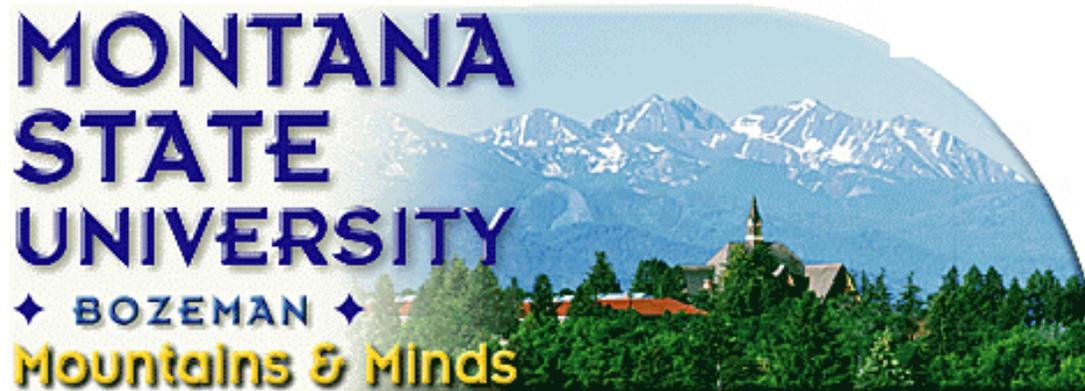


Wind Energy in Montana

**Doug Cairns – Professor, Mechanical Engineering,
and Director, Montana Wind Energy Consortium**

John Mandell – Professor, Chemical Engineering



Pre-election “Schmoozing”



The Importance of Wind Energy in Montana

- Montana has the fifth best wind energy resource of any state, but currently has only about 500 kW power generation. (Estimated potential of 116,000,000 kW)
- Benefits of development
 - Short to Medium Term
 - Local power in rural areas
 - A communications infrastructure to stimulate value-added development of its resources (not just wind power extraction)
 - Longer Term
 - Power distribution infrastructure for long term development
 - Establishment of higher technology economy in Montana

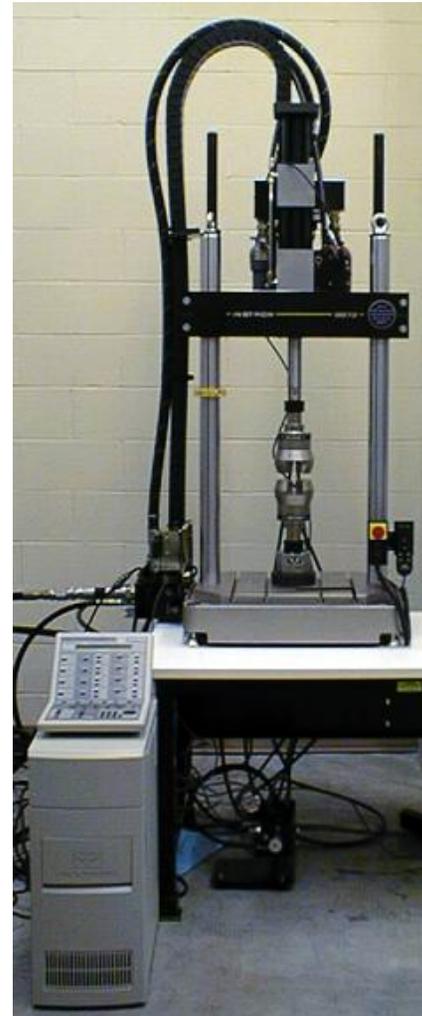
Montana Has a Long History for Wind Turbine Development (since 1989)

- **Department of Energy**
- **National Renewable Laboratory
(National Wind Technology Center)**
- **Sandia National Laboratories**
- **Research Includes**
 - **New composite materials**
 - **MSU/DOE materials database**
 - **New Manufacturing Techniques**



DOE/MSU FATIGUE DATABASE

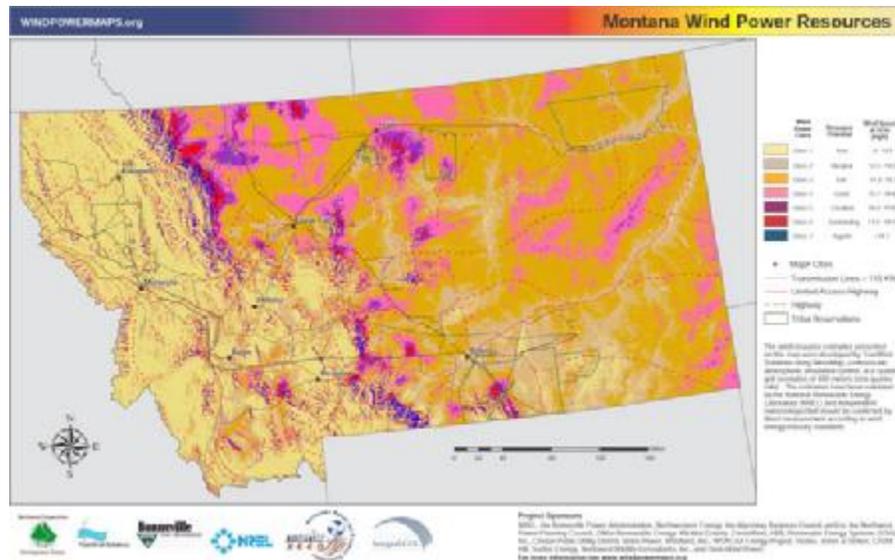
- Materials Properties
(1989 to present)
 - 27 Commercial Materials
 - 150+ MSU Materials
 - European Materials
 - 9000+ Tests
- Updates (SNL Website)
 - Last update February 2003
 - Next update February 2004



MSU is Currently Teaming with GE Wind to Develop Enabling Technologies for Low Wind Speed, 4+ MW Wind Turbine Systems



A Major Challenge – Wind Resources Do Not Necessarily Align with Power Transmission Infrastructure in Montana



Wind Resource Map (darker is better)



Transmission Line Map (many of the best wind resources not coincident with existing transmission lines)

How a Development of Alternative Energy in Montana Could Work

- Geographic diversity presents challenges and resolving them will benefit Montana and similar geographic regions (worldwide)
- Good natural resource potential and desire to not simply have them as export products (value-added through research, development, and manufacturing infrastructure enhancement in Montana)
- Possibility of hybrid generation with Montana's geothermal potential (including many moderate geothermal potential sites throughout the state)
- The local power generation to value-added transition model can help develop the state economies (power, communications, manufacturing)
- Montana has great universities and development of resources could be a good way to train engineers, scientists, and technologists to provide value to Montanans with opportunities within Montana

Congressional Action Needed

- This activity is important for Montana take the lead for the development of its resources instead of simply allowing developers to extract resources with little value added
- Every MW of installed power creates 2.5 job-years
- **\$1,000,000 - \$5,000,000 appropriation is sought to pursue described activities**