Wind Energy: Production Line Sources

Major Goals for US Wind Production:

- to install 10,000 MW of capacity in the U.S.;
- to build a $4 billion domestic wind industry capable of delivering 3,000 MW annually;
- to create tens of thousands of new, long-term, skilled jobs;
- to achieve levelized costs below four cents per kilowatt-hour;
- to make wind power a major option in achieving the nation's global climate change objectives; and
- to make the U.S. wind energy industry the world's technology leader and lowest cost supplier.

Remember where the Wind Blows in the US:
Western Regional Potential

- Where the wind blows on the Internet
- There are a lot of startup utilities engaged in this enterprise
- California Wind Production Report
Costs:

- **American Wind Energy Association** claims levelized costs to be 4.3 cents per KWH
- **Electrical Power Research Institute** claims the 1993 levelized cost was 7.3 cents per KWH and is projected to be 3.5 cents per KWH by the end of 1998/
- In 1980, the levelized cost was about 25 cents per KWH
- Projected future costs are 3-3.5 cents per KWH
- Lower costs reflect economies of scale and improved turbine design

Domestic Production in California:

- 1992: Wind produced 1.1% of total electricity used
- 15,000 wind turbines located at Altamont Pass (East of San Francisco), Tehachapi (near Bakersfield) and San Gorgonio Pass (near Palm Springs)
- This is 54% of the world's production! (Denmark has 20%)
- Peak capacity is 1600 MW

Other States:

- Southwest Minnesota 25 MW capacity sold at 5 cents per KWH
- Planned 100 MW facility for Northern Minnesota for 1996 to be sold at a cost of 4.2 cents per KWH
- State law in Minnesota by 2002 wind energy capacity should reach 425 Mega Watts

Potential Wind Capacity at Some Locations in the US:

Note: Total electrical energy generated by fossil-fuel plants in 1990 was 2000 billion KWH

- Along the Aleutian Chain 402 Billion KWH
- Offshore New England 318 Billion
- Offshore South Carolina 283 Billion
- Great Plains effort (see below) 210 Billion
- Off Shore Texas Gulf Cost 190 Billion
- East-West Axis of Lake Superior 35 Billion
- North-South Axis of Lake Michigan 29 billion
- North-South Axis of Lake Huron 23 Billion
- East-West Axis of Lake Erie 23 Billion
- East-West Axis of Lake Ontario 23 Billion

- Total Capacity 1500 billion or 75% of fossil fuel capacity

Some Large Scale Projects:

- Aleutian Project Stretch turbines out over the entire 1300 mile chain. Use electricity to create Hydrogen. Liquefy the Hydrogen and ship it to California.

- Great Plains I: One turbine Tower per square mile
stretched out from Texas to Canada.

- 300,000 total towers
- Each tower 850 feet high Important so as to get above friction induced by ground based obstacles.
- each tower has 20 generators and is powered by a two blade propellor of diameter 50 feet.
- Capacity of single tower is 500 KW capacity so total capacity is 150,000 Mega Watts (1/2 the US consumption

- Note, we already have 600,000 oil wells in the US and no one seems to mind

Great Plains II: Clustered wind farms of 165 individual turbines seperated by 60 miles laid out in 300 mile swatch from Texas to Canada

Problems: (?)

- In some locations it will be difficult to connect to the existing grid therefore make hydrogen or store energy in batteries
- Installations may be unsightly (but so is air pollution)
- Could interfere with functions on agricultural land
- Susceptible to storm damage (tornado alley) so replacement costs have to be well-calculated
- They are a hazard to migrating birds
- Worse of all - they could potentially interfere with TV reception

Conclusions:

- Price of wind power is coming down.
- There is enormous capacity
- Wind power is a lot more promising that Solar PV production line facilities
- Energy storage, however, is still a problem
Costs to the consumer will only be competitive if mass production of wind turbines is achieved.