# Wind for Schools
# Program Overview


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Dan McGuire, NE Facilitator


Presentation to

**NE Wind Working Group Tour February 18-22, 2008**

Developed by NREL and NWAC

NREL: Ian Baring-Gould and Larry Flowers, Marguerite Kelly, Trudy Forsyth & Tony Jimenez

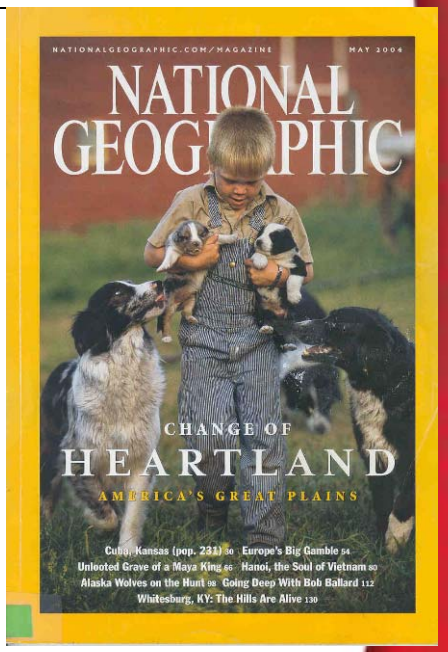
# Project Objectives

***Engage rural America in the concept that wind offers an alternative energy and economic future for rural America***

***Engage rural school teachers and students in energy education, specifically wind***

***Equip college juniors and seniors in wind energy applications and education to provide the growing U.S. wind industry with interested and equipped engineers***

*Long-term economic development in rural areas is tightly linked to schools*




*20% energy from wind will require on the order of 2,750,000 FTE job years over a 20 year project life*

– We need to start training the people who will make this happen

**We hope to meet these objectives by installing small wind turbines at K-12 schools in rural communities with the help of local institutions of higher education**

# Project Approach

- Low-cost replicable system
- Assist community and local utility to implement a sustainable school wind project
- Work with American Wind Energy Association/National Energy Education Development (AWEA/NEED) on K-12 curriculum
- Build in-state capacity to provide technical assistance for community-scale projects
- Work with State Universities on college-level program and curricula
- Work collaboratively with all community organizations to implement successful projects

Walsenburg, CO

# Project Finances

**Sample financial arrangement**

- Reduced system cost ~$10,000
- $1,500 from the school
- $2,000 from selling lifetime green tags through a broker – Community Energy
- $2,500 from a buy-down fund or other grant source
- $4,000 provided in-kind by the community and utility

**Payback - The real payback is in the education**

- Skystream @70ft in a class 3 wind resource will produce about 6000 kWh/year
- At a retail rate of $0.05 / kWh this amounts to ~$300 per year in reduced energy costs
- Simple payback to school ~5 years

*Skyline High School, Idaho*

*Milford High School, Utah*


# NREL / DOE

Supply organization, oversight, financial assistance, and training to state organizations implementing Wind for Schools projects

- Provide initial/seed funding for the Wind Application Center (3 years)
- Provide funding for the State Facilitation (3 years)
- Host a yearly week long training program at NREL on wind applications
- Assist in the identification of candidate schools and final school assessment (resource analysis, siting and interconnection, installation guidance etc)
- Support the development of wind specific energy curricula
- Development of project documentation, legal information, and other logistical support

**Education Curricula:**

- Work with partners (e.g. NEED, KidWind) to develop K-12 Curricula incorporating data from the wind turbine for projects
- Development of college curriculum with WACs

# 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

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

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

Idaho: **Brian Jackson**, Renaissance Engineering

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

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

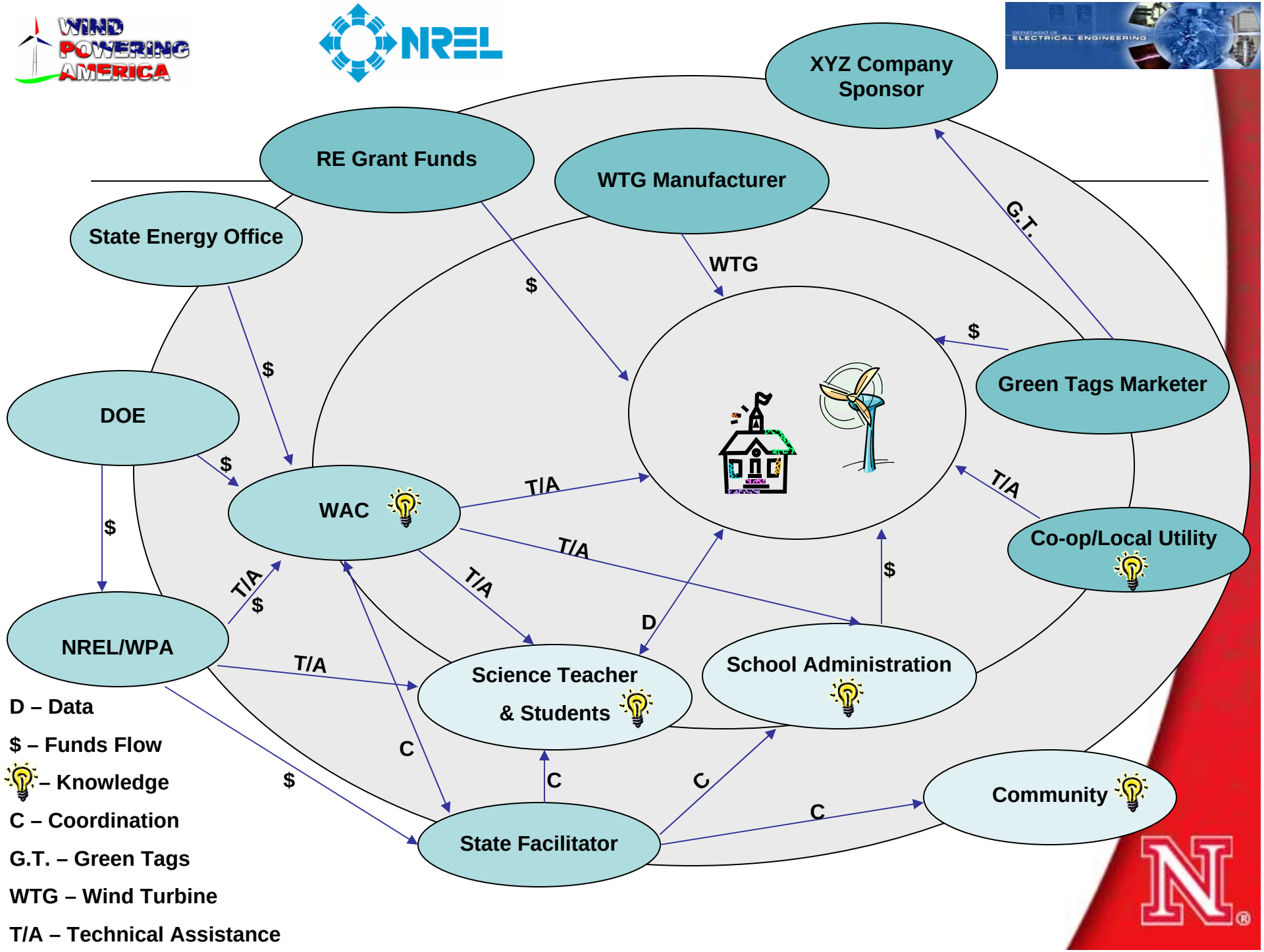
South Dakota: **Steve Wegman**, SD Public Utilities Commission

# Wind Application Centers


Establish 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

University of Nebraska-Lincoln
Colorado State University
Boise State University
Kansas State University
Montana State University
South Dakota State University


XYZ Company Sponsor
RE Grant Funds
WTG Manufacturer
State Energy Office
G.T.
WTG
$
$
$
$
$
$
$
$
DOE
Green Tags Marketer
WAC
T/A
T/A
T/A
T/A
T/A
T/A
Co-op/Local Utility
NREL/WPA
D
Science Teacher & Students
School Administration
C
C
C
C
State Facilitator
Community
D – Data
$ – Funds Flow
– Knowledge
C – Coordination
G.T. – Green Tags
WTG – Wind Turbine
T/A – Technical Assistance


# Nebraska Wind Applications Center
## works in collaboration with the
# Nebraska Center for Energy Sciences Research

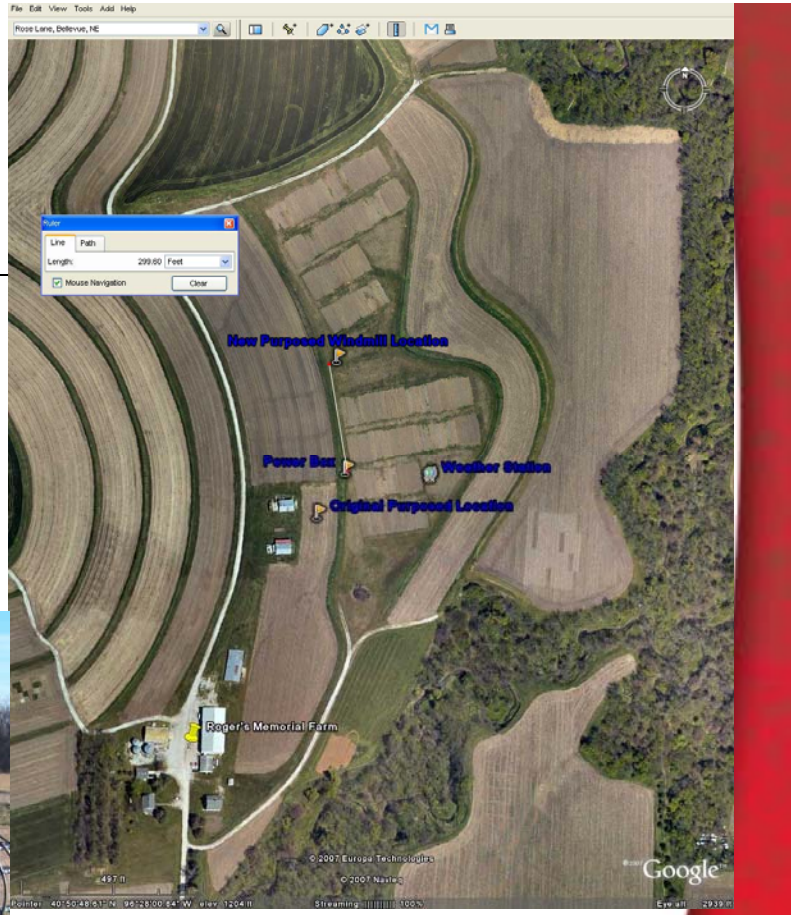
- Funded by Nebraska Public Power District
- Research
  - 2 wind projects among 19 funded
- Education
  - 4 efficiency and renewable projects funded
  - 1 developed an Energy Sciences Minor
  - Seminars
- *Vision for Energy Sciences at UNL*
  - 21st Century Power Generating Systems

# Nebraska Wind Applications Center

- Skystream 3.7 specifications:
  - 1.8 kW (2.4 kW peak)
  - Weight 170 lbs.
  - Rotor Diameter is 12 feet
  - Cut-in Wind Speed 8 mph (3.5 m/s)
  - Rated Wind Speed 20 mph (9 m/s)
  - Survival Wind Speed 140 mph (63 m/s)
  - Rated Speed 50-325 rpm
  - Wireless 2-way interface remote system

Shown: nacelle and single blade


- UNL Skystream Turbine Installation Location at Roger's Memorial Farm





- Rebar Assembly for Turbine Foundation

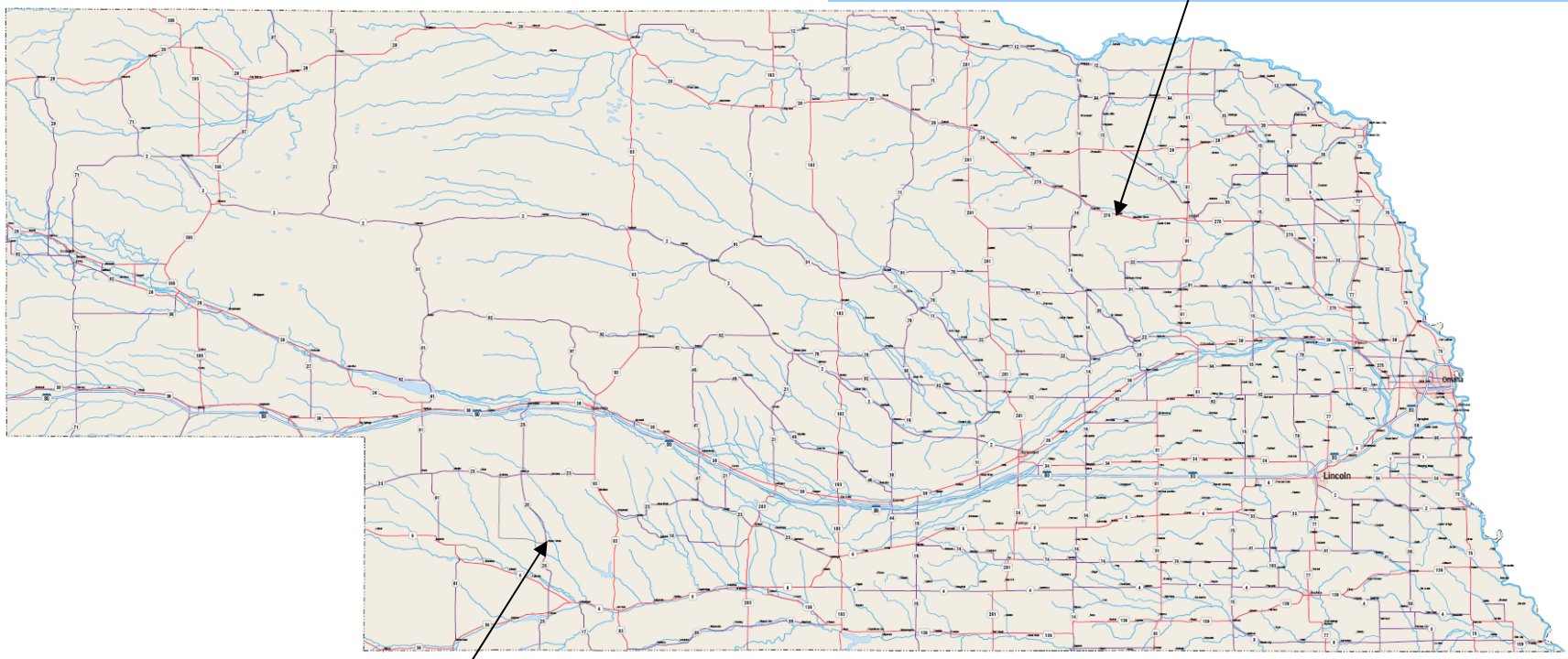

- Pouring the foundation for the monopole tower


- Monopole Ready to be Raised

# NWAC Program Activities

Elkhorn Valley High School, Tilden, NE

- School Board, Community, and Local Utility Support Garnered
- Site Selected
- Initial Budget and Engineering Specifications Delivered




Hayes Center High School, Hayes Center, NE

- School Board and Community Support Garnered
- Site Selected
- Initial Project Budget Delivered

# NREL Program Expansion Plans

**2007 Pilot Rollout**

- Initial Pilot underway in Colorado
- Contracts in place for the first five pilot expansion states
- First Wind for Schools applications training workshop in September
- First potential school systems were analyzed this past fall
- Power systems being implemented in late 2007 and through spring 2008

**2008 Phased Rollout**

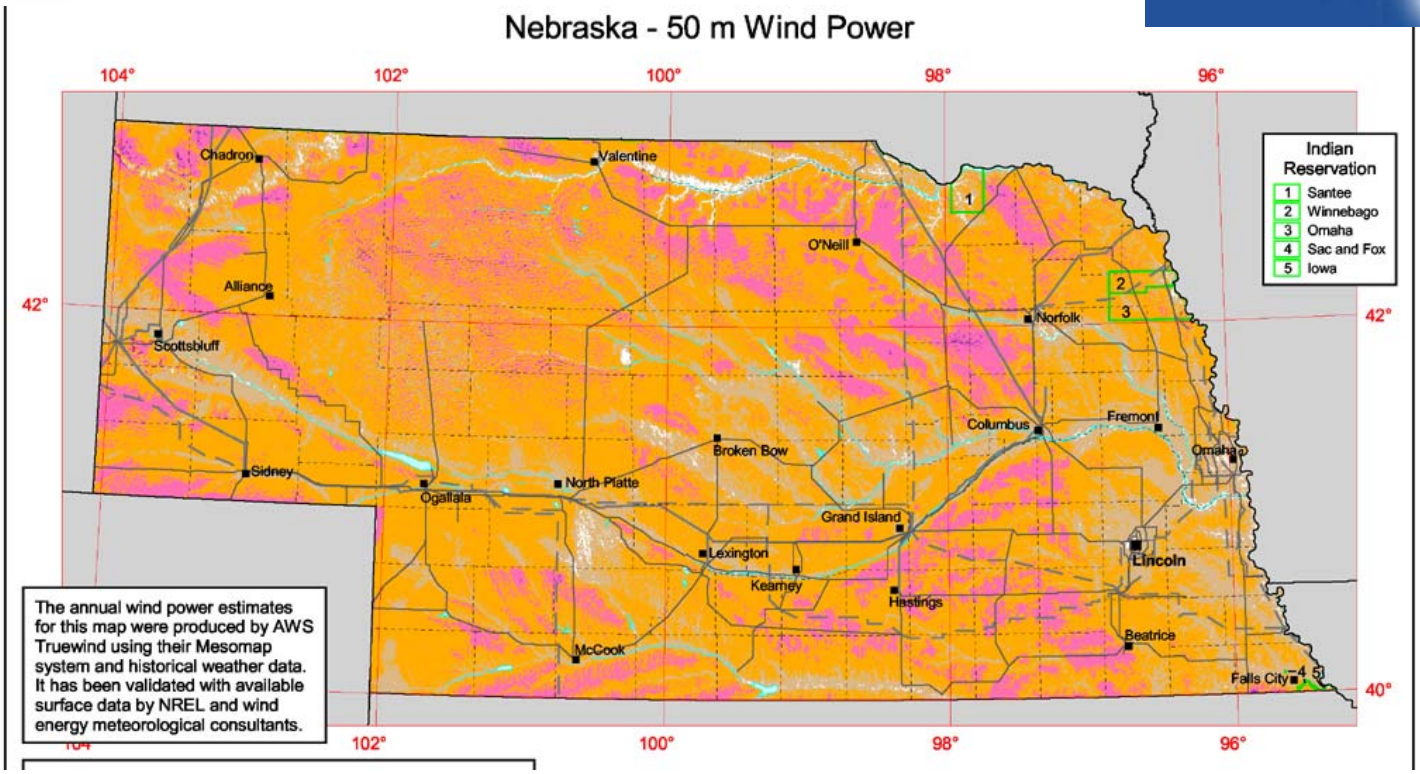
- Funding looking constrained in FY2008 - Congress still needs to act
- With appropriate funding – expect to roll out to 5 additional states in the spring of 2008
- Process of determining where rollout will take pace is unclear - priority states, regional focus, competitive competition…
- Hope to expand to approximately 5 new states each year

**There are many other State based programs to develop educational opportunities in schools – feel free to use our support services, but don't feel you have to wait for our program**


# *Carpe Ventem*

http://windpoweringamerica.gov

Click on Schools under Program Areas




# *Carpe Ventem Magnus Rutilus*

http://engineering.unl.edu/academicunits/electricalengineering/

http://www.ncesr.unl.edu/