



*Wind & Renewable Webinars  
Electric Cooperative Case Studies*

*presented by  
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Iowa Lakes Electric Cooperative  
September 23<sup>rd</sup>, 2009*

**energy and the environment**



# 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



# Iowa Lakes Electric Cooperative

- Approximately 12,500 members
- 4,600 Miles Distribution Line - \$84 Million Plant
- System Demand – 106 MW
- Sales – 500,000 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

The image is a horizontal banner. On the left side, there is a row of wind turbines against a sunset or sunrise sky. On the right side, there is a close-up of a welder wearing a yellow hard hat and gloves, working on a metal structure, with bright sparks flying from the welding point.

# *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**

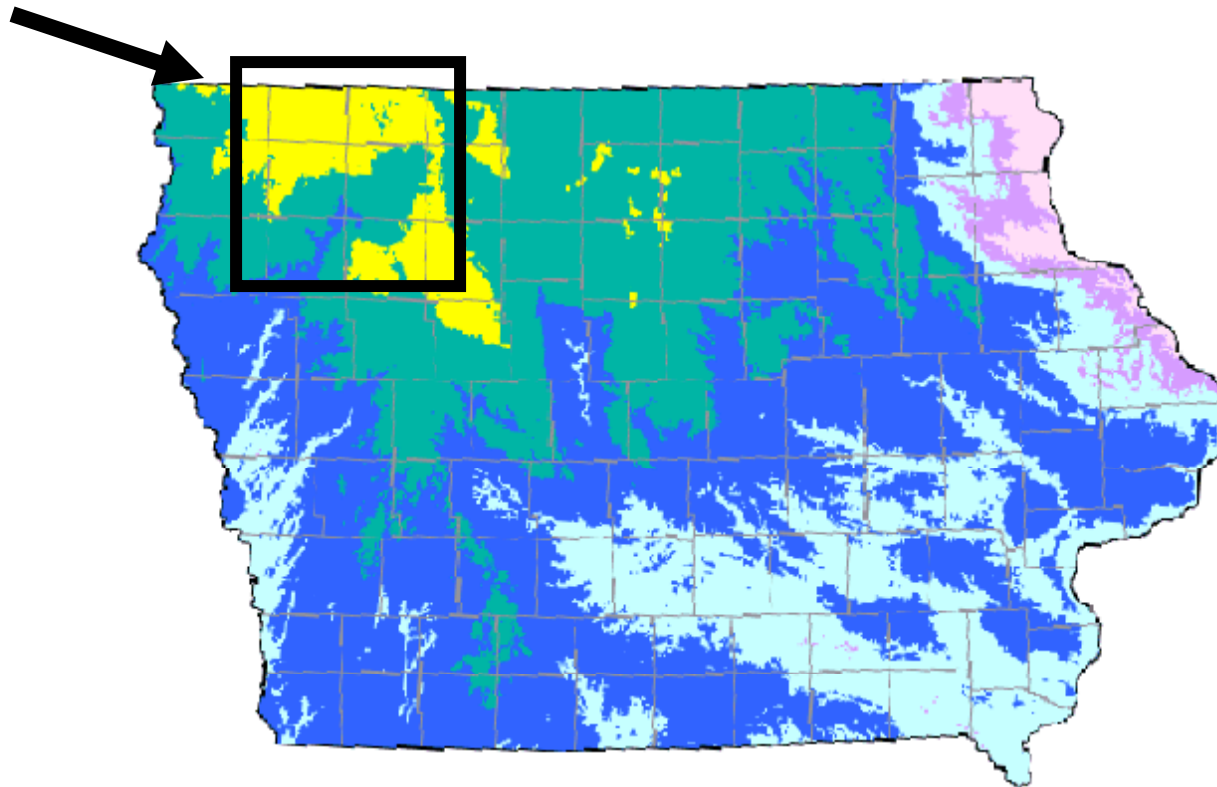
- 2 wind generation projects serving renewable ethanol facilities
- 7 turbines per site each with a capacity of 1.5 megawatts – GE 1.5 SLE ESS
- Approximately 71 million kilowatt hours (kWh) of wind energy generated annually

*Enough electricity generated to serve nearly 3,700 member-owners farm/homes for a year!*

# Average Annual Wind Speeds

## Estimated Average Annual Wind Speeds

Typical average wind speeds on well exposed sites at 50 m above ground



MPH		m/s
>19.0	Red	>8.5
17.9-19.0	Orange	8.0-8.5
16.8-17.9	Yellow	7.5-8.0
15.7-16.8	Light Green	7.0-7.5
14.5-15.7	Blue	6.5-7.0
13.4-14.5	Cyan	6.0-6.5
12.3-13.4	Purple	5.5-6.0
<12.3	Pink	<5.5

### Iowa Energy Center

This map was generated from data collected by the Iowa Wind Energy Institute under Iowa Energy Center Grant No. 93-04-02. The map was created using a model developed by Brower & Company, Andover, MA.

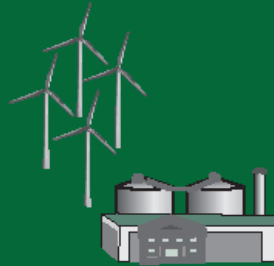
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Iowa Energy Center, 2521 Elwood Drive, Suite 124, Ames, IA 50010-8263 Phone: (515)294-8819 Fax: (515)294-9912

*Iowa Lakes' service territory has great wind resources!*

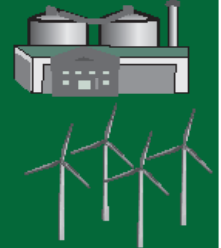
# *Wind Farm Locations*

**Dickinson County**



**Emmet County**

**Kossuth County**



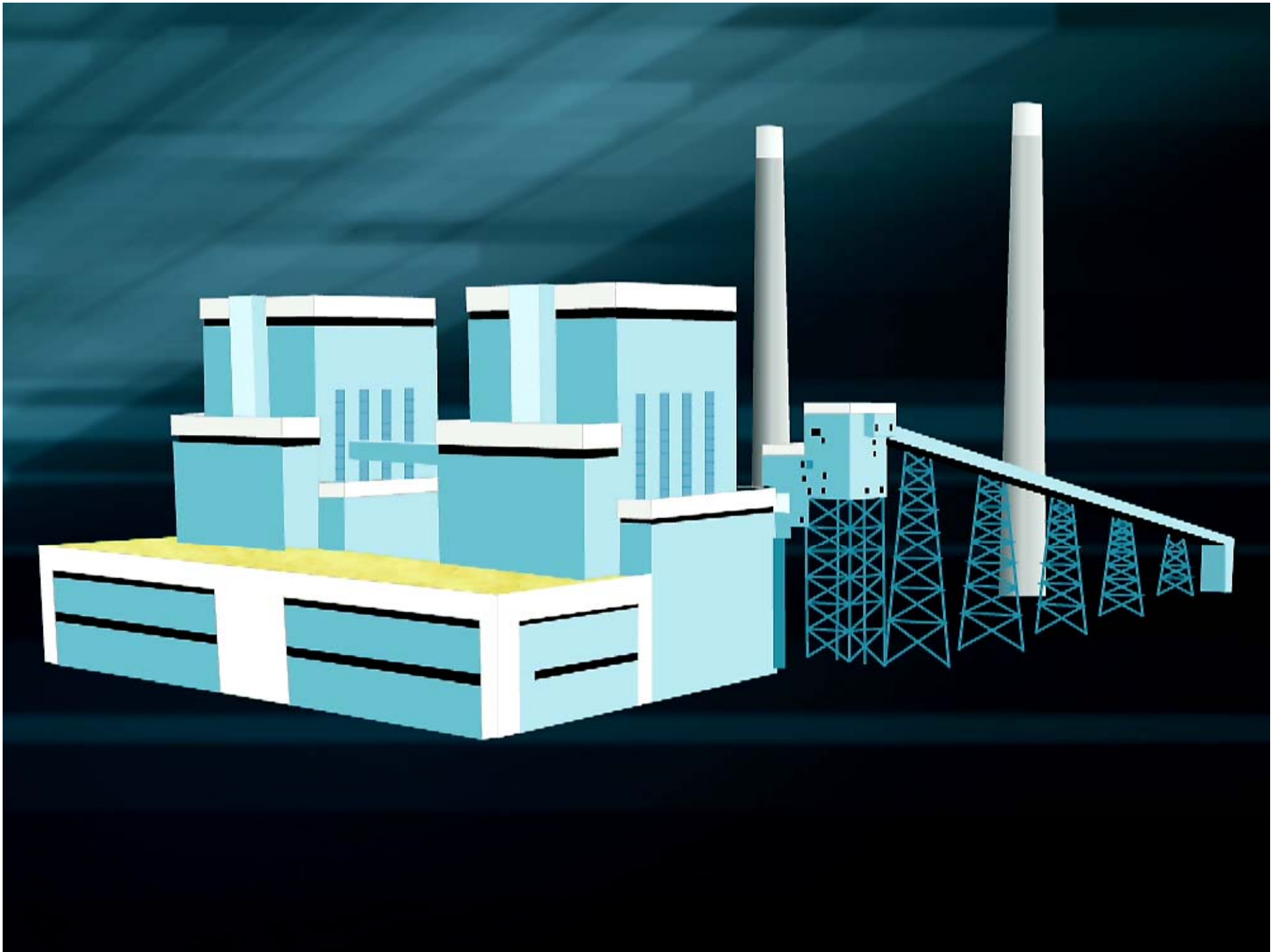
**Clay County**

**Palo Alto County**

**Cherokee County**

**Buena Vista County**

**Pocahontas County**



**Instead of this....**



**think this...**





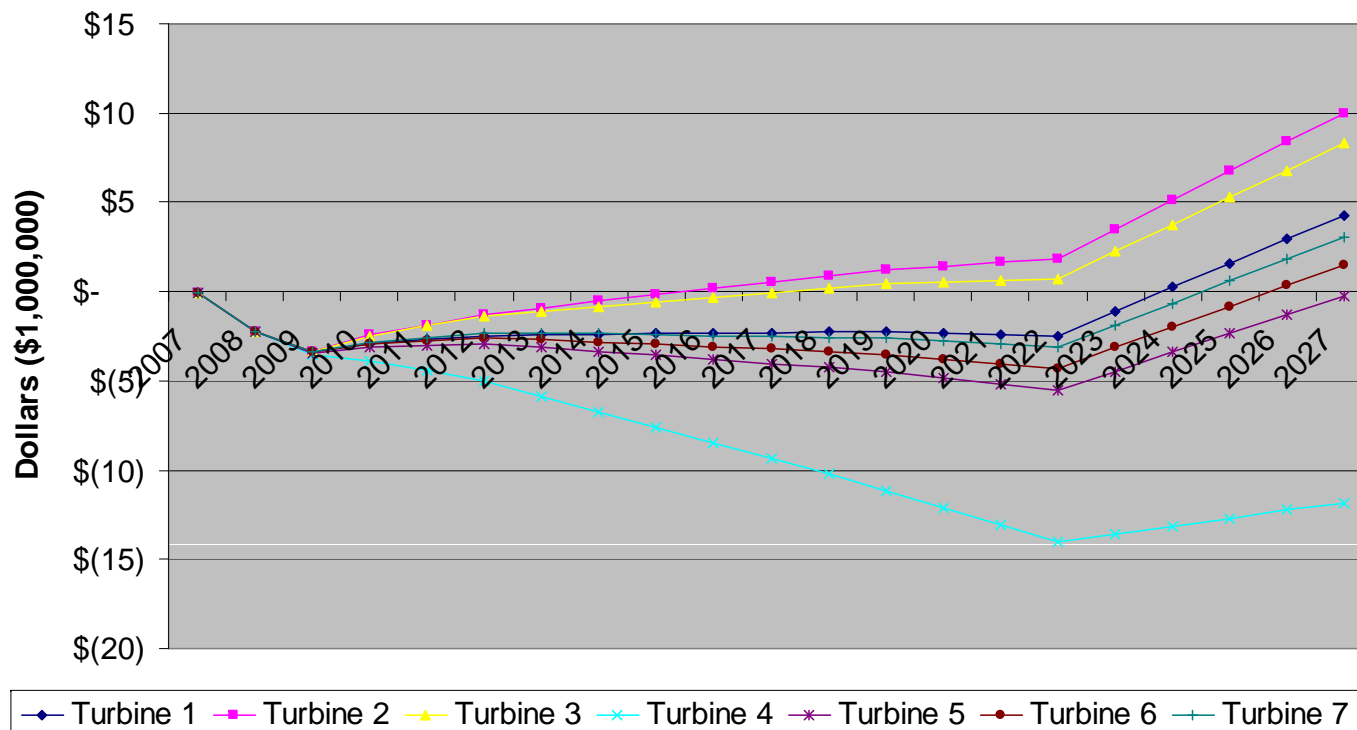
# ***Overview of Project to Date***

- **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**





## *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**



# ***CREBS Risks***

- **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**

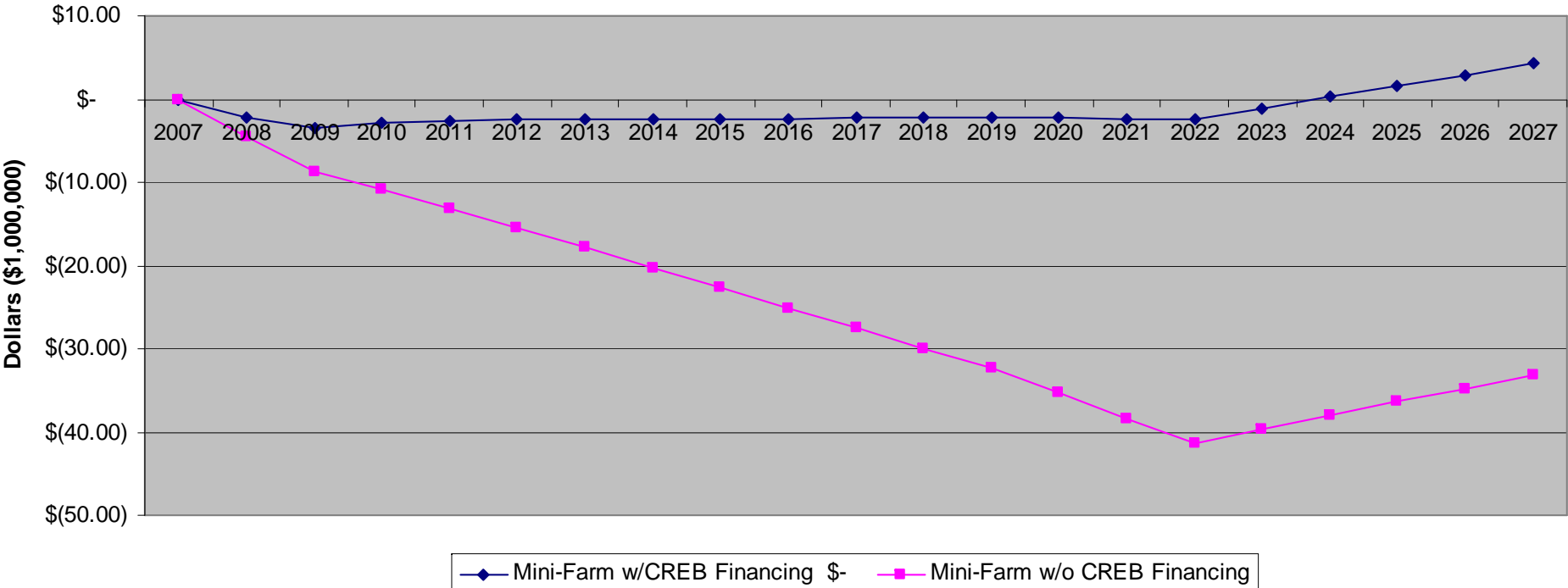


- **Administrative fix on CREB rate as set by Treasury on the due to the efforts of Senator Grassley and his staff**
  - **NRECA – Susan Petit**
  - **CFC – Rich Laroche**
- **Interim financing received from CFC**
- **Final CREB issuance purchased by CoBank**



# CREB Effect...

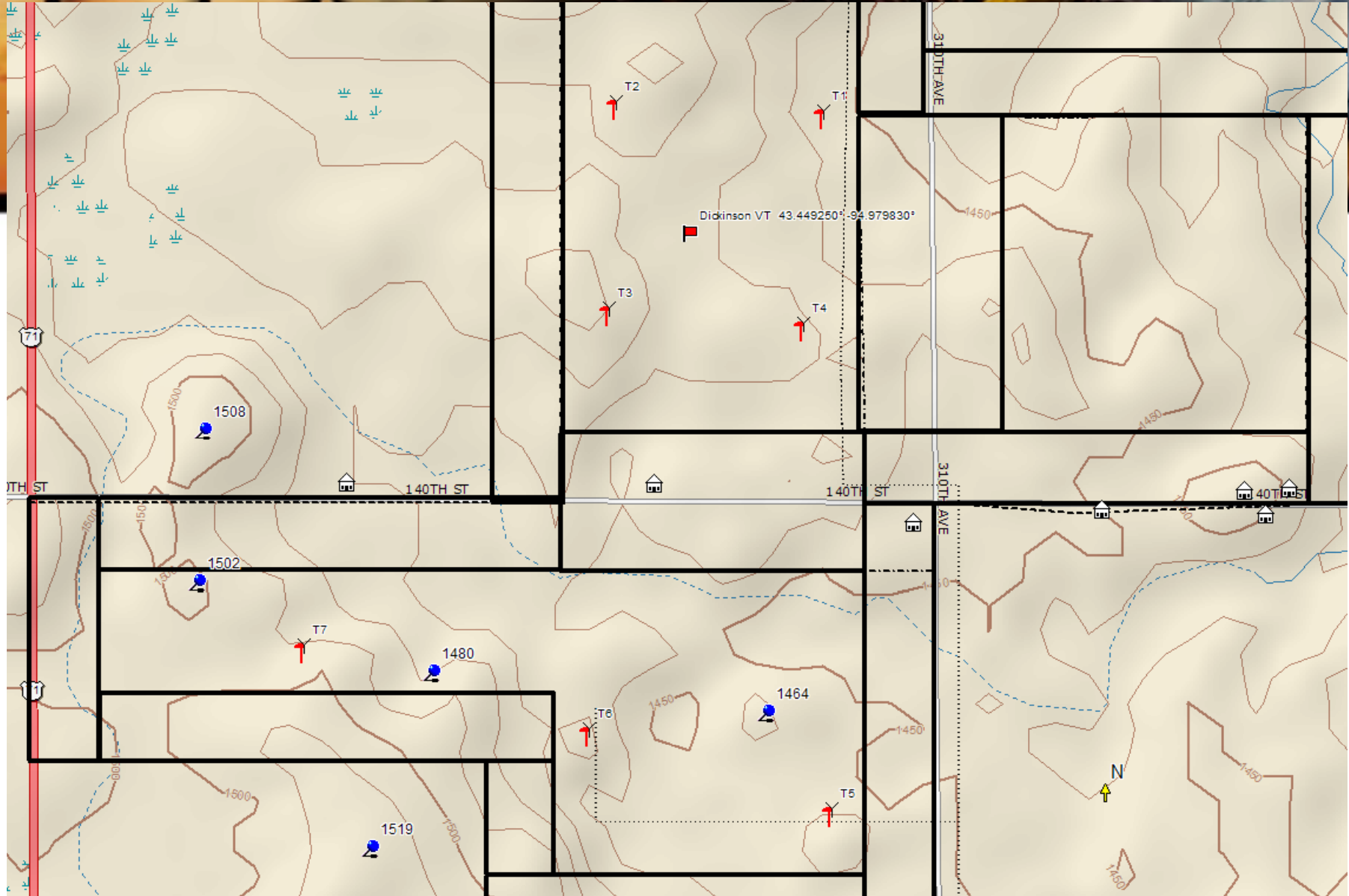
Effect of CREB Financing upon Project, Cumulative





# 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

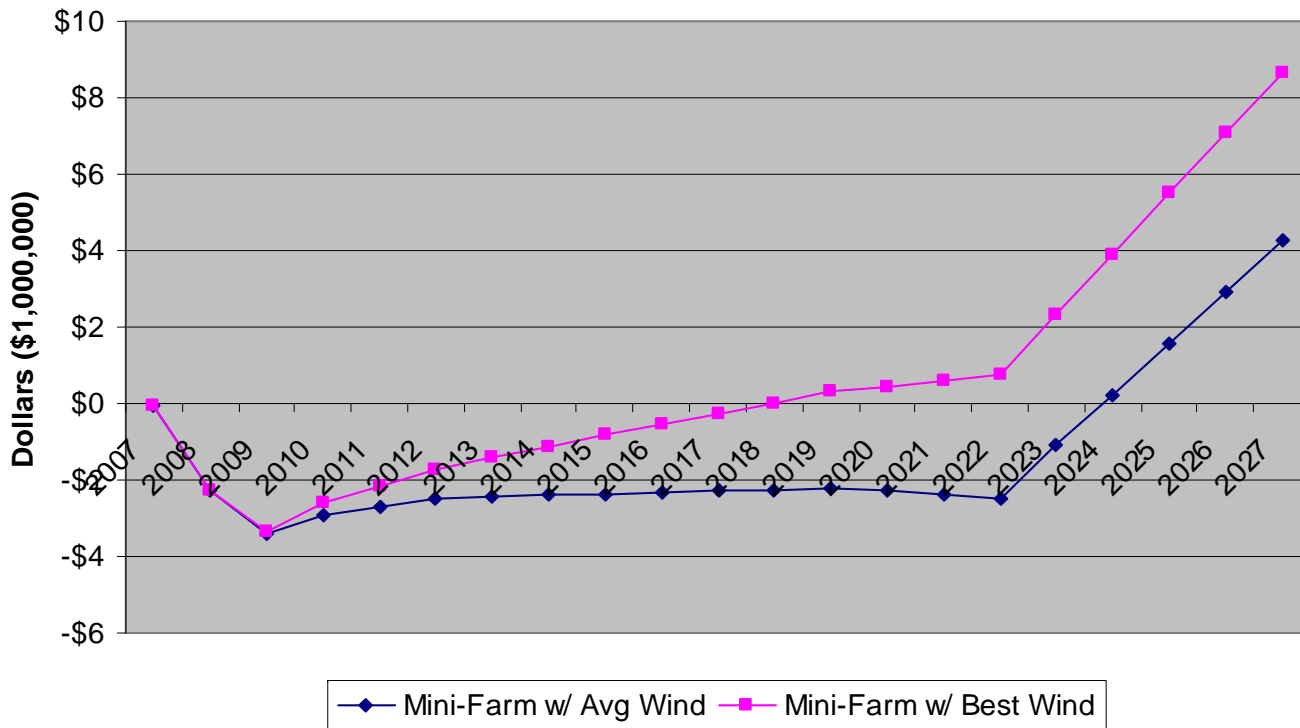






# Wind Effect...

**Comparison of Wind Values and Production  
Cumulative Cash Flow at Assumed PPA Rate**





# 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



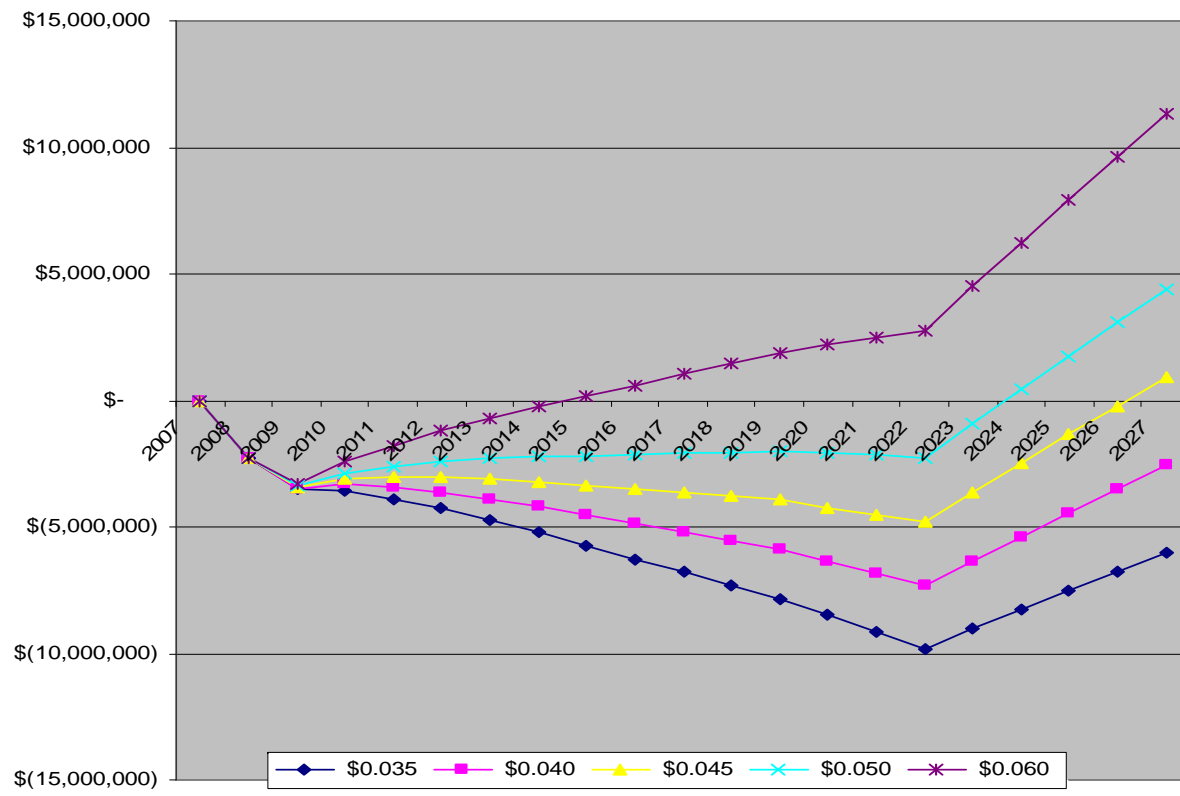
# Common Concerns

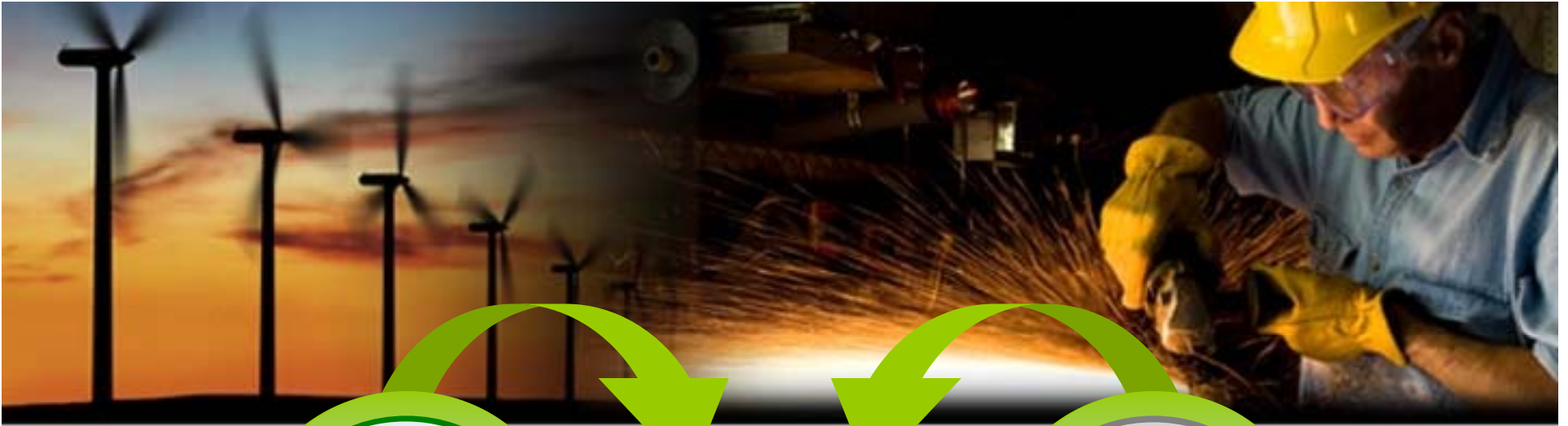
- “Wind Turbine Syndrome”
- FAA / Microwave
- Shadow flicker
- Attracts lightning
- Setback / visual aesthetics
  - **1000’ from residences**
- Maintenance

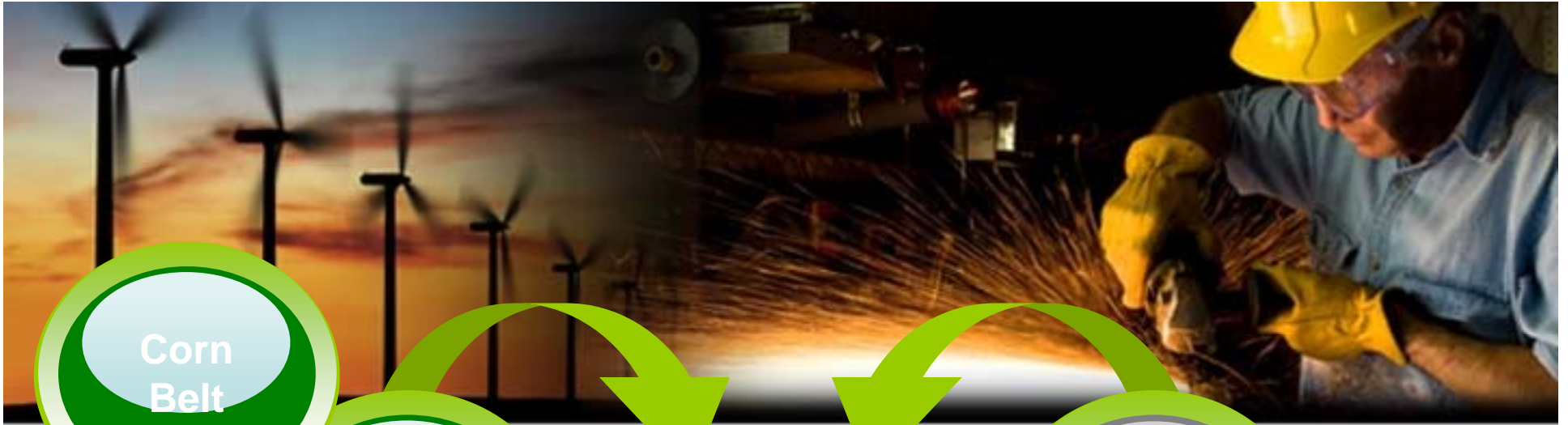


# Energy PPA Price Effect

Mini-Farm Example Turbine Cash Flow vs Rate







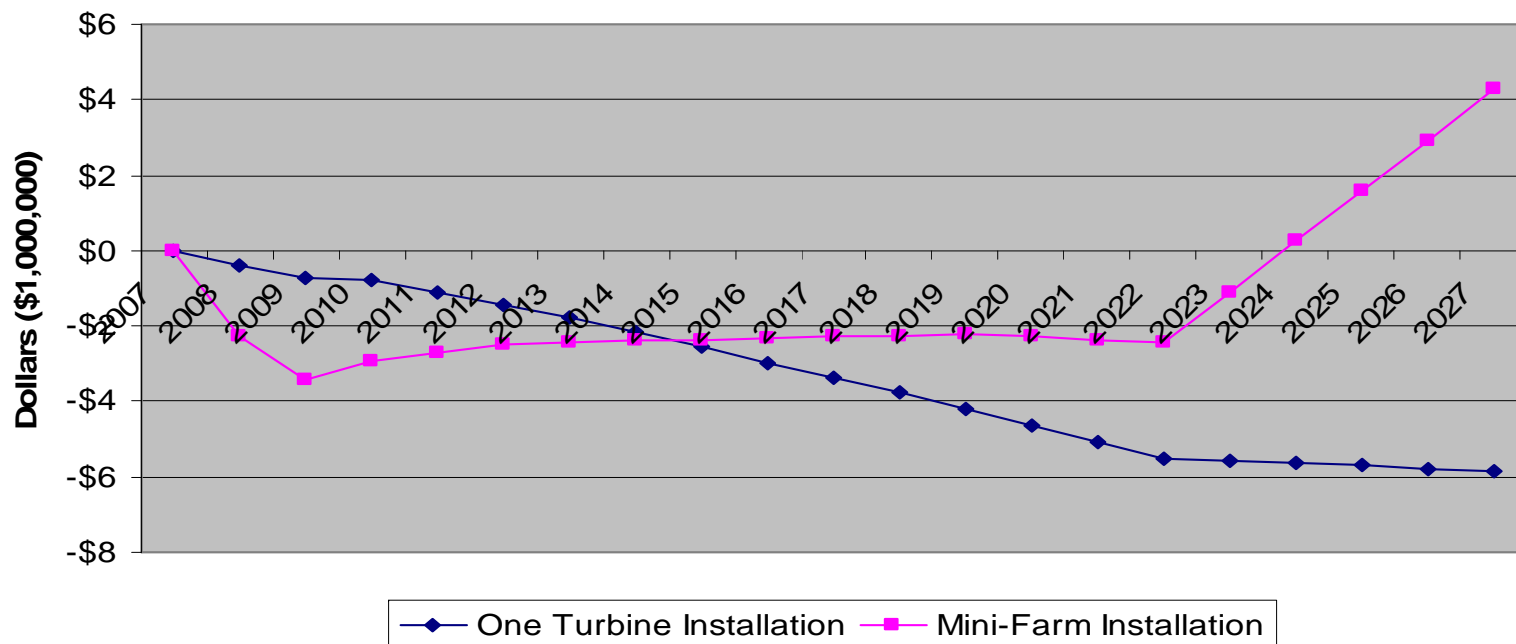


- Renewable Energy Production Incentive
- DOE program that is available (on a prorated basis)
  - **Oversubscribed, more wind projects coming online**
  - **2006 paid ~ 45% of applied kWhr**
  - **2007 paid ~ 26% of applied kWhr**
  - **Estimated at ~18% over 10 year period**

# Financials of 1 Turbine vs Mini-Farm

*A single turbine still incurs many of the same costs as a mini-Farm*

**Comparison of Wind Values and Production  
Cumulative Cash Flow at Assumed PPA Rate comparing one  
turbine vs 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



# SUMMARY

- 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



# ACKNOWLEDGEMENTS

- Worley Parsons – W. Skip McClimans, P.E.
- GE Wind
- WindLogics
- Basin Electric Power Cooperative
- WANZEK Heavy Industrial Constructors

# Renewable Energy Project

- Investing \$43 Million in Renewable Wind Energy
- Community Based Wind Project
- Two wind generation projects serving two renewable ethanol facilities
- Project Commission Date – March 2009
- Renewable Serving Renewable
  - *Unique & Innovative Wind Project*
  - *First in the Nation!*





# Q&A

energy and the environment



*Thank You!*

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