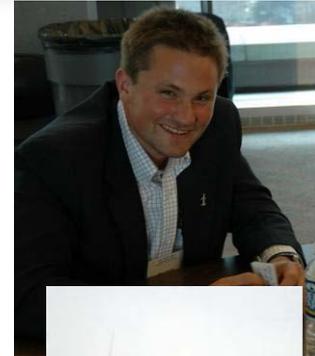
Idaho: **Brian Jackson**, Renaissance
Engineering

Kansas: **Dan Nagengast**, Kansas Rural
Center

Montana: **Mike Costanti**, Matney-Frantz
Engineering

Nebraska: **Dan McGuire**, American Corn
Growers
Foundation

South Dakota: **Steve Wegman**, former SD
Public Utilities
Commission



Sample Project Costs (Skystream Turbine)

Cost depends 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

Sources of Funds

- \$2,000 - \$2,500 from the school
- \$2,500 from green certificate sponsor
- \$5,000 - \$10,000 from grant sources (e.g. USDA, SEO)
- \$6,000 provided in-kind by the local utility/community

Payback - The real payback is in the education

- Skystream @70ft in a class 3 wind resource will produce 4,000 – 6,000 kWh/year
- Energy cost savings: \$280 - \$420/year (at retail rate of \$0.07 / kWh)
- Simple payback to school: 6 – 8 years



**Skyline High School,
Idaho**



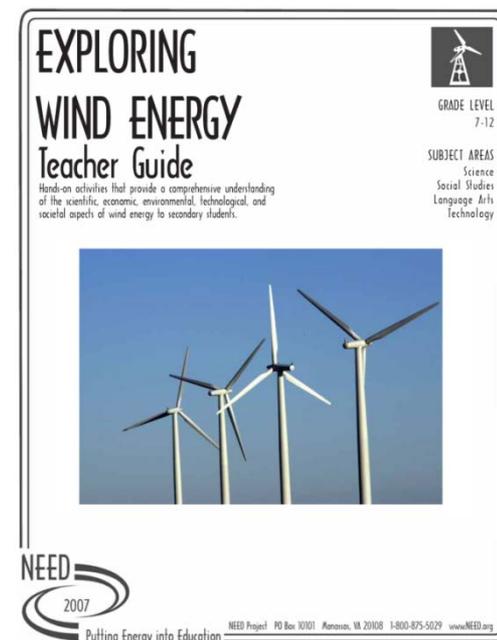
**Milford High
School, Utah**

University programs -

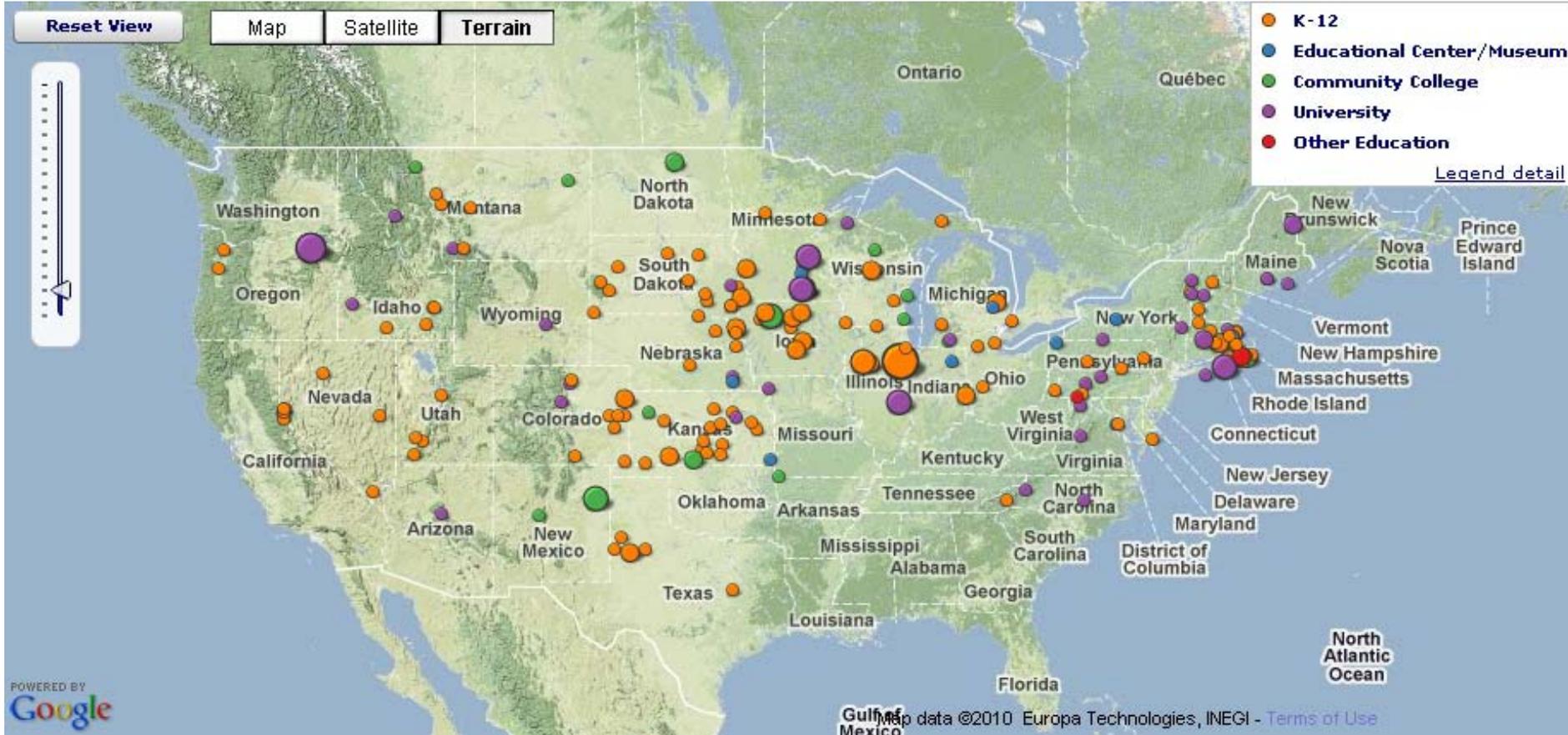
- University school turbine project teams
- Basic materials for short course in wind energy
- Developing expert series video for lectures
- Expanding curricula

K-12 host schools -

- NEED developed curricula (www.need.org)
- Developing student project guide
- Collaborative use of data from WfS sites
- NREL supported teacher training programs
- Sharing of curricula among WfS partners



WfS Project Locations



- 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



Internship for Wind Applications Center Research:

Nguyen and KSU professors use the software package Fluent to model wind turbulence caused by trees and buildings to compare Nguyen's results to anemometer data from Kansas Wind for Schools project turbines to determine the effects of the turbulence on the turbines' lifetime and production.

Wind for Schools - Other peoples words speak volumes

"I strongly support continued local, state, and federal cooperation in putting this nation's wind energy resources to work for all

An "This important program will not only provide a small amount of ac wind energy for rural Montana schools but will also educate

ad tom "When we were working on the Wind for Schools project, which is

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"Josh Cochran, a Greenbush teacher, says they have people stopping by almost daily to ask about the turbine, and they have had some 16,000 to 17,000 students working with it, one way or another, in the last year. And that's just one installation. This

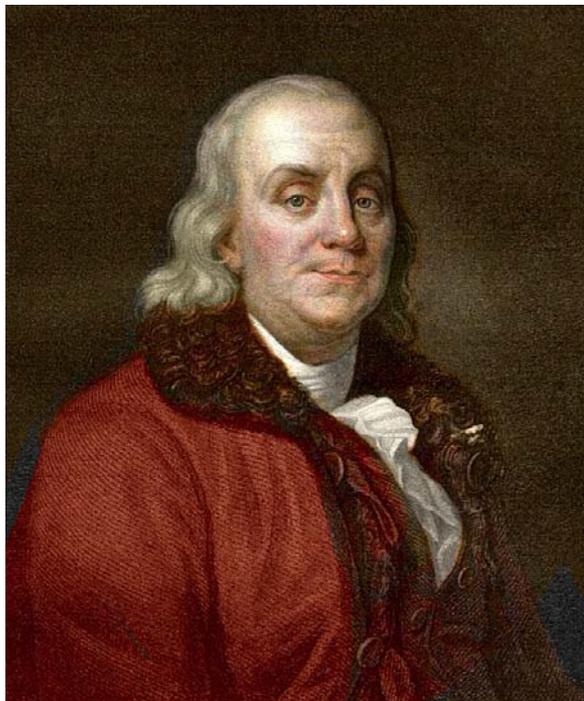
"Science is not something that should just be in a textbook or on a te

"These projects will get people back on the job now and will set the stage for growth by educating future generations."

"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



“The confidence and self-esteem they gain in these types of competitions is priceless. We on the staff know these kids are bright, imaginative, and resourceful.... We just can't always convince them of that. When any of our teams do well in this type of competition, the results are felt throughout the entire school. Level 1, 2, 3, and 4 kids stand a little straighter and try a little harder on their homework. Kids who were afraid to speak last week, did an entire comedy sketch for talent show today.”



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

Benjamin Franklin

Carpe Ventem



<http://windpoweringamerica.gov/schools>