EXHIBIT 1
DATE 4-8-05

Edgar A. DeMeo
President, Renewable Energy Consulting Services, Inc.

For twenty-two years, Dr. Edgar (Ed) DeMeo exercised increasingly broad responsibility for the research and development programs in renewable power at the Electric Power Research Institute (EPRI). Operating through a consulting firm he formed in February of 1999, he now provides program-management and technology-development support to several ongoing government- and private-sector programs aimed at advancing the capabilities and use of wind and solar power.

For the past several years, his major activities have been associated with the DOE-NREL Wind Energy Program, including strategic advisory roles for the Utility Wind Interest Group, the National Wind Coordinating Committee, and the systems-integration segment of the federal wind program. He recently received the Wind Energy Program's 2004 Outstanding Program Leadership Award. And in 2002, he was named a Wind Energy Pioneer by the DOE's Wind Powering America program.

Ed is author or co-author of more than fifty publications on wind power, photovoltaics, solar-thermal power and utility applications of renewables. He is an electrical engineering graduate of Rensselaer Polytechnic Institute, and holds Masters and PhD degrees in electrical engineering science from Brown University. For his leadership in the development of variable-speed wind turbine technology while at EPRI, he was a 1993 recipient of an R&D 100 Award and *Discover Magazine's* Annual Technology Award in the Environment Category.

Prior to joining EPRI in 1976, he served as an associate professor (research) on the engineering faculty at Brown. He is also a 1980 graduate of Northeastern University's Management Development Program.

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Integrating Wind Power into the Electric Power System


Ed DeMeo
Renewable Energy Consulting Services, Inc.
Technical Advisor: Utility Wind Interest Group
(EPRI Renewable Energy Programs, 1976-1998)

Montana Legislature House Energy Committee Meeting
April 8, 2005 *Helena, Montana*

Key Integration Issues

- Costs (capital, energy, O&M)
- Variability Impacts (ancillary services costs)
- Energy (fuel displacement) and Capacity (serving demand growth) Contributions
- Environmental Considerations

Wind Energy Cost Trend

1979: 40 cents/kWh

2000:
4 - 6 cents/kWh
(no subsidy)

NSP 107 MW Lake Benton wind farm
4 cents/kWh (unsubsidized)

- Increased Turbine Size
- R&D Advances
- Manufacturing Improvements
- Operating Experience

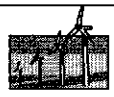
2004:
3 - 5 cents/kWh
(no subsidy)

Natural Gas Situation

Today's tight natural gas markets have been a long time in coming, and distant futures prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon

– Alan Greenspan, Federal Reserve Chairman,
Testimony at Senate hearing, July 10, 2003

Wellhead gas costs - 2002-2003: $3 - $5/MMBTU



Cost Comparison

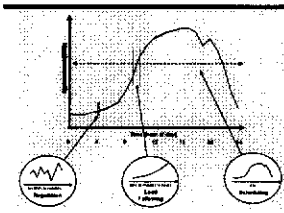
- Wind total capital cost: $1,000 - $1,100 kW today
- Wind energy cost: about 3¢/kWh (4¢ without PTC)
- Includes 0.5 to 1.0¢/kWh for O&M
- Wind energy costs are ***stable*** over plant lifetime

Natural-gas plant fuel cost (HR 7,000 - 10,000)

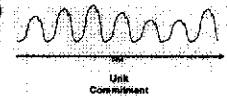
$/MMBTU:	2	4	5	6	8	gas cost
¢/kWh:	1.4 - 2	2.8 - 4	3.5 - 5	4.2 - 6	5.6 - 8	***fuel only***

- Wind-gas synergy: save gas when wind blows; burn gas to provide system reliability during low winds

Wind Variability: Power-System Operation Impacts



- Regulation -- seconds to a few minutes -- similar to variations in customer demand (loads)
- Load-following -- tens of minutes to a few hours -- usage follows predictable patterns, wind less so



- Scheduling and commitment of generating units -- one to several days -- wind forecasting capability?

Wind controlled by nature, not power-plant operators!

Wind Variability Can Increase Power System Operating Costs

- Committing unneeded generation
- Scheduling unneeded generation
- Allocating extra load-following capability
- Violation of system performance criteria
- Increased cycling operation
- **These are reflected in *ancillary services* costs**

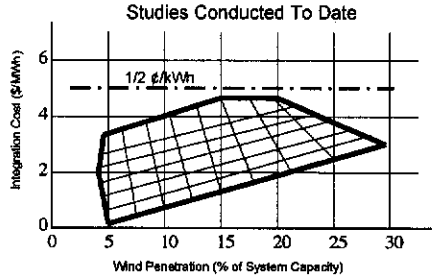
Incremental cost added by wind's variability?
Utility Wind Interest Group 2003 case study:
$1.85/MWh of wind energy (<10% of value)

System Operating Costs Impacts: Results from Recent Studies ($/MWh)

Study	Penetration (%)	Regulation	Load-Follow	Unit-Commit	Total Impact
UWIG/Xcel	3.5	0	0.41	1.44	1.85
Pacificorp	20	0	1.6	3.0	4.6
BPA/Hirst	7	0.19	0.28	1.40	1.87
We Energies (a)	4	1.12	0.09	0.69	1.90
We Energies (b)	29	1.02	0.15	1.75	2.92
Xcel/MNDOC	15	0.23	0	4.37	4.60

Range of System Operating Cost Impacts

Studies Conducted To Date



All results to date fall within the crosshatched area

GE Energy/NYISO/NYSERDA New York Wind Evaluation

- *Comprehensive study* of wind's impacts on transmission system planning, reliability and operations
  - System stability
  - Regulation, load following, generation scheduling
  - Load growth and reliability
  - System operating costs and emissions reductions
- 3,300 MW of wind in system serving 34,000 MW of customer load *(10% wind penetration)*
- Energy prices based on *functioning commercial wholesale markets* – day-ahead and hour-ahead
  - All previous studies based on operating costs
- *Assumes wind is a price-taker*
  - Market (demand-supply balance) sets price; wind generators are paid the market price
  - 11 zones in the state -- locational marginal prices (LMP)

GE Energy/NYISO/NYSERDA New York Wind Evaluation

- *Overall Conclusion: NY State power system can reliably accommodate at least 10% wind (3,300 MW)*
  - Minor adjustments to planning, operation and reliability practices
- Total NY system (less wind) variable operating costs (fuel, plant startup costs, etc.) reduced by $350 M
- State-of-the-art wind forecasting contributed $125 M of this reduction
- Electricity costs reduced statewide
- System transient stability improved

GE Energy/NYISO/NYSERDA New York Wind Evaluation

- *Load payment reductions (savings to energy consumers):* $305 M or about 0.18¢/kWh
- *Energy displacement:* 65% natural gas, 15% coal, 10% oil, 10% imports
- *Emissions reductions:* NOx -- 6,400 tons (10%); SOx -- 12,000 tons (5%)
- *Wind revenue:* $315 M (about 3.5¢/kWh)

Wind's Contributions to Electric Power

Energy: displacement of fossil fuels

- In most cases, this is the primary motivation. Previously existing power plants run less, but continue to be available to ensure system reliability.
- Contrary to common lore, addition of a wind plant requires NO new conventional backup generation to maintain system reliability.
- In many cases, natural gas is saved, reducing total system operating costs. In all cases, overall emissions are reduced.

Wind's Contributions to Electric Power

Capacity: meeting new load growth

- Because of its variability, wind is less effective in this respect than conventional generation. Winds may be low during peak electricity demand periods.
- Nonetheless, addition of a wind plant will allow some new load to be served. The amount depends on many factors. Examples:

New York	about 10%
Long Island	about 40%
Minnesota	about 25%

- With experience and over time, operating strategies and generation mix will evolve so that combinations of wind and other plants like hydro and natural gas will serve new load reliably.

Economic Development Opportunities

- Land Lease Payments: 2-3% of gross revenue ($2500-4000/MW/year)
- 1-2 jobs/MW during construction
- 2-5 permanent O&M jobs per 50-100 MW,
- Local construction and service industry: concrete, towers, some electrical
- Local property tax revenue: 100 MW brings in about $500,000/yr
- Equity investors and lenders: returns on investment, interest payments
- Potential for manufacturing and assembly plants (e.g., blade factory in ND)

Environmental Benefits of Wind

- *No emissions* of any kind during operation
  - No SOx, NOx, particulates or mercury
  - No contributions to regional haze
  - Hedge against environmental regulations
  - No greenhouse gases
- *No toxic wastes or health impacts*
  - Nuclear waste transport and storage unresolved
  - Respiratory diseases of growing concern
- *Global climate change* is a serious concern to every major political entity worldwide *except* the current Administration in Washington, DC
  - Avoidance not politically sustainable in the U.S. or worldwide

Environmental Tradeoffs

We need to evaluate environmental impacts on a relative basis.

No energy-generation approach is without impacts.

The choice is wind vs. *something* -- not wind vs. *nothing.*

Clinton Foundation Energy Policy Forum December 6, 2004, NYU

"The argument that global warming does not exist is now so discredited that it is no longer acceptable in polite society to make that case."

– Former President Bill Clinton, December 6, 2004

Bush Ally Breaks Ranks on Global Warming - James Baker, March 3, 2005; Houston, TX -

"It may surprise you a little bit, but I think we need to pay a little more attention to what we need to do to protect our environment. When you have energy companies like Shell and British Petroleum saying there is a problem with excess carbon dioxide emission, I think we ought to listen."

– Former U.S. Secretary of State James Baker, speech to oil industry and other executives, reported March 4 by MSNBC

Excerpts from Robert A. Klein Group Energy Risk Director Scottish Power (PacifiCorp Parent)

PacifiCorp IRP seeks 1,100 MW of wind over next 7 years. Assumed integration costs: $5.50/MWh. PacifiCorp supports a National RPS and a Northwest RTO.

IRP addresses financial risk of current and future regulations, including attention to NO_x, SO_x and CO_2. "It is imprudent to value CO_2 regulatory risk at zero!"

from Wind Energy in the Mainstream, confessions of a forward-thinking utility, Global Windpower 2004, March 2004

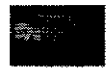
James Rodgers, CEO of Cinergy (Midwestern Utility, 95% Coal)

2010 Goal: Cut Carbon Dioxide emissions by 5% voluntarily

"We are in an era where companies are rewarded for postponing action on the issues they will face in the future. This is not an option for us."

– James Rodgers, interview with Utilipoint's IssueAlert, published April 5, 2004

If I Were A Utility CEO or Board Member



What would keep me awake at night?

- Customers want clean energy
- Wind energy is economical, environmentally responsible and offers price stability
- Ignoring global warming is irresponsible – too much handwriting on the wall

If I Were A Utility CEO or Board Member

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Are we doing enough in response? Will society find us liable for future consequences?

Is Wind Power a Prudent Investment?

Affordable costs

Hedge gas price volatility

Operational synergy

Environmentally responsible

Economic development

Strong public support