



Wind Energy
from Moorhead Public Service

Christopher Reed
Energy Services and Marketing Director

Who is Moorhead Public Service?

- Municipal electric and water utility
- Owned by citizens of Moorhead
- 12,500 customers

Who is Moorhead Public Service?

- Electric sales of 339,000,000 kWh annually
- Winter peaking
- System peak of 65 MW

MPS Electric Resource Mix

- All electricity (except wind) purchased
 - 65% hydroelectric from WAPA Missouri River Projects
 - 34% coal from MRES Laramie River Station
 - 1% wind energy from Zephyr (Turbine I)

The Capture The Wind[®] Program

- Replace electricity from coal with electricity from wind for subscribers
- Participation of 425 average customers necessary for Turbine I to be built
- Wind Power Premium: 1/2 cent per kWh, third lowest wind power premium in the nation according to NREL

The Capture The Wind[®] Program

- All or a block of 1000 kWh - residential
- All or blocks of 1500 kWh - commercial
- Three year commitment with renewal
- Cost to average residential customer \$5.00 per month
- Turbines located in Moorhead, directly connected to the distribution system

Why wind?

- Our customers asked for it
- Environmentally-aware residents
- Offer customers energy choices
- Saves resources for future generations

Project Benefits

- Members' names on the turbine
- 263-foot tall landmark
- Saves resources for future
- Promotes clean, renewable energy

Impact on the Environment

- Prevents the emission of 8,800 lbs. CO₂ each year
- Equivalent to planting 1.2 acres of trees
- Removing one car from the road

(Based on 1,000 kWh per month with 350 kWh from coal replaced with 350 kWh from wind)

Marketing Zephyr (Turbine I)

- Program kick-off during Earth Week 1998
- Direct mail piece with contract
- Press conference
- Television interviews
- Radio interviews
- Program fully subscribed in 2 1/2 weeks with 437 members

Marketing Turbine II

- Program initiated in October 2000 during Capture The Wind[®] Week
- Direct mail piece with contract
- Press conference
- Turbine II fully subscribed in 4 weeks with 490 customers

Results

- With over 7% of our customers (927) participating in the Capture The Wind[®] program, MPS has the highest Customer Participation Rate (NREL) of any other utility in the nation for a renewable energy program.

Lessons Learned

- Use press releases to build interest
- Make subscription simple
- Promote the environmental benefits
- Work with local environmental organizations
- Offer subscribers tangible benefits: T-shirts, caps, buttons, photos, plaque

Future Plans Involving Wind

- Turbine I named *Zephyr*, Spring 2001
- Continue to assist other municipal utilities with wind projects
- Continue Capture The Wind® newsletter
- Develop educational materials
- Construction completed, Turbine II online by Fall 2001
- Adequate Space for Turbine III on site

Wind Turbine Facts

- NEG-Micon 750-kW wind turbine generators
- Generation begins - 8 mph wind speed
- Shuts down - 56 mph
- 2 speeds - 14.2 or 22 rpm
- Tip brakes (hydraulic fail-safe)
- Disk brake (hydraulic fail-safe)

Wind Turbine Facts

- 750 kW asynchronous generator
- 180-foot tower
- 156-foot rotor (diameter)
- 263-foot turbine (tip height)
- 44.5-foot spread foundation
- 24.5 tons of rebar

Wind Resource Assessment

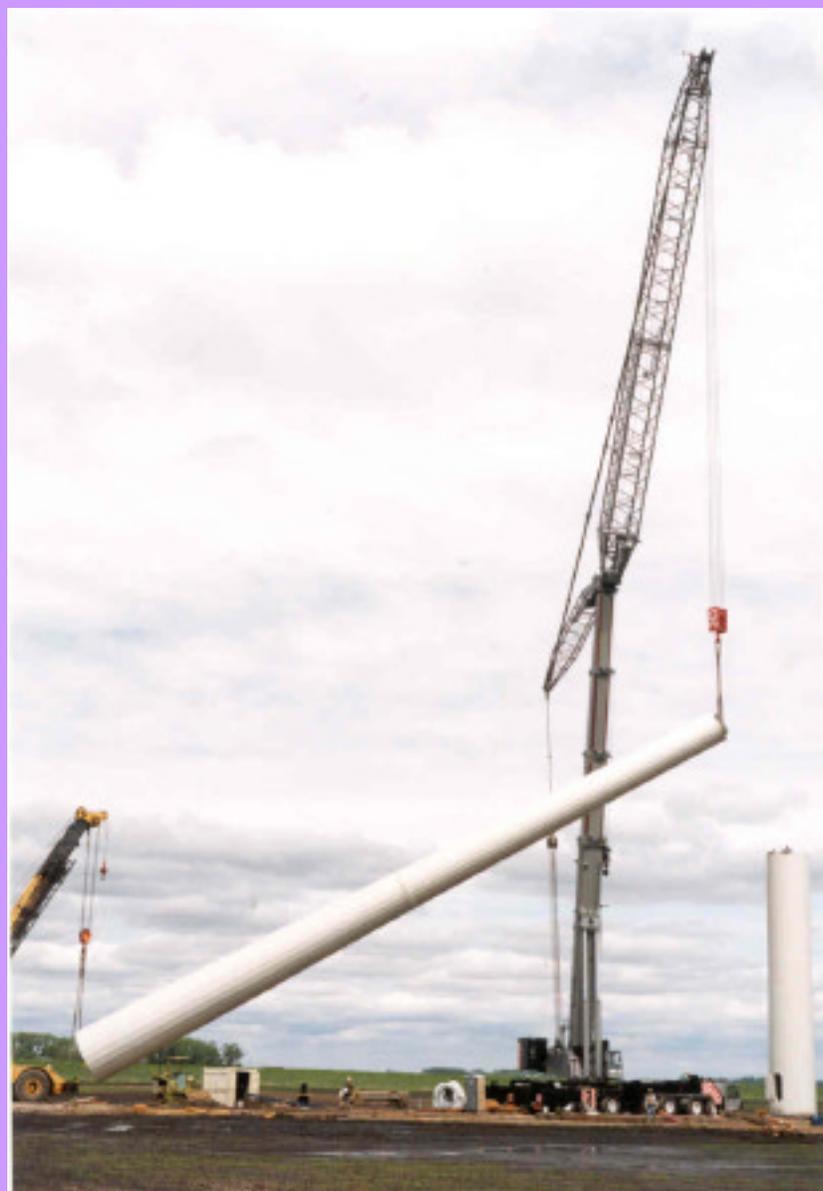
- Installed 130-foot meteorological station in May 1997
- 12 months on-site data correlated with National Weather Service data
- 14.4 mph at hub height, data plotted on generator production curve
- Estimated production of 3,600,000 kWh per average wind year for Turbines I & II

Capture The Wind[®] Construction





**MOORHEAD
PUBLIC SERVICE**





**MOORHEAD
PUBLIC SERVICE**





**MOORHEAD
PUBLIC SERVICE**





CAPTURE THE WIND[®]





**MOORHEAD
PUBLIC SERVICE**





CAPTURE THE WIND[®]

