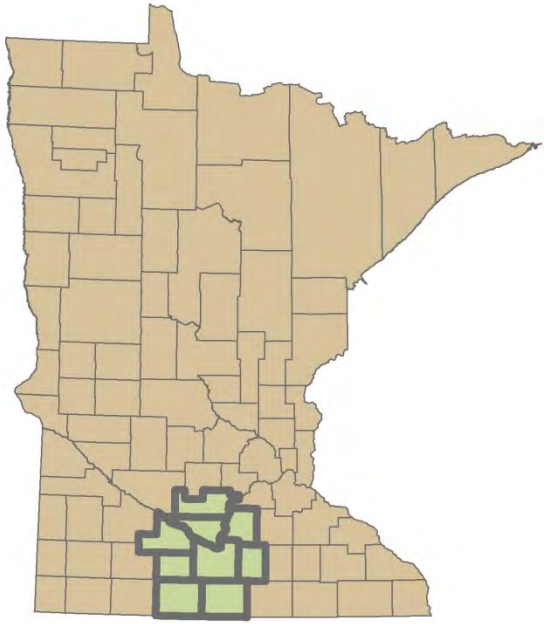
REGION NINE

RENEWABLE ENERGY TASK FORCE

Geography of R9:



Who we are:

A dedicated group of citizens, elected officials, business owners, educational institutions, nonprofit agencies and governmental agencies that share a passionate interest in renewable energy and energy conservation as means to environmental, social, and economic sustainability.

What we do:

The Task Force actively pursues opportunities to develop the renewable energy industry in the region and to promote the use of clean energy.

Our Partners:

And many more…

Our Projects:

<u>Completed:</u>

- Community Wind
- South Central Minnesota Regional Energy Study

<u>Current:</u>

- Website Development
- Energy Tour Series
- Guest Speaker Series
- **Small Wind Bulk Buy Program and Technical Assistance Program**

Wind energy challenges:

- Utility scale—costs and transaction costs
- Small wind—more appropriate but still challenging
- Reliability
- Support for decision-making
- Third-party evaluation

<100 KW small wind

> 1 MW utility scale

Difference in approach

- Utility scale
  - Delivery to grid
  - Power used off-site
  - Wholesale prices
  - Must fit with utility's current business model
  - Investment driven
- Small wind
  - Primary delivery to customer
  - Power mostly used on-site
  - Retail net metering
  - Utility less in control
  - Cost driven

MN net metering law…

<40 KW

Retail rates required

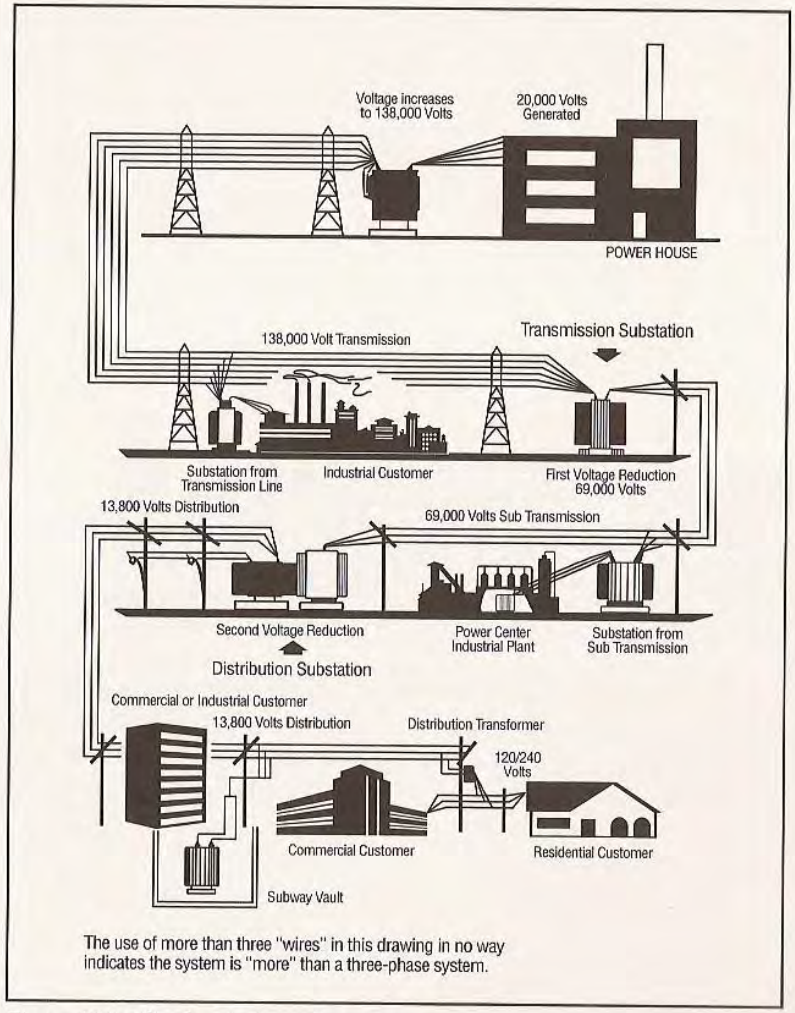


Figure 18-1: The electrical supply system

power plant serves more than one factory, business, and home, but their actual customer base may be a handful of utilities who then serve individual rate payers.

The scheduling aspect of transmission became far more complicated with the beginnings of deregulation in the federal Energy Policy Act of 1992. We glibly speak of "the grid" interconnecting power plants with

Figure 18-2a: End of WMEC Service, Amherst, MA

their customers but unlike the orderliness of lines on graph
mission and distribution lines in the U.S. look more like th
factory mouse might build in an electrical control box (Fig.

POWER:

KW = kilowatt = 1000 watts

MW = megawatt = 1 million watts

MW and KW refer either to how fast energy is being generated or the potential to generate energy

ENERGY:

KWH = kilowatt-hour=energy from 1 KW operating for 1 hour

MWH = megawatt-hour = energy from 1 MW operating for one hour

MWH and KWH refer to the actual amount of energy produced

POWER is nice but we pay for (and are paid for) ENERGY

Jacobs (WTIC)

31-20

20 KW

Bergey

Excel

10 KW

Endurance

G-3120

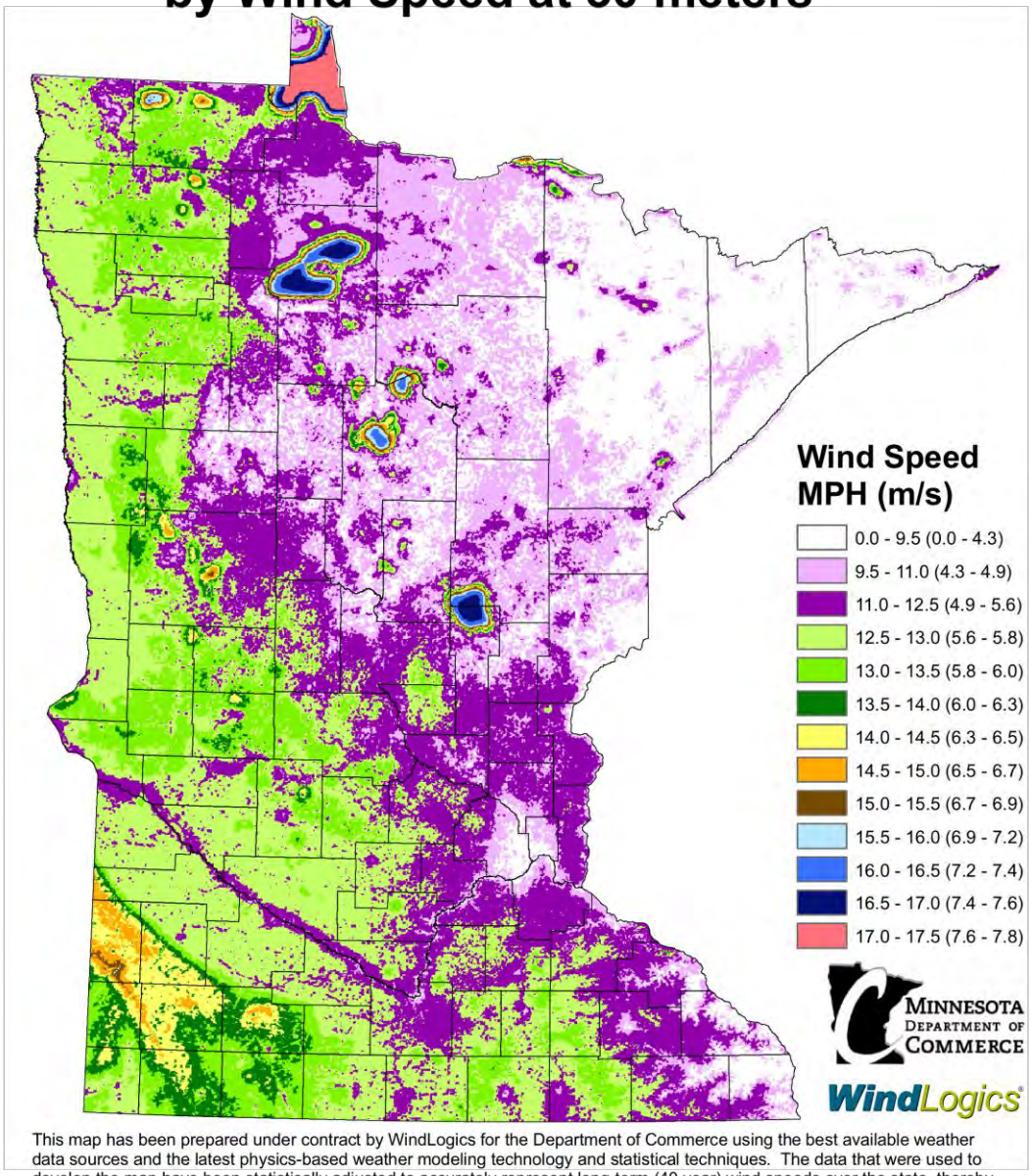
35 KW
(50 KW)

Skystream

3.7

2.4 KW

Minnesota's Wind Resource by Wind Speed at 30 meters



This map has been prepared under contract by WindLogics for the Department of Commerce using the best available weather data sources and the latest physics-based weather modeling technology and statistical techniques. The data that were used to develop the map have been statistically adjusted to accurately represent long-term (40 year) wind speeds over the state, thereby incorporating important decadal weather trends and cycles. Data has been averaged over a cell area 500 meters square, and within any one cell there could be features that increase or decrease the results shown on this map. This map shows the general variation of Minnesota's wind resource and should not be used to determine the performance of specific projects.

January 2006

KWH/month

Tower height (ft)/30 m wind speed (mph)	Skystream*	Bergey	Jacobs	Endurance
100/12	204	1142	1969	7771
140/12	--	1411	2466	8972
140/13	253	1703	3000	10115

*Skystream always on 70 ft tower

Estimate of installation costs (140 ft tower)

	Skystream	Bergey	Jacobs	Endurance
Total cost, $	$20,000	$88,000	$100,000	$328,000
10% down	$2,000	$8,800	$10,000	$32,800
30-year ROI with $0.10/kWh (12.5 mph)	neg	1.6%	5.4%	8.7%

Other financial considerations

- Federal tax credits (Endurance ROI to 12.4%)
- Accelerated depreciation
- Hedge against energy inflation

Components of a good small wind installation….

- Planning (site assessment, permitting)
- Turbine (rotor diameter, generator design, control and breaking, durability)
- Tower (foundation, installation and access for maintenance, aesthetics)
- Interconnection (inverter, wiring run, capacity of service, monitoring, safety)
- Ongoing maintenance (how often, who does it, what does it cost)

Steps to a good wind installation….

- Initial feasibility (Why am I doing this? Can I do this?)
- Site assessment (Will a turbine work here and what will it produce?)
- Regulatory hurdles (Any insurmountable hurdles—airports, zoning, neighbors, setbacks, utility interconnection issues?)

Steps to a good wind installation….

- Financial commitment (contract, down payment, financing, delivery time, unforeseen circumstances)
- Construction (foundation, tower, turbine, interconnection and commissioning)
- Maintenance and monitoring

R9 site assessment

- Initial feasibility screen (wind resource, location and financial (downpayment))
- Full site assessment (report that can be used with bank, regulatory applications, and negotiations with installer)
- Handoff (with support) to installer for negotiation of price and contract

Information for initial screening and site assessment

- Full contact information
- Potential location(s) of turbine(s) (property boundaries)
- Electric utility name
- Type and size of service (residential/commercial; amperage, 1 or 3 phase)
- Electric bills (at least twelve months)
- Statement of motivation

Meeting Schedule & Contact Info:

The Task Force typically meets the second Friday of each month at the Intergovernmental Center in Mankato, MN from 9-11am.

For more information contact Jon Hammel at 507-389-8863, or at jon@rndc.org.

Questions?