Case Study #2

Rick Olesen
Iowa Lakes Electric Cooperative
Wind & Renewable Webinars
Electric Cooperative Case Studies

presented by
Rick Olesen, V.P. Operations & Engineering
Iowa Lakes Electric Cooperative
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ILEC WIND STRATEGY

- Distributed Generation
- Community Wind Application
- CREB’S Financing
- Simulated – Virtual MET Tower Analysis
- Distribution Level Connection – 12,470 volts
- Turbine Acquisition – Partnership
Iowa Lakes Electric Cooperative

- Approximately 12,500 members
- 4,600 Miles Distribution Line - $92 Million Plant
- System Demand – 116 MW
- Sales – 600,000 Mwh’s
- 60% Sales – Commercial/Industrial
- ILEC Service Area – Excellent Wind Resources
Overview of Project to Date

- In 2004, ILEC investigated wind generation
  - No-Go Based Upon negative business case
- A high interest from Board & Membership remained in tapping this resource, and how to make it a win-win for ILEC and its members
- Subsequent Strategic Plans Targeted Wind Project Development
Major Changes Since 2004 Report

- Development of the Ethanol industry
- Larger substations & related infrastructure
- Extremely high load factor
- Development of Clean Renewable Energy Bonds (CREBs)
  - Not quite the financial equivalent of PTCs but close enough for a second look
- Development of alternate incentives
Overview of Project to Date

- A design involving 2 sites (Superior & Lakota), and multiple turbines per site, developed as a strong ILEC option
  - Deploy as many turbines as possible without adding a transmission level connection
  - Take advantage of existing infrastructure
- 2007 CREB’s Application
  - Key “Go/No Go” Factor For ILEC
Iowa Lakes’ Wind Energy Project

- 2 wind generation projects serving renewable ethanol facilities
- 7 turbines per site each with a capacity of 1.5 megawatts – GE 1.5 SLE ESS
- Approximately 71 million kilowatt hours (kWh) of wind energy generated annually

Enough electricity generated to serve nearly 3,700 member-owners farm/homes for a year!
Average Annual Wind Speeds

Iowa Lakes’ service territory has great wind resources!
Wind Farm Locations

- Dickinson County
- Emmet County
- Kossuth County
- Clay County
- Palo Alto County
- Cherokee County
- Buena Vista County
- Pocahontas County
Instead of this....
think this...
Turbine availability severely limited
- 8-10 turbines are considered “minimum orders”
- Experience has shown that single turbine installations are not cost effective
- Wind turbine demand has outstripped supply, with a waiting list of approximately 18 months to 2 years

*Developed partnership with Basin Electric*
Turbine Choice is Critical
Expense vs. revenue generation ratio is key project success requirement

Mini-Farm Financial Comparison
Cumulative Cash Flow at Assumed PPA Rate

Dollars ($1,000,000)
ILEC’s Wind Energy Project

• Energy Policy Act of 2005
  – *Clean Renewable Energy Bonds (CREBs)*
    • A new financing tool established by the Energy Policy Act of 2005 for eligible entities to obtain low interest financing for renewable generation projects such as wind

In December 2007, ILEC was awarded $43 million in CREB financing for two renewable wind projects!
CREB Financing

- CLEAN RENEWABLE ENERGY BOND
  - CREBS are nearly the equivalent of a PTC (Production Tax Credit) for private firms
  - Legislative Intent
    - 0% loan for 100% of the project
  - Payback in 14 - 17 years, levelized payments
  - ILEC requested funding for 100% of project
  - ILEC applied for 2 separate CREBs totaling $43M June 2007
  - ILEC awarded CREBS December 2007
Terms of the transaction will not be known until the day the transaction closes
- CREB term is set monthly by Treasury
- CREB rate is set daily by Treasury
- [www.treasurydirect.gov/SZ/SPESRates?type=CREBS](http://www.treasurydirect.gov/SZ/SPESRates?type=CREBS)

Investor Discounts/Pricing Issues*
- Accordingly, firm pricing will not be known or determined until the day the transaction closes
CREBS Risks

- Administrative fix on CREB rate as set by Treasury on the due to the efforts of Senator Grassley and his staff
  - NRECA – Susan Petit
  - CFC – Rich Larochelle
- Interim financing received from CFC
- Final CREB issuance purchased by CoBank
CREB Effect...

Effect of CREB Financing upon Project, Cumulative

Dollars ($1,000,000)

- Mini-Farm w/CREB Financing
- Mini-Farm w/o CREB Financing
WIND RESOURCE ISSUES

- Turbine Delivery Timeline Compressed
- No MET Tower Information
- Initial Analysis – AWS Truewind
- Complete Analysis & Micrositing – WindLogics
- Cooperation & Collaboration
  - GE Wind
  - WindLogics
  - Landowners
  - ILEC
Comparison of Wind Values and Production
Cumulative Cash Flow at Assumed PPA Rate

- Wind Effect...

Dollars ($1,000,000)


- $6
- $4
- $2
- $0
- $2
$4
$6
$8
$10

Mini-Farm w/ Avg Wind  Mini-Farm w/ Best Wind
Utility Must Address Community Concerns

- While large wind farms are located “far away”, distributed wind turbines are located “next door”
  - The more urban an area, the more vocal the opposition
  - Utility should be pro-active in addressing issues raised by both concerned citizens and those who are anti-wind on principle
- As many are for renewable energy, there are equal numbers of people vehemently against the turbines
Common Concerns

- Beneficiaries versus those impacted
- “Us versus Them” polarization
- Local zoning versus State zoning, permitting
  - Politics need to be proactively addressed
- Perceived reduction in property values
- Perceived pandering to big money interests
- Voltage issues, real or imagined
  - Turbine start up / shut down
- Noise
Common Concerns

- “Wind Turbine Syndrome”
- FAA / Microwave
- Shadow flicker
- Attracts lightning
- Setback / visual aesthetics
  - 1000’ from residences
- Maintenance
Energy PPA Price Effect

Mini-Farm Example Turbine Cash Flow vs Rate

$0.035  $0.040  $0.045  $0.050  $0.060
Revenue Streams

- Energy PPA
- REPI
- Green Tags
- Tax Options
Revenue Streams

- Corn Belt
- Energy PPA
- Green Tags
- ILEC Owns
- REPI
- Property & Sales Tax
- Tax Credits
- 476b
• Renewable Energy Production Incentive
• DOE program that is available (on a prorated basis)
  – Oversubscribed, more wind projects coming online
  – 2006 paid ~ 45% of applied kWhr
  – 2007 paid ~ 26% of applied kWhr
  – Estimated at ~18% over 10 year period
Financials of 1 Turbine vs Mini-Farm

A single turbine still incurs many of the same costs as a mini-Farm.
Large Wind Farms

- System integration is the challenge for large wind installations
  - Studies often take at least a year
  - There is a huge backlog of studies, increasing overall time to 1-3 years
  - Interconnection requirements are substantial
- Generally, dedicated transmission lines and substations are required for the wind farm
  - $2.5 million per substation
  - $300,000 or more per mile of transmission line
Interconnection Issues

- Substation Connection – Low Side 12,470 Volts
  - Substation Ownership
  - Operating Protocol
- Power Quality – Due Diligence
- Voltage Regulation
- System Impact Study
- Transmission Service Requests
Collection System

- 69 Kv Transmission System
- 7,500 KVA Substation
- 2.5 Miles 750 MCM AL URD
- 12,470/7,200 Volt Grounded Wye System
- IT/Communications Interface
  - High Speed Internet Connection
Collection System
Substation Connection

- Corn Belt Power Cooperative Owns the Substation
- ILEC Owns Breaker/Riser Out of Sub
Substation Connection
Substation Connection
Interconnection Impact Study – July 2007
- AC Contingency Calculation
- Performed “In-House” by Power Supplier
- Two Week Process - $1,500
- Established 12.5 MW Limit /Site
- No “Adverse Impacts” Identified to Surrounding Transmission System
- Great Support From Power Supplier
System Impact Study
MAPP Accreditation

- Standard Generator Interconnection Procedures
- Mid-Continent Area Power Pool (MAPP)
- Midwest Independent System Operator (MISO)
- Initiated June 2008 – Completed Nov. 2008
  - Cost - $138,000
- Impacted By Higher Queued Speculative Projects
System Impact Study

- Study Results Reviewed by Design Review Subcommittee (DRS)
- Move to Basin Class “A” Membership Made This “Option” a Mandatory Study
- Now Subject to WAPA Control Area
Transmission Service Request (TRS)

- Reservations To Deliver 11 MW At Each Site On Corn Belt’s Transmission System
- Long Term Firm Network Service
- Costs - $20,000 Each Site
  - Initiated February 2009
  - Completed May 2009
Transmission Service Request (TSR)

- OASIS – Open Access Same-Time Information System
- OATI – Open Access Technology International
  - Digital Certificates
  - Tickets to Access OASIS
  - Cost - $150 – Good For (1) Year
- OATI – Great Support!
- Corn Belt – Great Support!!
Developed Standard Operating Procedures For Both Sites
- Identified Restrictions
- With & Without Ethanol Plant Load

Control Of Breakers At Interconnection To Corn Belt Control

Loss Of Transmission = Loss Of Wind Generation
Voltage Regulation

- Industrial Customer Hyper Sensitive To Any Power Quality Issue
- Standard Regulator – Siemens MJX Panel
  - Reverse Power Flow
  - Co-Generation Mode
- GE Turbine Voltage Support
  - Windcontrol Application
  - Dynamic VAR Control
Voltage Regulation
Voltage Regulation

- Alert
- Reverse Power Flow
- Remote Auto Inhibit
- High Band
- In Band
- Low Band
- Flow: 0.000 GPH

Buttons:
- Cancel Reset
- Change
- Save
- Max Min
The wind industry has changed considerably in the last 5-10 years

- What was common sense a few years ago no longer applies
- Very dynamic environment has vendors scrambling to meet demand, and pricing accordingly

Distribution wind is often overlooked

- Not the “sweet spot” for large wind developers
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energy and the environment