I. Preface

On February 11, 2005, Governor Rod Blagojevich sent a letter to Chairman Edward Hurley, asking the Illinois Commerce Commission ("ICC" or "Commission") to conduct an investigation as to the most effective way to implement a Sustainable Energy Plan ("Plan") for Illinois. Along with the letter, Governor Blagojevich submitted a set of goals to be achieved with this Plan through a Renewable Portfolio Standard ("RPS") and an Energy Efficiency Portfolio Standard. Chairman Hurley asked Commission Robert Lieberman to spearhead the ICC's efforts to develop the Plan. To facilitate discussions on the goals outlined in the Plan, Commission Lieberman chose to divide the issues into two working groups, the RPS Working Group and the Demand Response/Energy Efficiency ("DR/EE") Working Group. This report summarizes the RPS Working Group discussions.

II. Purpose of this Report

The purpose of this report is to provide an overview of the RPS working group discussions. The convenors wish to acknowledge all comments submitted by various stakeholders. The ICC Staff will review these comments and provide a report with recommendations to the Commission.

III. Working Group Participants

Many interested parties participated in and/or attended the RPS working group discussions, including the ICC Staff, electric utilities, alternative retail electric suppliers ("ARES"), consumer advocates, governmental agencies and consultants. Below is a comprehensive list of the organizations and individuals who participated in the RPS working group.

A. Stakeholder Organizations

Alliant Energy
Ameren Companies

BAI
Center for Neighborhood Technology

Chicago Climate Exchange
Chicago Department of the Environment
Chicago Green Power Foundation

Citizens Utility Board (CUB)

City of Chicago

Illinois Commerce Commission (ICC)
Illinois Community Action Association (ICAA)
Illinois Energy Association (IEA)
Illinois Industrial Energy Consumers (IIEC)
Illinois Landfill Gas Coalition (ILGC)
Illinois Public Interest Research Group
Institute for Regulatory Policy Studies (IRPS)
International Brotherhood of Electrical Workers (IBEW)
Low Income Utility Advocacy Project

Commonwealth Edison (ComEd)
Community Energy Cooperative

Constellation New Energy
Consulting Energy Economist

Department of Commerce and Economic Opportunity (DCEO)
DLA Piper Rudnick Gray Cary
Dynegy, Inc.

Energy Management Inc./ISEA
Enescon
Environmental Law and Policy Center (ELPC)
Evolution Markets, LLC
Exelon Energy
FPC Services - GSG Wind
Gas Technology Institute
GE Energy
GEV Corp.
Giordano & Neilan, Ltd.
Governor Rod Blagojevich's office
GSG Wind

Haller Wind Consulting
Illinois Attorney General's Office (AG)

Mainstay Energy
MidAmerican Energy Company (MEC)
MidWest Generation
Midwest Independent System Operator (Midwest ISO)
Navitas Energy

Nexant, Inc.
Office of Lieutenant Governor Pat Quinn
Peoples Energy Services
PJM Interconnection, LLC
PPM Energy
Primary Energy
Sieben Energy Associates
SenreQ
Sexton Energy
Shaw Group
Spire Solar Chicago
Summit Blue Consulting
Trintek Energy Consulting
University of Illinois at Chicago Energy Resources Center
WM Renewable Energy
Zilkha Renewable Energy

B. **Individual Participants**

Abolt, Bill
Baker, David
Barbieri, Bill
Bieniak, Janet
Borders, Will
Boyd, Robert "Hap"
Brick, Myron
Budd, Charley
Burger, Mark
Carolan, Michael
Cherry, Allan
Clow, Bryan
Colgan, John
Crist, Dean
Cynamon, Joshua
Darguzos, Joe

Libson, Tim
Lidisky, Dan
Lieberman, Bob
Loomis, David
Mallinckrodt, John
Matchett, Barry
Mathias, Rich
McClain, Katie
McClure, Scot
McDentt, Dan
McNulty, Jim
Mervis, Ari
Mill, Bob
Mishoe, Michelle
Mitchelson, Randy
Mitro, Fred

Detweiler, Hans
Downes, Brennan
Elliott, Sherman
Ericson, Christine
Eucret, Mark
Frenkel, Steve
Gale, Brent
Gallagher, Betty
Garg, Rishi
Giordano, Pat
Greenberg, Freddi
Gunn, Randy
Hall, Mark
Haller, Mark
Hedman, Susan
Hoeger, Brian
Huddleston, Barry
Iannello, Charlie
Jantze, Mark
Johnson, John
Johnson, Mike
Juracek, Arlene
Karegianes, Myra
Kelley, Shauna
Kennedy, Tom
Klaviter, Amy
Kretschmer, Ruth
Kurth, Henry
Lakshmanan, Joe
LeFevers, Dan
Leontis, Angela
Lesniak, Steve
Leuthauser, Rick
Moehn, Michael
Monk, Jim
Moore, Jennifer
Moore, John
Mueller, Steffan
Neilan, Paul
Nemer, Kurt
Norbeck, Michael
Ornelas, Antonia
Pabian, Michael
Papadimitriu, Katie
Papiech, Bruce
Papiech, Joyce
Persky, Dan
Prohov, Rick
Quasey, Kathy
Roberts, Roby
Stanfield, Rebecca
Star, Anthony
Stavy, Michael
Stephenson Schroeder, Mary
Stoller, Harry
Tangel, Jeff
Tholin, Kathy
Thomas, Chris
Townsend, Chris
Tramm, Tom
Unger, David
Voiles, Jackie
Walton, Jerry
Wattson, Kate
Wilson, Jim

C. **Working Group meetings**

Commissioner Lieberman conducted two meetings of the RPS working group, the first on

April 5, 2005, in Chicago and the second on
April 21, 2005 in Springfield.

D. Convenors

Shauna Kelley, Policy Advisor to Commissioner O'Connell-Diaz, Illinois Commerce Commission
Michelle Mishoe, Senior Policy Advisor to Chairman Hurley, Illinois Commerce Commission
Harry Stoller, Director, Energy Division, Illinois Commerce Commission

IV. April 5, 2005 Meeting

On April 5, 2005, the RPS working group heard presentations regarding renewable sources of energy, including biomass, landfill gas, recycled energy, solar and wind power.

A. Panel One

- Peter Dreyfuss, Director, Midwest Regional Office of the U.S. Department of Energy, Energy Efficiency and Renewable Energy

The Department of Energy ("DOE") houses a research arm for energy efficiency and renewable energy throughout the nation. The DOE does not take a position on state legislation or policy, although the DOE can offer the parties assistance in implementing the renewable portfolio standard.

- Dan LeFevers, Associate Director, State and Municipal Project Development, Gas Technology Institute ("GTI")

Mr. LeFevers explained gasification technologies. For nearly 50 years, GTI has strategically pursued development of gasification technologies. A commitment to the development of biogas[1] can lead to energy prosperity during the latter half of the 21st century. Currently, there are fifty 100 MW municipal wastewater facilities in Illinois. The best opportunity for Illinois is power from animal waste. Illinois has a large number of swine farms in the southern part of the state. For a successful biogas energy project from animal waste, the minimum size would be 300 cattle or 2000 swine, which could produce 50 kW. Larger farms could produce up to 3-5 MW. The market will respond when the farmers, utilities and businesses are all educated on this issue. Farmers need to know about federal Requests for Proposals ("RFPs") for renewable energy grants, which would be beneficial to construction of biogas projects. To encourage development, utilities could offer special rates and own energy production equipment on farms. For successful marketability, advancements in technology and systems must be made.

[1] Biogas is methane produced through fermentation of organic matter, such as animal waste.

Investments by larger companies in systems development and deployment would also be beneficial to proliferation of biogas as an energy source.

- Bill Johnson, Agricultural Compliance Manager, Alliant Energy

Mr. Johnson explained the role of biomass in an RPS. Alliant serves approximately 53,000 farm customers across Iowa, Wisconsin, Minnesota, and Illinois. Biomass energy[2] opportunities exist in various forms, including biogas, crop residue and switchgrass. Alliant has a tariff in Wisconsin that allows a premium energy price for biogas. Alliant works with consultants to install anaerobic digesters on large farms. Farmers can either net meter the electricity, sell it to the grid, or use it on their own farm. The success of a biomass project requires several factors including: favorable power purchase agreements; predictable cash flow; secondary drivers, such as waste management or odor control; a market for secondary products; tradable "green qualities;" incentives de-coupled from cost of fossil fuels; and access to financing.

- Freddi Greenberg, Attorney at Law on behalf of the Illinois Landfill Gas Coalition

Ms. Greenburg explained the benefits of landfill gas. Landfill Gas ("LFG") is the product of the anaerobic decomposition of waste in landfills. It is compromised of 50 to 60% methane and the remainder is carbon dioxide and trace components. Many benefits are associated with the use of LFG to produce electricity. LFG uses a local resource that would otherwise be burned in a flare. It produces fewer emissions than a combination of flare and fossil fuel generation. LFG is extremely reliable at a 95% or higher capacity factor. The output is not weather sensitive. These projects require a short amount of development time and minimal transmission upgrades. Onsite fuel supply eliminates fuel transportation risk.

In Illinois, there are approximately 100 MW in operation.[3] There are 28 facilities which average 3 to 8 MW per facility. The estimated cost for a LFG project is $1200 per kW. An LFG facility averages about 25 to 30 years of productive life.

- Mark Hall, Senior Vice President, Primary Energy

Mr. Hall explained that recycled energy refers to useful thermal, mechanical, or electrical energy produced from: (1) exhaust heat from any commercial or industrial process; (2) waste gas, waste fuel or other forms of energy that would otherwise be flared, incinerated, disposed of or vented; and (3) electricity or equivalent mechanical energy extracted from a pressure drop in any gas (excluding any pressure drop to a condenser that subsequently vents the resulting heat). The benefits are similar to traditional renewables, such as that the energy can be produced with no incremental fossil fuel inputs, which means no incremental emissions. An additional benefit is that, in most cases, the energy will be used at or near the point of production, minimizing the capacity

[2] Biomass encompasses organic materials, such as switchgrass, that can be converted into electricity or environmentally friendly liquid fuels.
[3] Illinois may potentially develop up to 400 MW of LFG generation capacity.

losses associated with transmission and distribution. The installed cost varies with each project, although the typical payback is two years.

An example of a project is located at the Mittal Steel plant in East Chicago, Indiana. The capacity of the system is 95 MW electric and 930,000 lbs/hr steam. The benefits of this system are that it supplies 21% of the electrical requirements and 85% of the plant's process steam needs.

These projects can also be used as energy efficiency measures. Nevada and Pennsylvania allow "green tags" for recycled energy. There is also legislation in Texas that would expand their RPS to include recycled energy.

- Mark Burger, Spire Solar Chicago

Mr. Burger explained how photovoltaic electricity could play a role in the Plan. The strengths of photovoltaic electricity are that it is non-polluting, peak power, highly distributive and low maintenance electricity. One of the weaknesses is the "cloudy perception," which means that people think solar power does not work if it is cloudy. A solar system will work as well in Chicago as one in Miami, around 88%.[4] A Chicago system can actually out-produce a Miami system in the summer. The potential is greater further away from Lake Michigan. Another weakness is that photovoltaic electricity has a higher comparative cost.

There are about 2MW of photovoltaic electricity in Illinois, mostly in the ComEd territory. Recent installations have cost $10 per kilowatt. Illinois is also a leader with using Building Integrated Photovoltaics. This is a promising growth market that includes replacing curtain walls, canopies, windows, awnings, etc. with clean power generation.

To be a viable option, solar energy needs access to a power pool, *e.g.* it needs the ability to trade across PJM and Midwest ISO. It also requires multi-megawatt scale, power purchase agreements, use of third party financing and access to incentives.

B. **Panel Two**

- Dennis Elliott, Analyst, National Renewable Energy Laboratories ("NREL")

NREL, a research arm of the DOE, conducts studies to determine the potential to develop wind power in certain areas[5]. NREL conducted a study of the wind electricity potential in Illinois in 2001 and produced a map to show the greatest wind potential. The map identifies several "good" wind areas, *i.e.* Class 3+ and Class 4[6]. Based on these studies, NREL concluded that 3000 to 9000 MW of wind capacity may be installed in Illinois. Illinois potentially can develop 3000 MW of electricity from Class 4 wind. Additionally, NREL believes that areas with elevated terrain near transmission lines in northern and central Illinois holds the most potential for utility-scale wind projects.

[4] In addition to sunlight, humidity also plays a role in the output of solar power.
[5] The studies discussed at this meeting concern only wind potential, not transmission siting issues or cost issues.
[6] Wind is classified on a scale of Class 1 to Class 7. Developers generally will not consider siting a project unless an area is rated at least Class 3+.

NREL developed a computerized mapping system to demonstrate regional wind availability. This system employs Geographical Information System software and digital terrain data. Analyses are based on upper-air data, tall-tower measurements and meteorological station data. Periodically, NREL reviews the wind maps based on the demand for wind power.

- Environmental Law and Policy Center ("ELPC")

The ELPC sponsored a group of presenters: Michael Skelly, Vice President of Business Development, Zilkha Renewable Energy; Matt Shuerger, P.E., Energy Systems Consulting Services; Mark Haller, Haller Wind Consulting; Roby Roberts, President, American Wind Energy Association ("AWEA"); and Hap Boyd, Manager, US Government Relations, General Electric.

There are several wind generation projects planned or capable of being planned for installation in 2006. See Appendix B for an example time line for completion of 2006 wind projects. Many things must be considered when planning a wind project, including transmission issues. Notably, in order to interconnect, a project must be placed in the transmission queue. The queue can take up to one year**.**

The delivery and installation of wind turbines is cyclical, largely dependent on the federal production tax credit ("PTC")[7] and steel prices. Because of this, turbine availability is limited. Turbines with a 2005 delivery date were sold out by fall of 2004. As a result, most developers have learned to place turbine orders sooner rather than later. Currently, developers are doing what they can to ensure 2006 delivery.

Typically, for a wind project to be constructed, the developer needs a long-term Purchased Power Agreement ("PPA"). PPA terms include a fixed price for 10 to 20 years, the utility pays for all energy delivered, pricing may be varied by day and time of year, the developer bears the construction risk and the utility bears the pricing risk.

In addition to creating benefits to Illinois as a whole, wind projects will provide economic benefits to the communities in which they are situated. Land owners where the turbines are situated receive $3000-$5000 per MW/pad. These projects typically create 100 to150 construction jobs per 100 MW for six months, plus local materials. Additionally, projects can create six to eight permanent technical jobs per 100 MW. Property taxes are approximately $5000 per MW.

AWEA acknowledges the potential risk to the avian populations associated with wind turbines. AWEA conducts siting seminars to make developers aware of the impacts to avian populations.

- Brent Gale, Senior Vice President, Legislation and Regulation, MidAmerican Energy Company ("MEC")

Mr. Gale generally echoed the sentiments of the AWEA panel. The 2006 goal of having turbines spinning might be ambitious. A more realistic goal is to have contracts signed.

[7] The PTC is subject to federal legislation. Congress decides annually whether to make the PTC available, typically in October. The 2005 PTC is 1.8 cents.

MEC already owns and operates a large-scale wind farm in Iowa. As such, MEC learned many valuable lessons in the development of this project. Wind power is largely unreliable and non-dispatchable. Wind can be used to supplement baseload generation, not displace it. Wind becomes an attractive option when considering the PTC, ability to sell/trade RECs, increased wholesale energy sales, capacity credit and any state incentives.

Many factors can affect the cost of a wind project. Advances in turbine technology tend to lessen the cost.[8] Availability of the PTC and the ability to use debt to secure the risk also tend to decrease the costs. Scarcity of turbines could prompt a developer to shop in the European market, making the price of turbines subject to unfavorable exchange rates. Other pieces of the price tag include costs of materials, such as steel, and the expense and availability of the construction equipment.[9]

There are also operational issues to consider when developing a wind project. Each turbine needs at least forty acres of unobstructed space to operate efficiently. One hundred acres would be optimal. Also, a developer must have a contingency plan in place if a land owner in the area for the proposed farm chooses not to participate. The weather also plays a crucial role in the construction of a wind project. Spring and summer are the best times to build.[10]

MEC would prefer a national RPS to individual state RPSs. MEC would also like to see a national Renewable Energy Credit ("REC") trading program. As for Illinois, MEC believes certain principles and rules act as barriers for its plans to diversify its generation portfolio. A reasonable cost standard should replace the least cost standard found in Public Utilities Act section 8-406(b)[11]. The ICC should also express a clear policy for the inclusion of renewable in the generation mix.

V. **April 21, 2005 Meeting**

On April 21, 2005, the RPS Working Group heard presentations from ComEd and Ameren. The companies set forth their proposals to implement the RPS as outlined in the Governor's letter. These plans are a work in progress and the companies await comments from the stakeholders.

A. **ComEd**

Arlene Juracek, Vice President Exelon Energy Delivery, Energy Acquisition, presented ComEd's implementation plan. ComEd supports the Governor's goals for use of renewable resources, but recognizes the specific challenges in implementing them successfully. Some of the implementation challenges include: minimizing the impact on

[8] Technical considerations for a wind project include turbine height and blade length.
[9] Special cranes must be used to erect a wind turbine. There are very few in the United States.
[10] It tends to be too windy in the fall months to erect turbines. Winter tends to be too harsh to construct anything.
[11] 220 ILCS 5/8-406 deals with certificates of public convenience and necessity. Subsection (b) concerns such certificates as needed for the construction of new plants and facilities. Under this subsection a utility must demonstrate, among other things, that its proposed project is necessary for the provision of reliable service and is the least cost means of satisfying this requirement.

customer's bills; full and timely cost recovery in utility rates; and recognizing a broad and creative array of resources that can contribute to supply diversity and long-term price stability.

Under the Governor's proposal, significant new wind generation construction is required. 200-400 MW of new wind generation is needed to meet the 2007 and 2008 targets. Availability of new landfill gas supply is limited, so new wind is needed to reach these goals.

ComEd proposed a few ways to meet the goals:

-**Procure renewable resources not already under long-term contract to ComEd via a competitive bidding process.** First, there needs to be a RFP process for energy and RECs to cover the ComEd load obligation only. There was some discussion about how to set up a REC market in Illinois. There is no national or regional market and an Illinois only market concerns ComEd. Next, generation may directly bid or bid through aggregators or marketers. There will be a laddered 10-year solicitation for output from a fixed amount of resources for the 10-year period. Each subsequent solicitation procures an incremental 10-year tranche to facilitate ramp-up of RPS targets. There was some discussion about the length of the contract term. ComEd proposed 10 years because it is concerned that a longer term would create a prudency risk. Wind developers would prefer longer term contracts because of financing concerns. ComEd is open to discussion on this issue.

-**Limit consumer rate impact by capping expenditures for first few years.** The quantity of resources to be procured in Solicitations 1 and 2 will be capped at the lesser of the target megawatt hours of energy/RECs required or that amount of energy/RECs that can be purchased and create no more than a **0.5%** impact to bundled revenues projected for the calendar year from ComEd's retail customers.

-**Resources procured via this process are a fixed price hedge against volatile energy prices.** Renewable resources are not typically subject to escalating fuel prices. The RECs will be retained and retired against ComEd's voluntary goal. The energy will be sold to PJM in the real-time spot market per the PJM market rules. The cost recovery rider passes through to retail customers the difference between fixed contract prices and PJM revenues/avoided cost. Essentially, this is the implicit cost of the RECs.

-**The Commission must find that this procurement of renewable supply resources is an accepted "utility function" and that all the costs associated therewith are prudently incurred in light of the benefits realized by customers in their electric service and rates.** A rider will be used to recover costs. ICC pre-approval of the solicitation process and approval of contracts are necessary to minimize risk to all stakeholders. "Regulatory out" contract clauses will also minimize utility risk. This is necessary because there is no legislation and future Commissions might not allow cost recovery. Furthermore, the market for renewable resources will be influenced by many external forces, so there should not be a penalty for missing targets if insufficient resources are bid.

-**The ICC needs to recognize a broad and creative array of resources that contribute to supply diversity and long-term price stability.** This includes wind, photovoltaic, and biomass. The ICC should also allow aggregators/marketers to bid

because they can bring small resources to the market. Further, for Solicitation 3 and beyond, the RFP should be expanded to include renewable energy projects within PJM.

-**This is not a competitively neutral solution, unless RESs voluntarily comply with the Governor's goals.**

The next steps that need to be taken by ComEd: obtain feedback from stakeholders; develop solicitation parameters; develop standard form contracts; structure an RFP process for the energy and REC market; develop a cost recovery tariff; file the contracts, RFP process, and tariffs with the ICC; conduct the RFP once all the regulatory approvals are obtained. Additionally, ComEd must obtain board approval for its plan.

B. **Ameren**

Michael Moehn, Vice President of Corporate Planning and Bob Mill, General Manager, Regulatory Policy & Planning, presented the Ameren companies' implementation plan. Ameren supports the Governor's intent for utilities to use renewable resources to serve a portion of their load, although Ameren acknowledges several challenges in procuring these resources in a way that meets the goals of the Plan and the Public Utilities Act. Some of these challenges include: balancing short-term load needs with wind developers need for long-term contracts[12], excluding out-of-state resources from the eligible source pool may hinder the inclusion of "superior" renewable resources from other states, there may not be enough renewable power and energy available to meet the 2006 goal[13] and combining the procurement of renewable generation with the Post '06 procurement process may not be the best way to obtain these resources.

Ameren's implementation plan included the following key points:

Utilities should not be required to take physical delivery of the renewable energy. Utilities would take ownership of the RECs associated with the energy and retire them to effect the RPS goals. The producer would then sell the energy into the Locational Marginal Pricing ("LMP") market. As a financial contract, Ameren would contract based on the difference between the market price and the contract price.

This would be a financial hedge for the utility. Ameren would contract for the RECs, which includes a value for the energy generated and a price per kWh for each REC generated. The cost to utility customers would vary, based on a calculation agreed to by both the utility and the resource developer. This calculation will compute the difference between a "fixed RPS unit energy price" and the LMP revenue received by the producer.

[12] Optimally, wind developers need long-term contracts to secure financing for projects. With the utility being responsible for meeting the RPS, developers should receive better financing terms. This will provide funding certainty for the developers/producers.

[13] The Governor's plan calls for 2% of a utility's generation to come from renewable resources by 2006. Wind resources should provide 75% of that goal. Given the availability of wind resources, there will not be enough on-line to meet the initial goal until the end of 2006.

Ameren would file a tariff with the ICC. The tariff will define the competitive procurement process for the RPS, allow for ICC pre-approval of the winning bids and establish a delivery service rider mechanism for cost recovery.

Ameren sees many benefits to its proposal. Regulatory oversight authority remains with the ICC, as the utility will be responsible for procuring the RPS resources. Competitive market development will be enhanced by competitive neutrality, *i.e.* all customers will pay for the RPS through delivery services. ARES will be able to compete for customers using any available resource. Long-term contracts will reduce the costs of an RPS.

Consumers will realize benefits and protections. The ICC will review the procurement of RPS resources at every stage, from approval of the contract price to the accuracy of the delivery services charge to continued compliance with RPS requirements.

APPENDIX A

RPS Working Group
Meeting Minutes
April 5, 2005

Panel One

1) Peter Dreyfuss, U.S. Department of Energy
   i) The Department of Energy ("DOE") houses a research arm for energy efficiency and renewable energy throughout the nation.
   ii) The DOE takes no position on state legislation or policy.
   iii) Material can be provided about programs at the DOE. These programs include wind technology, photo voltaics, biomass and other renewable sources of energy.
   iv) The DOE can offer assistance in implementing the renewable portfolio standard.
2) Dan LeFevers, Gas Technology Institute ("GTI")
   i) Currently, there are 50-100 MW municipal wastewater facilities in Illinois.
   ii) GTI is available to assist Illinois with technical questions related to biomass.
   iii) Gasification is difficult in Illinois due to a lack of feedstock like woodchips. Other things to consider are crop issues, collection issues, and economic issues for farmer, etc.
   iv) Illinois presents a good opportunity with the large number of swine farms in the southern part of the state.
   v) California has 30 bio plants that use more traditional methods instead of gasification.
   vi) Illinois could employ incentives and outreach programs to make biomass more attractive option.

b) Questions-
   i) What energy can you get from 50 MW (kWh)?
      (1) Mr. LeFevers will research the answer and report back.

c) How is smaller scale generation used?
   i) The amount of energy generated is not really large enough to affect the grid, but that would be up to the utility. Some farms in Wisconsin do put their power into the grid.
   ii) Larger farms could produce up to 3-5 MW.
   iii) Peter Dreyfuss response: Research is being conducted in Iowa using switch grass to combine with coal. Anaerobic digesters for waste are commercially available. Grants are available for projects. The cost- benefit must be measured in respect to waste; total benefits must be measured.
   iv) It may be more beneficial to clean and put directly in pipeline.

3) Bill Johnson, Alliant Energy

a) Mr. Johnson used a power point presentation. This will represent the minutes for his presentation.
b) Mr. Johnson also presented extra handouts.
c) Alliant has a tariff that allows a premium price energy for biogas.
d) Alliant works with consultants to install digesters on farms.

e) It takes five animal units to produce one kW.
f) The farmers have several options with biomass facilities. The can net meter electricity, sell to the grid or use on their own farm.
g) Questions
    i) How does the six (6) cent credit work?
        (1) The six cents is not a credit but a purchase price. This encourages maintenance in the off peak. It is incorporated in the tariff to create an economic incentive. The Wisconsin Public Service Commission allows this to flow through the Fuel Adjustment Clause even though it is above market price.
    ii) Does the five year contract pay back time service the debt?
        (1) Cost recovery does not occur in the five year period. Longer contracts are not allowed. Alliant intends to ask for extension this year.
        (2) The responsibility is to pay a fair price. Customers should not expect a fast pay back with these projects. In the upper Midwest we should foster saturation zones (high phosphorus).- We need to consider the total benefits
    iii) What is the cost per kW?
        (1) Each animal costs $1000. The energy cost is in the $3500-$5000 range.
    iv) Can biomass be considered base load?
        (1) Biomass can account for up to 89% of capacity.
    v) Is there a capacity payment?
        (1) No. Everything is included in the tariff.

4) <u>Freddi Greenberg, Illinois Landfill Gas Coalition</u>

a) Ms. Greenberg used a power point presentation. This will represent the minutes for her presentation.
b) Questions
    i) How does the Retail rate law work?
        (1) It is a program that provides a loan during financing period of the project. Incentives have created enough interest and economic development. Illinois produces the second largest amount of landfill gas, second to California. In California, the avoided cost was ten (10) to twelve (12) cents per KWh. In Illinois, the avoided cost varies between 1.8 to 3.6 cents per kWh. This would not be possible without the retail rate law.
    ii) What are the interconnection requirements? Is curtailment required? Is landfill gas saved for peak shaving?
        (1) Landfill gas cannot be stored. It is drawn to central point at the facility. If it is not used, it is burned in a flare. Gas is produced at stable levels.
        (2) Ms. Greenberg is not aware of curtailment issues that affect landfill gas facilities. The cost of a facility depends on how close it is located to distribution facilities. The cost can range from $100,000 to $500,000. The cost depends more on infrastructure. These projects rarely affect transmission.
        (3) The stimated capital cost for a landfill gas project is $1200 per kW.

(4) The average lifetime of a facility depends on the number of cells. These projects are developed in cells. Once one cell filled, the next cell is used. Many of these facilities may last 25-30 years.

iii) Is there a tariff in Illinois?

(1) The output is sold at avoided cost. The loan payment is a separate tariff, per the Retail rate law. The finance period is usually 10 years.

iv) How many are or may be built per year? Ms. Greenberg is unsure. To extent there are incentives; projects may be developed as fast as possible.

5) Mark Hall, Primary Energy

a) Mr. Hall used a power point presentation. This will serve as the minutes for his presentation.

b) Questions

i) Could these projects be used energy efficiency measures? Do these projects use green certifications?

(1) Nevada provides green tags for recycled energy. Pennsylvania uses a different term, industrial fuel and heat byproducts, but the same green tag concept. Legislation in Texas would expand the Renewable Portfolio Standard to include recycled energy. Green certification is also under consideration in other venues.

(2) Recycled energy falls into Demand Response/Energy Efficiency umbrella as well. Although, it has the same environmental attributes as those projects included in Renewable Portfolio Standard, then it meets the definition of renewable resource. Recycled energy may levelize the cost of a Renewable Portfolio Standard. It is difficult to give the installed cost, as it varies for each project. The typical payback is two years.

6) Mark Burger, Spiresolar

a) Mr. Burger used a power point presentation. This will represent the minutes of his presentation.

b) To be viable, solar energy needs access to a power pool. It needs the ability to trade across PJM/MISO.

c) Question

i) What is the capacity of a local plant? How many employees?

(1) There were twenty (20) people, producing hundreds of kW per year. Now there are 10 people. Every Mw employs about thirty-five (35) people.

Panel 2

7) Wind

a) Dennis Elliott, National Renewable Energy Laboratory

i) Mr. Elliott used a power point presentation. This will represent the minutes for his presentation.

ii) Questions

(1) Did this study consider transmission capability in relation to areas where wind power could feasibly be developed?

(a) Not in this study. Other studies took this into consideration.

(2) What is the estimated cost of wind per KW?

(a) Others have conducted those studies. This study covers only the availability of wind.
(b) The DOE funds wind maps for guidance, not for economic analysis.

(3) How much Class 4 wind is available in Illinois?
(a) Approximately 3000 MW.

(4) What is the capacity factor difference between Class 3+ and Class 4 wind?
(a) This is an arbitrary classification. There is not much difference in capacity. The current study is based on 2001 data. Today, wind potential may be a lot different given advances in technology.

(5) There are loan programs available to gather wind data. There is a program in Illinois, coordinated by Western Illinois University (details?). Many of these programs loan funds for anemometers. Most investors in wind technology get their own anemometers. Because of this, there is often a loss quality control of the data. There is a need for organized programs of wind data gathering instead of general public involvement.

(6) How often are the maps reviewed?
(a) It depends on the demand for wind power. It also depends on the multi- year program plan. The wind power in America plan is more strategic. If a state isn't investing in wind, then NREL won't update the map.

b) <u>Environmental Law and Policy Center ("ELPC") panel</u>

i) Roby Roberts

(1) Mr. Roberts used a power point presentation. This will represent the minutes of the ELPC panel presentation.

(2) Additional information
(a) This year 2000 MW of wind capacity will be installed in the United States and 400-500 MW will be installed in Canada.
(b) The number of projects in the transmission queue demonstrates a maturing market in IL.
(c) There are about 2000 MW in the queue for Illinois.
(d) Economic issues
(i) There was an article published recently regarding LaSalle County's proposal to tax wind turbines on a per square foot basis.
(e) Turbine availability
(i) Siemens and an Indian company are getting into turbine manufacturing.
(f) Wind developers work the Edison Electric Institute to draft power purchase agreements.
(g) Environmental assessments
(i) California has avian issues. What mitigation measures are used to reduce negative impacts to avian populations?
1. For now, reconstruction surveys and post construction surveys are conducted.
2. It is useful to compare environmental impact of wind power to other technologies.

3. The American Wind Energy Association ("AWEA") conducts siting seminars. This is getting the message out there that minimum criteria should be considered when siting projects.

(3) Questions

(a) Under the terms of the Power Purchase Agreement, does the purchaser bear the energy price risk? How does the price escalator work?

(i) With the escalator, the customer pays less up front for the wind, based on an index, usually the Consumers Price Index.

(ii) Customers pay for all delivered energy. There is risk associated with outages and congestion issues.

(iii) Developers tend to be flexible about pricing. They have knowledge about the best time for wind delivery. An example of flexible pricing terms would be to set a higher price in August than April, depending on the better delivery times.

(iv) In a contract to get a certain dollar figure per mWh, if the market price is worth more than the contract price, the purchaser gets benefit. Conversely, if the market price is worth less than the contract price, the purchaser bears the risk.

(b) Is it necessary to perform a federal Environmental Impact Statement ("EIS")?

(i) In Illinois, the permitting of power plants is county based. These wind projects do not fall under federal programs for transmission siting that would trigger an EIS.

(ii) The United States Fish and Wildlife Service conducts surveys of the environmental impact of a proposed project. The developers will share these surveys up front.

(iii) Wind projects are not excluded from federal review; there is no federal regulation for power plant.

(iv) There are state agencies in some states that would review a wind project prior to construction.

(v) If there were federal funds involved, then an EIS would be conducted.

(c) What is the availability to meet the 2006 wind requirements outlined in the Governor's proposal? Can the 2% RPS be met?

(i) The developers need until December 31, 2006 to meet the 2%. The capacity can be installed by then.

(d) How are the energy imbalance and scheduling issues addressed?

(i) At the Federal level, the Federal Energy Regulatory Commission monitors these issues. The PJM rules are friendly about these issues.

(ii) Technical studies have been conducted by the New York ISO and Minnesota.

1. There are large penetrations of wind compared to a few years ago.
2. Wind can be reliably integrated into the grid.

3. Projects are being built in shorter time frames with relatively minimal impacts. There are impacts to the day-ahead time frames.
4. The costs are moderate; roughly $2-$4 mWh.
5. The Minnesota study found that wind forecasting technologies are good and improving.

(e) Does it cost more or less to develop in Illinois?
  (i) New York is very expensive. Oklahoma is relatively inexpensive. Illinois is in between, more like Texas.
  (ii) Illinois is higher waste state, which makes wind projects more complicated from land perspective. In Texas, there is a lot more empty land.
  (iii) Turbines make up 75-80% of the cost of a project.
  (iv) In Illinois, it costs roughly $1400 per KW.

(f) Is there a State policy for projects decided at the county level?
  (i) Sometimes the collective body needs to enforce will, for example, with transmission siting authority.
  (ii) There is too much intervention in some states.
  (iii) Illinois has the appropriate balance.

(g) What happens if Production Tax Credit ("PTC") is eliminated?
  (i) It depends on the terms of the PPA.
  (ii) Is there a provision for liquidated damages?
    1. It depends on the PPA.

(h) How much installed capacity is in Illinois right now?

(i) What class of wind is necessary to make wind profitable?
  (i) It depends on the market, transmission availability, the quality of wind, the height of the tower, the swept area, etc.
  (ii) In the Columbia River Gorge, technology changes allow for projects in lower class sites.
  (iii) The wind around Mendota Hills is rated at least Class 3+, possibly even Class 4.

(j) Are the projects in queue discussed today just for Illinois?
  (i) Yes.

(k) If there were a bid or RFP process to meet the goal for wind, how many developers would participate?
  (i) Approximately ten (10) to twenty (20) developers would likely participate.

(l) How is the penalty for failure to meet the RPS standard viewed? Is it considered a cost of compliance? How often is mechanism used?
  (i) In Massachusetts, Connecticut and the New England Power Pool, the prices for Renewable Energy Credits are close to the penalty, this constrains supply.

(m) Is Green pricing a complement to an RPS?
  (i) The wind developers find green pricing to be great for public relations purposes.

(ii) A study was conducted in Texas, which determined that wind power is very popular.
(iii) Nationally, there is a 3% subscriber rate to green pricing.

(4) How does forecasting work?
(a) Forecasting focuses on the day-ahead and hourly markets.
(b) The hourly pricing is very reliable.
(c) The twenty-four (24) hour forecast is accurate in terms of total energy, although the exact hour is not as accurate.
(d) The focus is on the consequences of hour- ahead for load following.

8) Brent Gale, MidAmerican Energy

a) Mr. Gale did not use a power point presentation during his remarks. He referenced a previously submitted presentation that will serve as the minutes for his presentation.

b) Information

i) 2006 is ambitious in terms of meeting the actual production goals as outlined in the Governor's letter. A more realistic goal is to have contracts signed.
ii) It may be beneficial to set goals for meeting the Sustainable Energy Plan, remove barriers to entry and let the market work. Iowa achieved success under this approach.
iii) For a wind farm, in terms of MW to acres, at least 40 acres per turbine are needed. 100 acres per turbine would be better. The turbines need unobstructed access to wind to operate efficiently.
iv) When developing these projects, one must consider that not every farmer/land owner will participate.
v) It is more expensive to build projects in Class 3 or 3+ wind areas than Class 4 wind areas. Taller towers with longer rotors are needed to achieve comparable capacity factors.
vi) MidAmerican's cost is based on a50/50 capital structure.
vii) Capacity factor and capital expenditures are the biggest drivers of cost of a project.
viii) The PTC is critical for wind development.
ix) A national REC trading program is a good idea.
x) Will the PTC be extended?
(1) This may not be known until October. It is possible that the credit could be at a different level.
(2) Roby Roberts thinks the fate of the PTC will be known before August recess of Congress.
xi) There is a need for clarity in the Illinois Commerce Commission's rules.
xii) Turbine prices fall victim to boom and bust cycles. If these could be eliminated, turbine prices would likely soften.
xiii) Operation and Maintenance costs $25,000 per turbine per year.
xiv) MidAmerican works with wind developers to get projects developed. There are many good developers in Illinois. Sometimes the developers assume the construction risk. Construction of the projects is by a general contractor.
xv) The length of construction time of a project varies. Thirty-five (35) turbines per month can be built in the summer, depending on tower availability. With smaller turbines, more can be built per month.

October, November, and December are high wind months. Towers cannot be built in high wind.

xvi) Transmission costs are site specific. It takes approximately one year to get a project through PJM's queue If you need to build substation, this is another thing to keep in mind. Substations take approximately one year to build.

xvii) The ICC should look at each utility's portfolio to determine how beneficial wind is to that utility.

c) Questions

i) How was MidAmerican's wind program started?

(1) There is no RPS requirement in Iowa. Iowa's Governor asked for 1000 MW of wind power by 2010. Then he asked MidAmerican how it would go about meeting this target. MidAmerican presented a proposal. Iowa eliminated some regulatory barriers such as the least cost requirement and allowed advance ratemaking.

(2) Before this, MidAmerican litigated a mandatory RPS in Iowa for 15 years.

(3) MidAmerican does not support state RPS requirements because there are too many boundaries. MidAmerican advocates for a nationwide REC market.

ii) What has happened over the last 15 years to make wind a viable option?

(1) There have been gains in technology, increases in capacity factor and better information. This all makes wind a better proposition.

(2) Class 3+ wind areas will likely require more costs to develop than MidAmerican is comfortable with.

iii) Should there be a State renewable policy?

(1) Where it makes economic sense, yes.

RPS Working Group
Meeting Minutes
April 21, 2005

1. ComEd presentation
    a. Ms. Juracek used a power point slide handout. This will represent the minutes for her presentation.
    b. Questions
        i. Why does Com Ed only allow for a 10 year contract?
            1. ComEd believes this is appropriate to mitigate price on ComEd's end. This is open for discussion. There is a concern for prudency risk if the contract is thought to be too long.
        ii. The utilities would have a concern with long term contract risk. On the developers' side, ten years might not be long enough because of financing concerns. It is difficult to construct a wind project with a 10 year contract. Lenders want a 15-20 year contract.
        iii. Commissioner Lieberman is aware of this issue. He believes we need to continue the dialogue.
        iv. If the targets [as proposed in the Governor's letter] are missed because of underbidding, the long- term contract provisions might contribute to the missed targets.
        v. Reference to page 6 of ComEd's presentation: ComEd intends to limit consumer rate impact. Does this mean all customers or residentials?
            1. ComEd is concerned about all customers. All customers are concerned about their bills.
        vi. On the issue of cost recovery, in a competitive market, customers have the use of utility and the competitive markets. All retail energy suppliers just go out and get the power and energy.
            1. ComEd will still be providing the regulated utility service. As an IDC [integrated distribution company], ComEd is the default service provider, not an active marketer.
            2. As for the commodities, the cost to the utility customer is the market price. What ComEd is proposing for the cost recovery of wind power is the recovery of the difference of price for wind generation and PJM market price. ComEd will pass through residual price.
        vii. Does the holding company own generation?
            1. Yes. This only refers to ComEd.
        viii. If ComEd is purchasing on the basis of capacity rather than energy, there are financial instruments available for production. Why not put the burden on developers if failing to meet the production goals?
            1. With contracts for minimum production, ComEd doesn't want to penalize for deadband of wind production.

2. The Governor's plan shows interest for iron in ground.
3. To the extent wind comes from other sources, this might complicate things. The stakeholders need to work together to determine where the risk should lie.

ix. Would this stifle the market? Maybe it would be better to leave to things to the market rather than construct a default factor.
1. This should be discussed in the next steps.

x. On the issue of RECs, does ComEd have any thoughts about how to establish a market in Illinois?
1. ComEd is already trading RECs today,- mostly through bilateral contracts. There are no national or regional markets. PJM is working on GATS system [generation attribute tracking system] as an accounting tool.
2. ComEd is concerned with an Illinois only REC market. We need a broader base. There should be as many players as possible. There have been conferences on this subject. There are many consultants working on this issue also.
3. There currently is no transparency for pricing. ComEd worked on own its pricing. Maybe the PJM GATS system will evolve enough so that REC trading can be transparent. Another possibility is to use an independent third party to monitor or audit the markets.
4. With a RFP process, ComEd would cosntruct it so everyone is comfortable with the results. A third party would be needed to design the RFP process.

xi. If stakeholders have an interest in this, please comment on the REC trading issue.
1. In other states often, the REC value rises to level of penalty for failure to meet the RPS requirement. A comment was made about the Massachsetts REC value currently being very close to the penalty.

2. <u>Ameren companies' presentation</u>
   a. Mr. Moehn and Mr. Mill used a power point presentation hand out. This will represent the minutes for this presentation.
   b. Questions
      i. With regards to a long term contract, there are some LMP questions. From the development side and the view of this bifurcated structure in a semi-mechant marke-t type of payment, someone needs to forecast what LMP pricing will look like. How will this be quantified as payment stream for financing purposes? From a long term perspective, utilities will have a better idea of what will happen long-term than lenders and developers. When negotiating a contract, can a floor be offered as part of LMP ? Also with LMP, in many states, LMP rules have changed as things evolve in the market. LMP could be manipulated as units are

turned on and off. Generators will try to game the system. Giving credits to utilities may provide incentives for gaming.

1. For clarification: If Ameren enters into hypothetical 15 year contract at a fixed price of 4 cents per kwh, every day, Ameren would settle out for that day. The wind turbines will generate and then sell into LMP market. The wind generators will still get 4 cents per kwh. The utility will pay to bring the generator up to 4 cents or the utility will get whatever is over 4 cents.
2. The risk is on the ratepayers.
3. A fixed price contract will solve this issue.
4. Market monitors in PJM and MISO will monitor the markets for gaming.
5. Com Ed proposes to sell the energy into PJM and Ameren proposes that the generator should sell it into the market.

ii. Have the utilities considered providing pure renewable product to customers that might want it? How would Ameren charge customers? Would the costs/benefits be passed on to other customers as a result of participation in these programs?

1. ComEd: PECO has a program in which about 10,000 customers participate. This is a mix of residential and small industrial customers. City of Naperville also has this type of program. There are a large number of residential customers on this. The intent of Governors' RPS program is that costs should be more socialized. This doesn't prevent a "greener" proposal. It would be possible to layer a voluntary program onto what is being proposed
2. Ameren: Ameren agrees with ComEd. There is concern with having a competitive advantage. IDC rules prohibit promotion of this sort of program. It doesn't necessarily prohibit making this type of program available, although it prohibits the IDC from promoting it.

iii. Have the utilities considered recognizing the value of certain types of electricity, i.e. peak vs. non-peak?

1. Ameren: Considering the value of energy as different at different times has not been eliminated at this point. The issue is meeting the goals in the most efficient manner at the least cost to consumers. The developers could still contract for higher daytime value, lower off-peak value. Using the LMP market will capture the true value of the energy.
2. ComEd: LMP will capture the market value. The contract price is the known price. The energy value will be recognized through LMP.
3. No one wants to penalize one producer over another.

iv. When considering LMP, the Commission may want to think about location.
    1. Some of this will come out in bid price
v. Will the utility be responsible for procurement? Will this be shown in the annual statement?
    1. All suppliers must provide a quarterly environmental statement. Procurement of renewable power and energy would be included in this statement.
vi. Would RECs be included in this statement as well?
    1. As long as the RECs are attached to the load, this will be included in this statement.
    2. The statement will need to be adjusted for RECs.
    3. RECs must be adjusted for generation. In the physical world, this generation will be displacing something else so the REC is based on actual generation?????.
    4. This will be statistically reconciled.
vii. Does Ameren's proposal include an expenditure cap? How long for a long- term contract?
    1. There is no specific cap proposed. Ameren will rely on the ICC upon acceptance of bids for the RPS fulfillment to deterimine if bids are reasonable. Ameren will look to the ICC to determine zone of reasonableness.
    2. Ameren has developed no specific term yet for a long-term contract. Ameren continues to work with developers. Long-term contracts will probably be around 15 years.
viii. On the contract term issue, the landfill gas manufactures will be seeking contracts of no more than 10 years.
    1. Ameren will match K length to the needs of the source.

APPENDIX B

LANDFILL GAS
A Renewable Resource for Illinois

Illinois Landfill Gas Coalition

Presentation to the
Illinois Commerce Commission
Sustainable Energy Plan Initiative
Renewable Portfolio Standard
Working Group Meeting
April 5, 2005

ILLINOIS LANDFILL GAS COALITION

- Bio Energy (Illinois), LLC
- Bio Energy Partners
- Gas Recovery Services of Illinois, Inc.
- U.S. Energy Biogas Corp.
- Sexton Energy LLC
- WM Illinois Renewable Energy, LLC

LFG to Electricity Facility

Landfill Gas to Electricity

- What is Landfill Gas (“LFG”)?
- Benefits of using Landfill Gas to generate electricity
- Overview of Landfill Gas Utilization
- Landfill Gas to Electricity in Illinois
- The Details: Extraction and Use of LFG

What is Landfill Gas?

- Product of the anaerobic decomposition of waste in landfills
- 50 – 60 percent methane
- Remainder – carbon dioxide and trace components
- Heating value of 500-600 BTU/cubic foot

LFG to Electricity Facility

Benefits of LFG to Electricity

- Uses a local resource that would otherwise be burned in a flare
- Less emissions than combination of flare and fossil fuel generation
- Highly reliable – 95% or higher availability
- Output not weather sensitive – available at summer peaks

Benefits of LFG to Electricity

- Short development time
- Minimal transmission upgrades
- Onsite fuel supply eliminates fuel transportation risk
- Every KWH of electricity generated by LFG displaces a KWH that would be generated by imported and domestic fossil fuels

Overview of LFG Utilization

- First Commercial Utilization of LFG

  Palos Verde, California – 1975
- 1150 LFG Utilization Plants Worldwide
- 730 LFG Utilization Plants in Europe
- 355 LFG Utilization Plants in the U.S.
- 255 LFG to Electricity Plants in the U.S.

LFG to Electricity in Illinois

- Approximately 100 MW in operation
- 28 operating facilities
- Average capacity: 3-8 MW
- Incentive loan spurred development

Greene Valley Landfill
DuPage County

Potential LFG to Electricity in Illinois

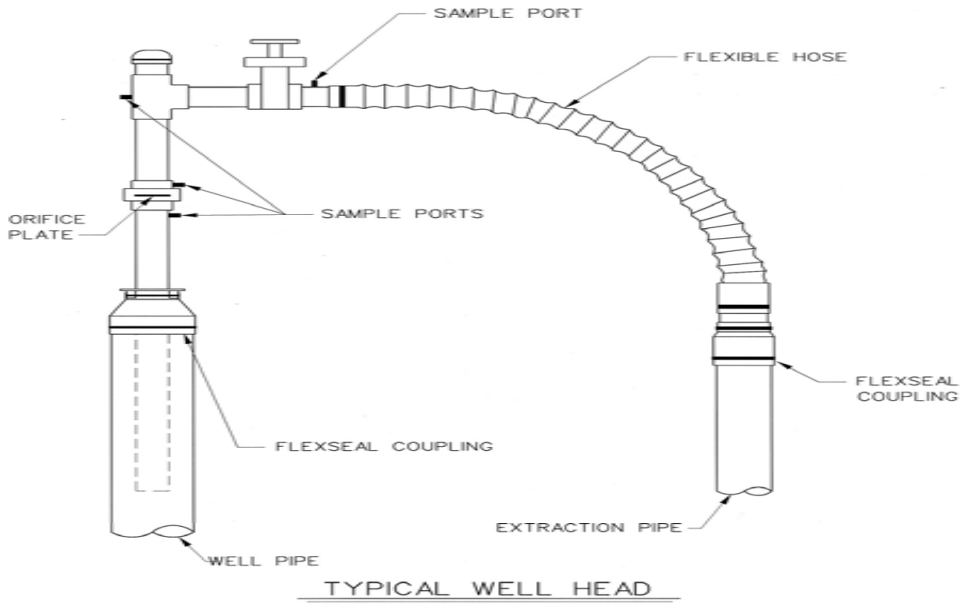
- Approximately 400 MW installed by 2012
- 300 MW new development
- Development period of 12 – 18 months at a site
- Minimal transmission upgrades
- Assumes RPS does not limit LFG

Collection of LFG From the Landfill

- Wells are drilled into the landfill
  (Horizontal and Vertical)
- Wells are connected by a system of pipes
- Landfill gas is collected to a central point
- Landfill gas is extracted from the landfill
- Unused Landfill Gas is burned in a flare

Landfill Gas Well Field

Landfill Gas Collection Well



Landfill Gas Wellhead

LFG to Electricity

- LFG to electricity plant located at landfill
- Generator leases site from landfill owner
- LFG purchased by owner of generating plant
- Unused LFG routed to flare and burned

LFG to Electricity

- Reciprocating engine generator set produces electricity
- Larger plants may use turbines
- Typical LFG to electricity plant operates during more than 95% of the hours each year

Landfill Gas to Electricity Facility

Questions?

Illinois Landfill Gas Coalition
1603 Orrington Avenue
Suite 1050
Evanston, Illinois
847.864.4010
email: ilfg@flglaw.com

Recycled Energy

RPS Working Group
April 5, 2005

Mark Hall, Senior Vice President

Primary Energy

Oak Brook, IL

But First...Who is Primary Energy?

- Primary Energy (“PE”) is a developer, owner and operator of on-site energy recycling and CHP facilities
- Extensive energy operations experience
- Currently own six inside-the-fence energy projects highly integrated into steel mill hosts in Northwestern Indiana and six gas-fired CHP projects in California, Colorado and New Jersey
- Headquartered in Oak Brook, Illinois
- www.primaryenergy.com

What is Recycled Energy?

What is Recycled Energy?

RECYCLED ENERGY. The term "recycled energy" means useful thermal, mechanical or electrical energy produced from:

(1) exhaust heat from any commercial or industrial process;

(2) waste gas, waste fuel or other forms of energy that would otherwise be flared, incinerated, disposed of or vented; and

(3) electricity or equivalent mechanical energy extracted from a pressure drop in any gas, (excluding any pressure drop to a condenser that subsequently vents the resulting heat).

Equivalent Environmental Benefits to “Traditional” Renewables

- Energy can be produced with no incremental fossil fuel inputs
- No incremental fuel = No incremental emissions
- Additional benefit is that in most cases the energy will be used at or near the point of production, minimizing the loses associated with transmission and distribution

Recycled Energy Projects Substitute Knowledge and Capital for Fuel

- Displace use of fossil fuel or purchased energy by capturing and using currently wasted, local energy resources
- Typically requires energy and process engineering
- Capital investments required for hardware and controls
- Often not part of the end users core business or competency

Key Customer Benefits of Recycled Energy

- **Save $**
  - Significant reductions in emissions are possible
    - Both onsite and displacement of purchased energy
  - Benefits common to all distributed generation (DG) technologies
    - Enhanced reliability & energy security

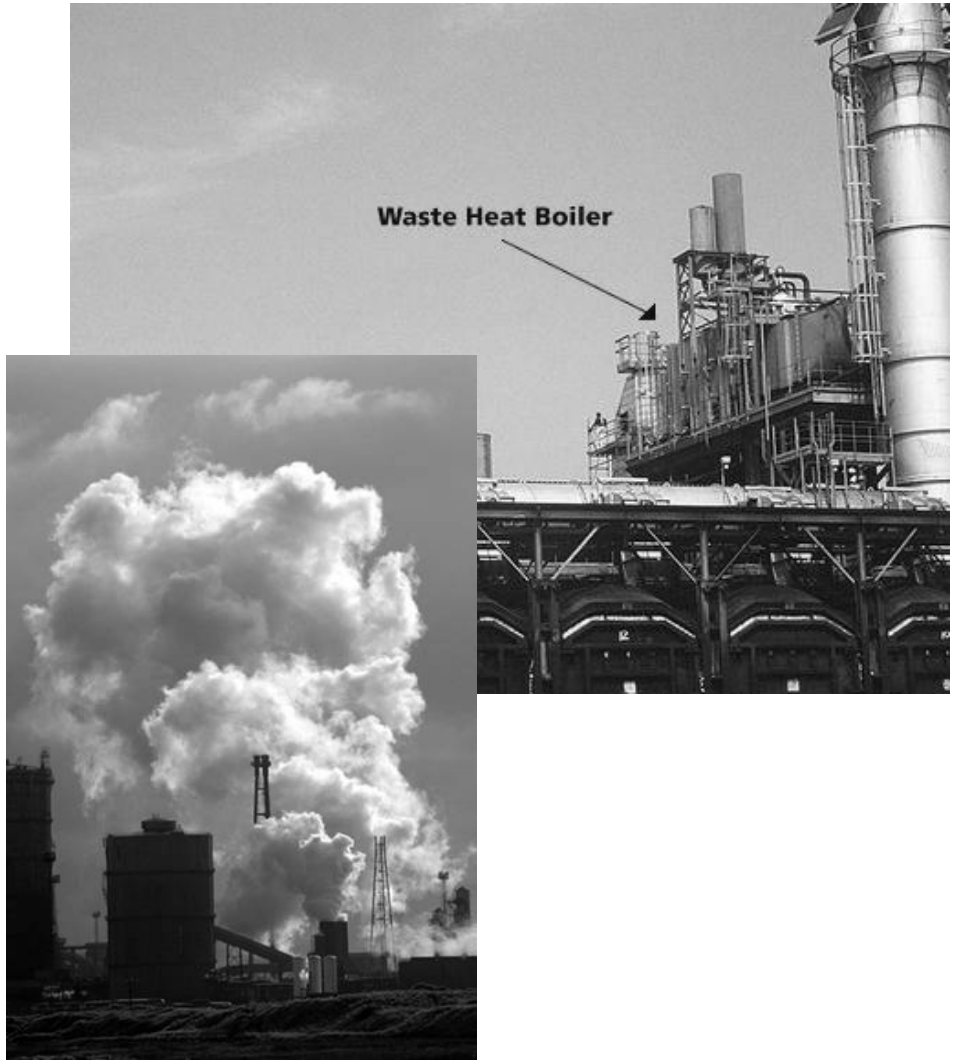
Recycled Energy Technologies

Many Technologies Off The Shelf

- A few examples:
  - Waste Heat Recovery Boilers
  - Gas Holders with fired boilers, engines or turbines
  - Backpressure Turbines (steam)
  - Expander Turbines (other gases and liquids)
- Lots more that people in the industry can access, especially for niche uses – look to Europe and other countries where energy prices have been consistently high

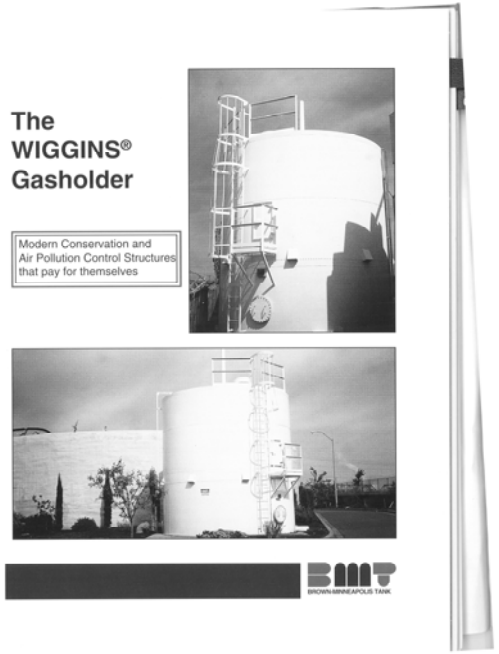
Waste Heat Recovery Boilers

- Recoverable heat from furnaces, stoves, thermal oxidizers, and other processes
- Heat recovered used to produce steam or hot water
- Can be connected to a steam turbine to generate electricity or used for process or space heat



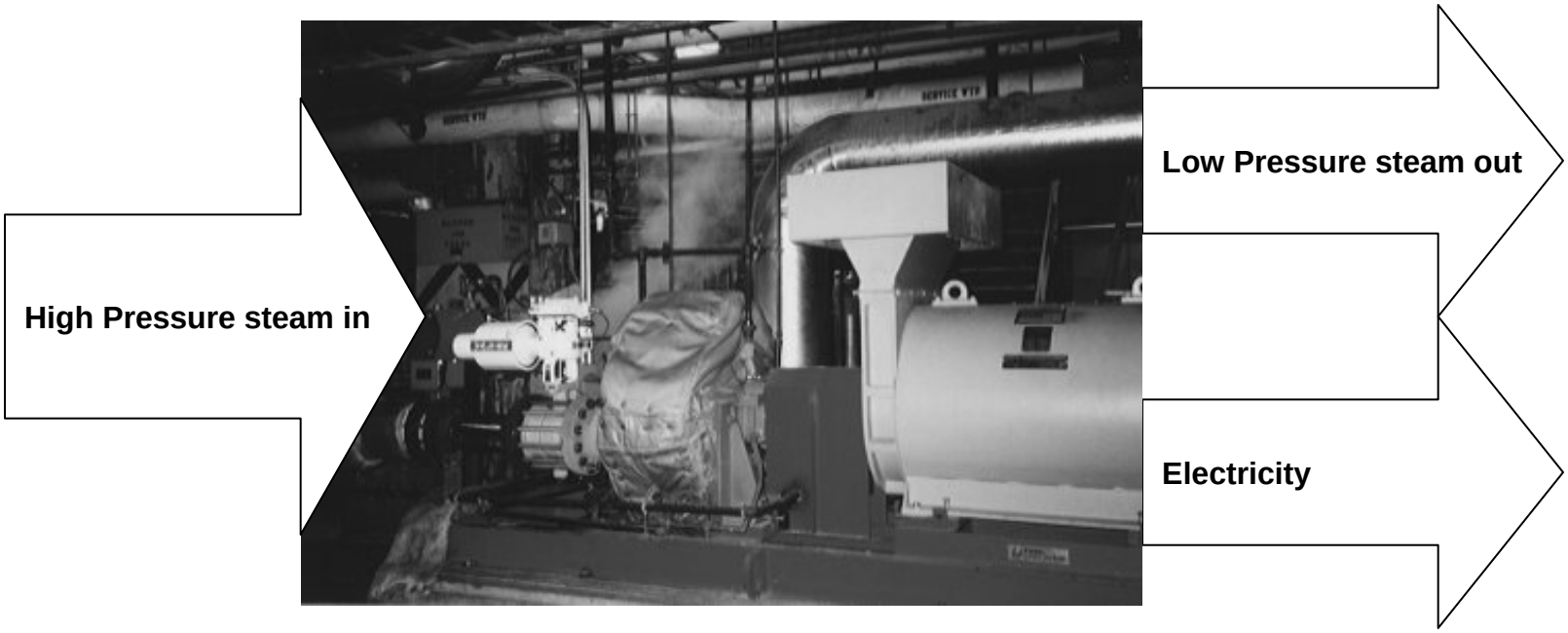
Gas Holders

- Replacing flares with gas holders can achieve same environmental result while allowing energy capture
- Many low to medium Btu gases produced in batch processes can be captured and used, much like landfill gas projects
- Stored fuel can be used by many traditional combustion technologies, producing electricity and/or thermal energy



Back-Pressure Steam Turbine

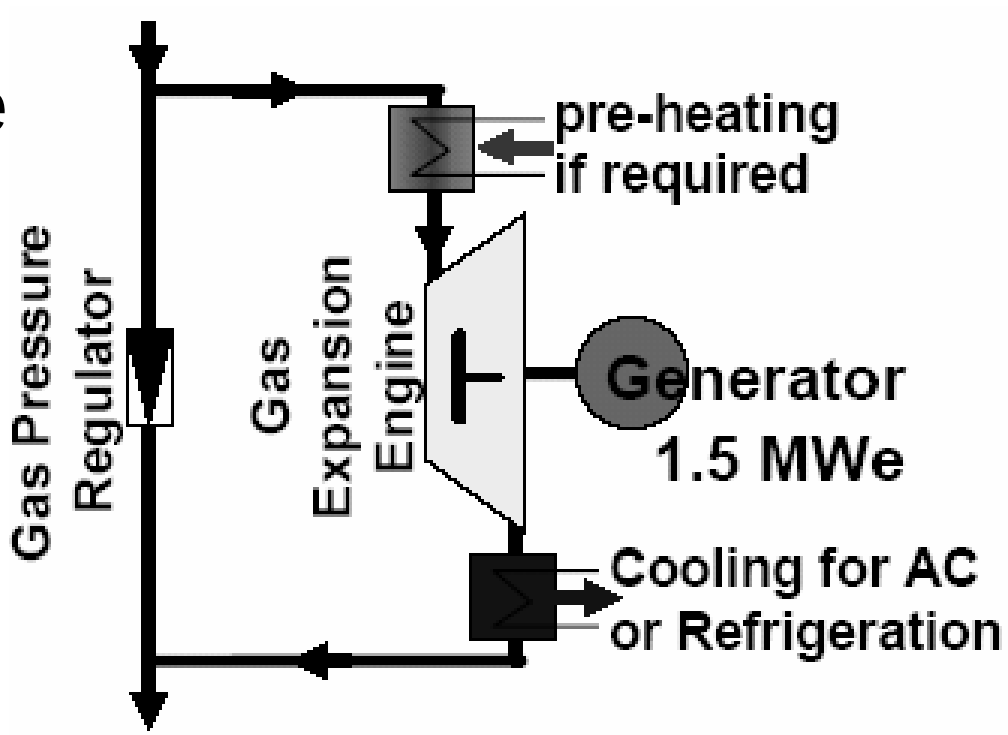
By replacing PRVs with turbine-generators, steam plants extract free electricity whenever steam is flowing.



Note that this generator is sized to the <u>thermal</u> rather than electric load (thus "heat-first")

Expander Turbines

- Same idea as a backpressure turbine but used in natural gas distribution systems, or other high pressure transmission to distribution environments



Case Studies

Cokenergy, LLC.

(A Primary Energy Project)

- ***Customer:*** Mittal Steel (formerly Ispat Inland)
- ***Location:*** East Chicago, Indiana
- ***Capacity***: 95 MW electric, 930,000 lbs/hr steam
- ***Benefits:***
  - Supplies 21% of the electrical requirements and 85% of the plant's process steam needs
- ***Awards:*** 2000 Governor's Award for Excellence in Pollution Prevention

Crane Paper Company CHP Installation

- Mill generates steam for use in dryers & paper machines (approx 27,000 lbs/hr)
- 1934-vintage boilers operate at 400 psig, all steam use at 100 psig or less
- Prior to 1990, used a valve to reduce pressure of steam from boiler down to process pressure

- 1990: Installed turbine generator to extract 426 kW of free electricity from the first 400 psig → 100 psig pressure drop.
- Generates relatively small fraction (<10%) of total electric needs, but serves all mill thermal needs
- Operates <30% per year, but has saved enough money to repay all capital costs 3X over since installation

Contact Information

2000 York Road
Suite 129
Oak Brook, IL 60523
Phone (630) 371-0505
Fax (630) 371-0673
www.primaryenergy.com

- Mark Hall
  - MHall@PrimaryEnergy.com
  - 630-371-0573

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

Renewable Energy Working Group
Illinois Commerce Commission
Chicago, April 5, 2005

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

spire Solar

STRENGTHS

- NON-POLLUTING ELECTRICITY
- PEAK POWER ELECTRICITY
- HIGHLY DISTRIBUTIVE ELECTRICITY
- LOW MAINTENANCE ELECTRICITY
- MATURE AND GROWING TECHNOLOGY
- ECONOMIC DEVELOPMENT POTENTIAL

WEAKNESSES

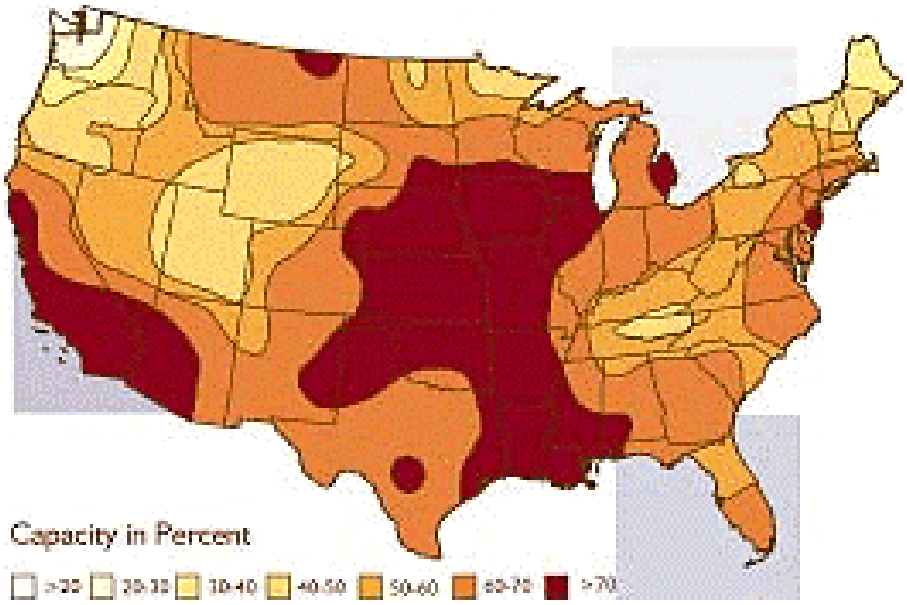
- "CLOUDY" PERCEPTION
- HIGHER COMPARATIVE COST

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

Peak Power Electricity

- **Illinois among the highest match of peak power electric need and photovoltaic power availability**
- **ELCC = Electric Load Carrying Capacity (source National Renewable Energy Laboratory)**

(SOURCE: Natl Renewable Energy Lab)



PV ELCC map of U.S. (based on 500 utility loads)

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

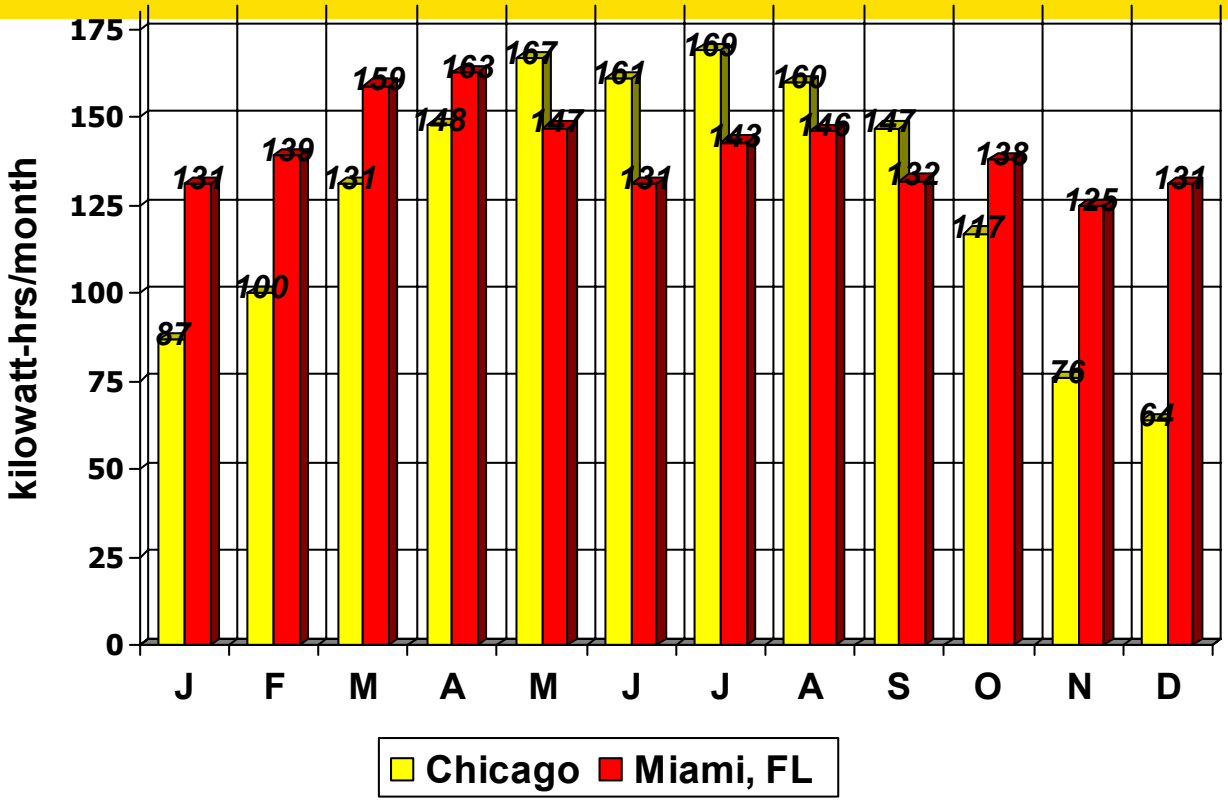
spire Solar

Peak Power Electricity

- **VALUE OF LOAD REDUCTION**
  - **AVERAGE - $100/MWh – 58% Above Baseload**
  - **SUMMER - $250/MWh – 460% times market price**
    - **Access needed to power pools like PJM**
    - **"PV Saves for All Ratepayers: Mid-Atlantic States Cost Curve Analysis 9/2002, JBS Energy**
- **VALUE TO PEAK ELECTRICITY IN POST-2006 REGULATORY ENVIRONMENT**
  - **Higher prices for Summer as well as daytime**

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

"Cloudy" Perception



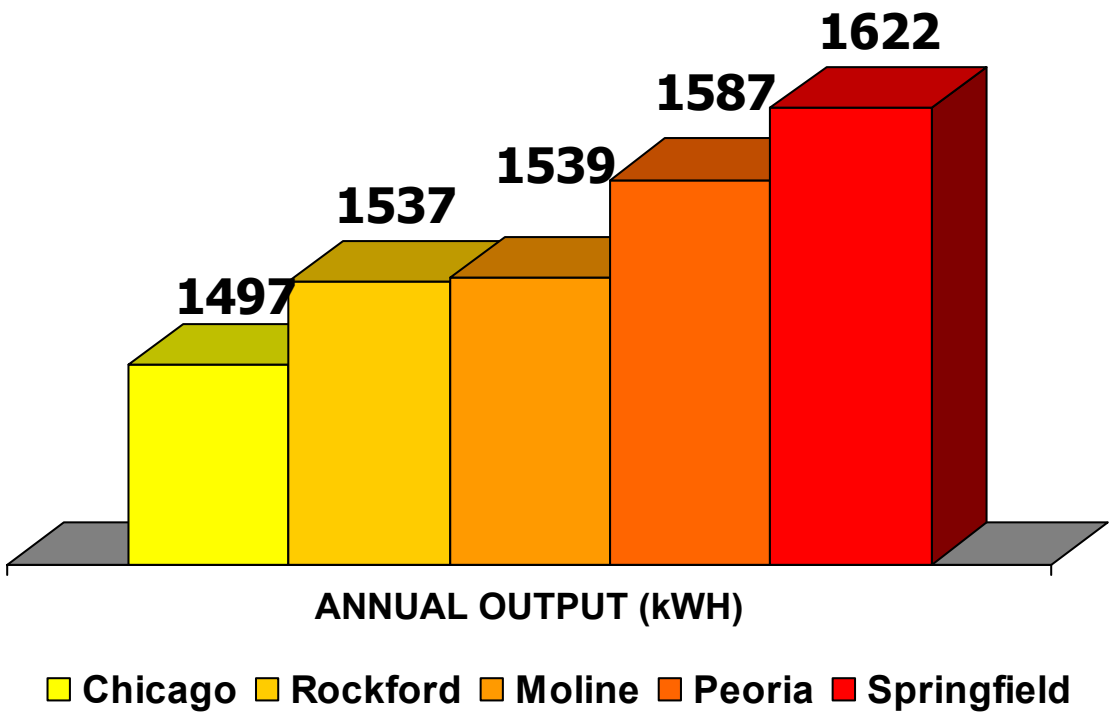
PVWATTS simulation – Natl Renewable Energy Lab, 1 kW AC, 30 degrees fixed angle due south

A solar electric system will work about as well in *Chicago* as one in Miami, Florida, around **88%**. A Chicago system can out-produce a Miami system in the summer.

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

spire Solar

"Sunnier Away From The Lake"



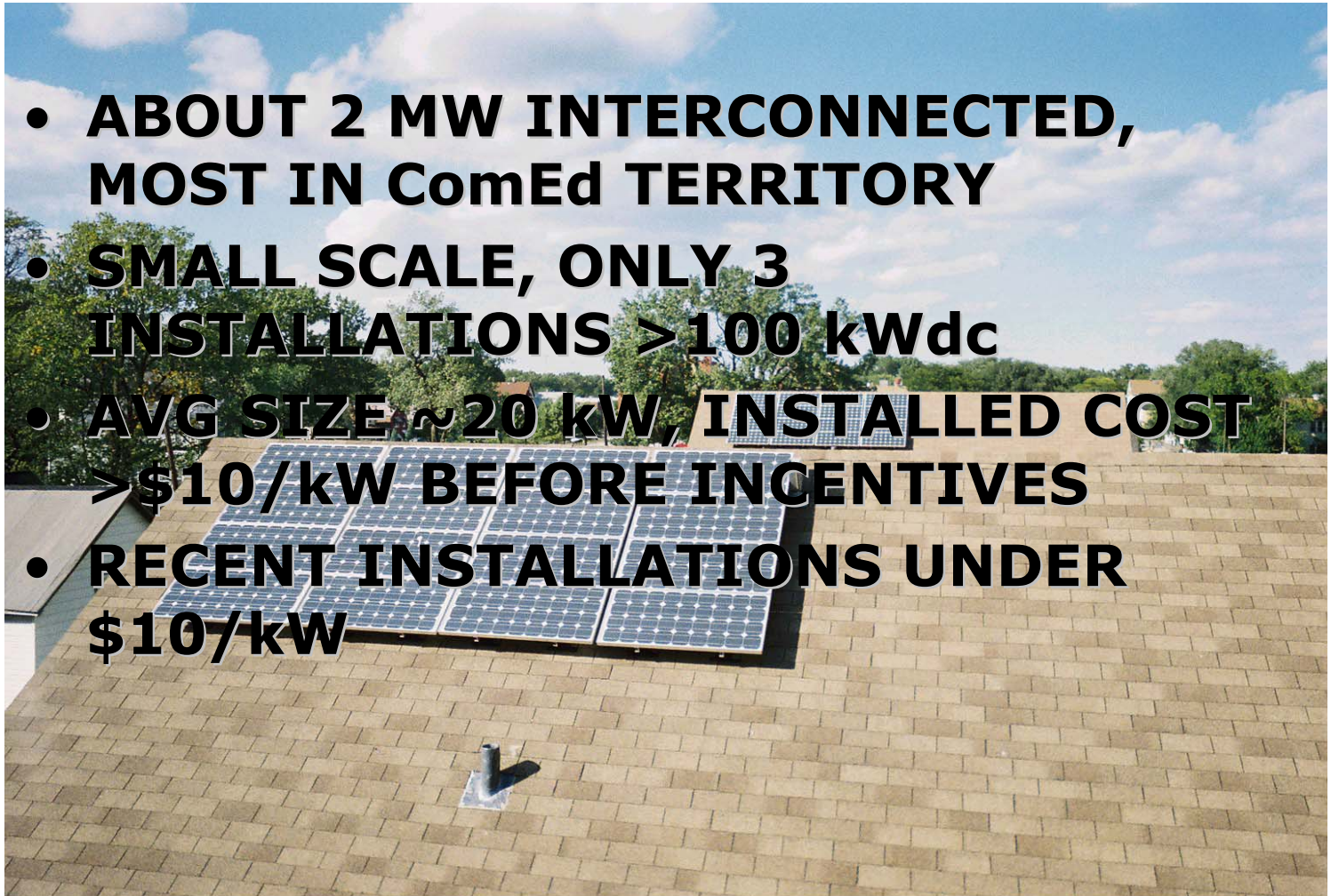
PVWATTS simulation – Natl Renewable Energy Lab, 1 kW AC, 30 degrees fixed angle due south

Other Illinois sites may be more productive than Chicago because of the "lake effect".

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

spire Solar

HISTORY OF PV IN ILLINOIS SINCE 1999

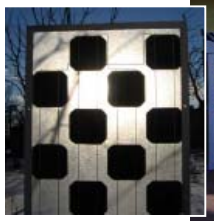


- ABOUT 2 MW INTERCONNECTED, MOST IN ComEd TERRITORY
- SMALL SCALE, ONLY 3 INSTALLATIONS >100 kWdc
- AVG SIZE ~20 kW, INSTALLED COST >$10/kW BEFORE INCENTIVES
- RECENT INSTALLATIONS UNDER $10/kW

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

SMALL SCALE IS BEAUTIFUL

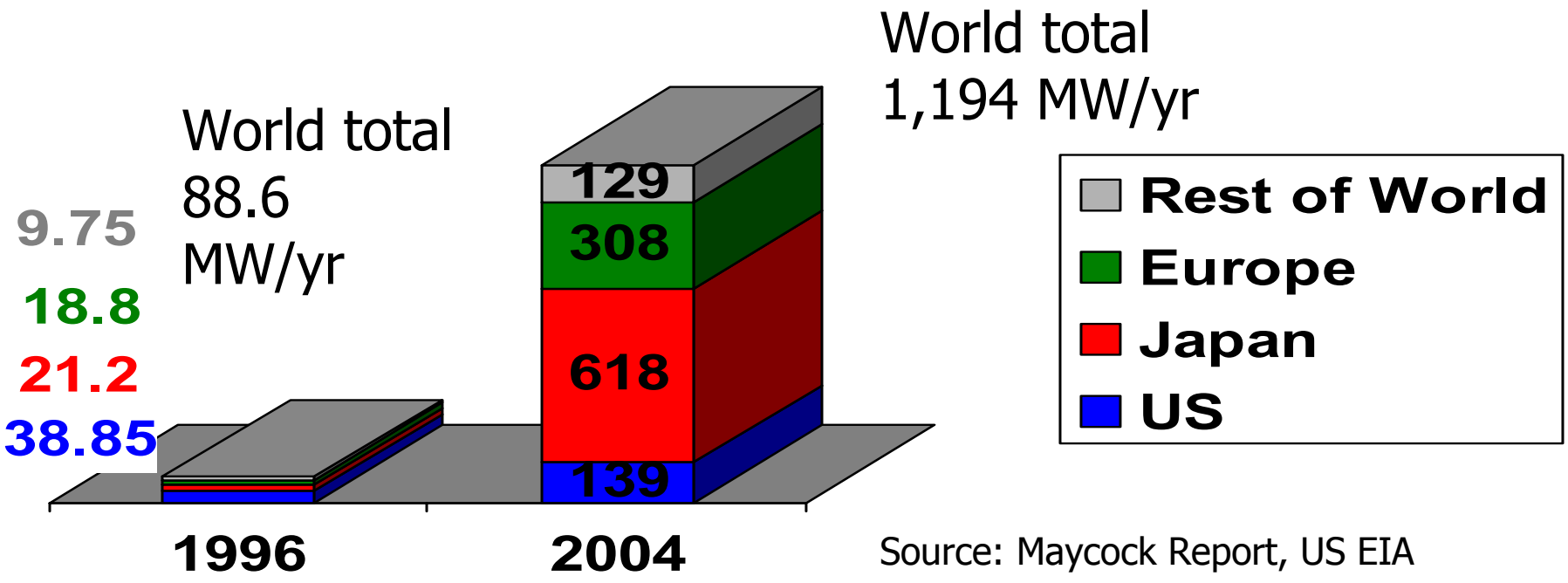
- IL has one of largest US small scale PV markets outside of Sunbelt
- Building Integrated Photovoltaics (BIPV) is a promising growth market
  - Replace curtain walls, canopies, windows, awnings, etc. with clean power generation
  - Market can eventually total hundreds of thousands of square feet in Illinois, 5-10 MW of capacity by 2012
  - Cost reduction of replacing building materials and design elegance makes BIPV appealing



ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

PHOTOVOLTAIC MARKET HAS NEAR EXPONENTIAL GROWTH

World Annual Photovoltaic Production - Peak MW



Source: Maycock Report, US EIA

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

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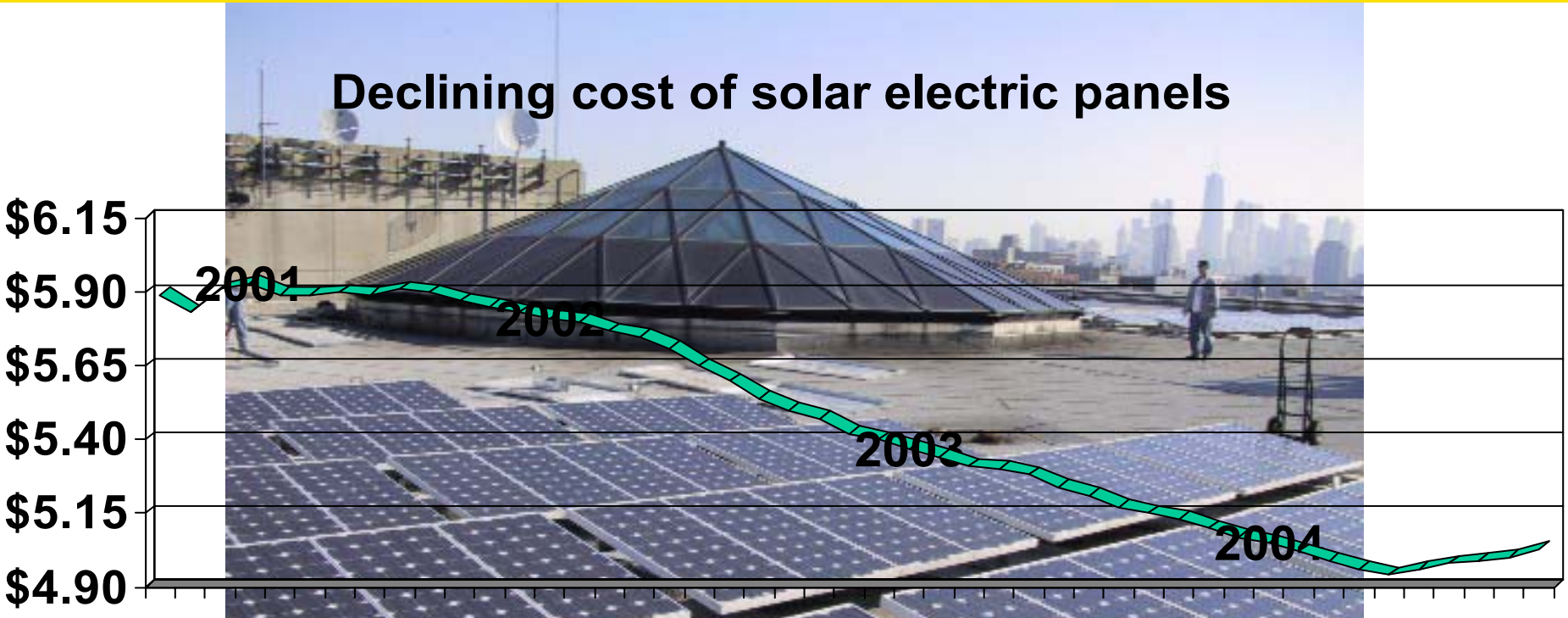
THIS GROWTH HAS CAUSED PRICE DECLINES TO SLOW



Panels drop ~7%/yr, Systems drop ~4%/yr in sustained markets (Source: Solarbuzz, Inc)

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

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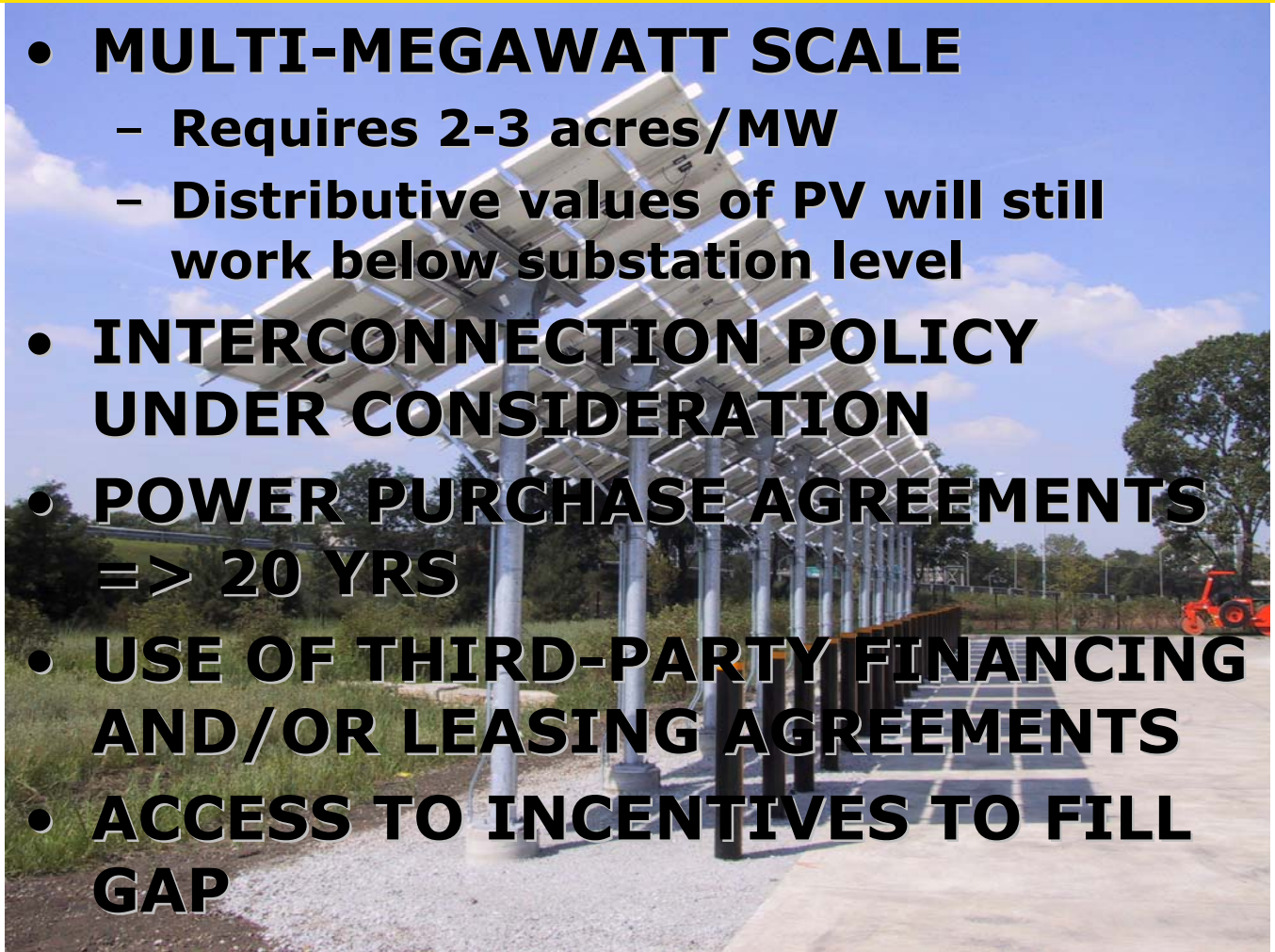
WHAT IS NEEDED FOR SIGNIFICANT PV MARKET?



- **MULTI-MEGAWATT SCALE**
  - Requires 2-3 acres/MW
  - Distributive values of PV will still work below substation level
- **INTERCONNECTION POLICY UNDER CONSIDERATION**
- **POWER PURCHASE AGREEMENTS => 20 YRS**
- **USE OF THIRD-PARTY FINANCING AND/OR LEASING AGREEMENTS**
- **ACCESS TO INCENTIVES TO FILL GAP**

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

WHAT IS NEEDED FOR SIGNIFICANT PV IMPACT?

ILLINOIS SUSTAINABLE ENERGY PLAN	8% of electricity generated from renewable energy sources 2% from non-wind sources
Illinois electricity generated in 2002 (USEIA State Electricity Profiles 2002 Table 1. Summary Studies)	188,054,449 MWh
0.1% to be generated by photovoltaic systems by 2012	188,054 MWh
Capacity required @ 1497/MWh-MWac	126 MW peak AC
0.2% generated by 2012	252 MW peak AC
0.5% generated by 2012	630 MW peak AC

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

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WHERE WOULD THESE SYSTEMS GO?

- Open lands not impacted
- Brownfields
- Right-of-ways
- Landfills
- Parking lots
- Power plant buffer zones
- @ 2-3 acres/MWac, need 250-2000 acres, or ½ to 3 square miles
- Proximity to transmission at or below substation level

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

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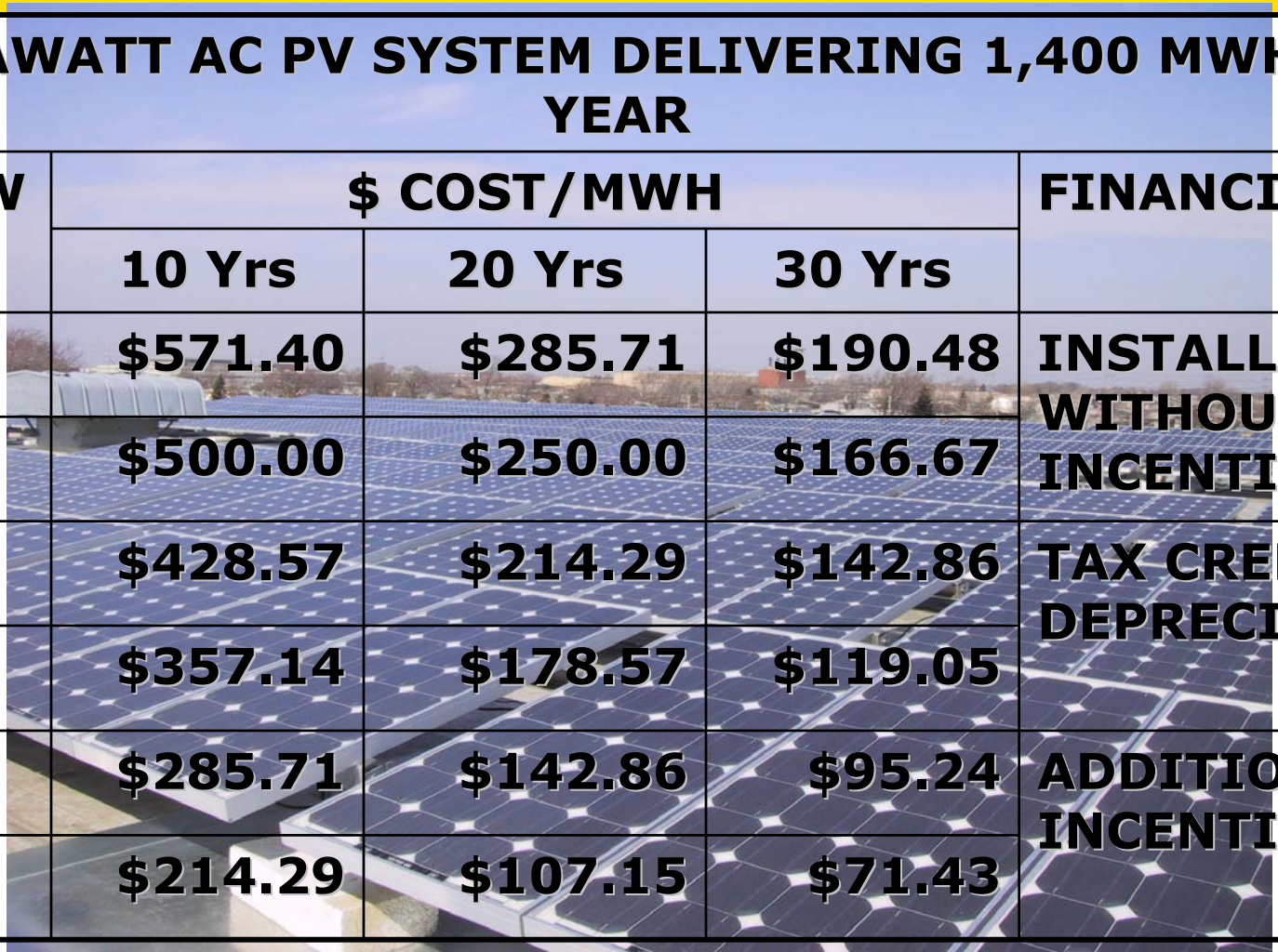
INSTALLATIONS ON A MULTI-MEGAWATT SCALE



1 MEGAWATT AC PV SYSTEM DELIVERING 1,400 MWH AVG YEAR				
COST/MW $MM	$ COST/MWH			FINANCING
	10 Yrs	20 Yrs	30 Yrs	
$8	$571.40	$285.71	$190.48	INSTALLED WITHOUT INCENTIVES
$7	$500.00	$250.00	$166.67	
$6	$428.57	$214.29	$142.86	TAX CREDITS, DEPRECIATION
$5	$357.14	$178.57	$119.05	
$4	$285.71	$142.86	$95.24	ADDITIONAL INCENTIVES
$3	$214.29	$107.15	$71.43	

ROLE OF PHOTOVOLTAIC ELECTRICITY IN ILLINOIS SUSTAINABLE ENERGY PLAN

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WHAT WOULD BE EMPLOYMENT IMPACT?

NUMBER OF JOB-YEARS CREATED FOR FIVE YEAR PERIOD

	SCENARIOS OF % OF ELECTRICITY FROM PV BY 2012		
	0.1%	0.2%	0.5%
# MWs 5-yr period	126	252	630
#MWs/yr	~25	~50	~125
Jobs-yrs in design, contract and service per yr	397	794	1,985
Include job-yrs in panel and component manufacturing	767	1,534	3,835
Include job-yrs in cell and basic material manufacturing	887	1,774	4,435

Renewable Energy Policy Project "The Work That Goes Into Renewable Energy", 1999, www.repp.org

THANK YOU!

Mark Burger

Spire Solar Chicago

Chicago Center for Green Technology

445 North Sacramento Blvd

Chicago, IL 60612

773-638-8700x228

mburger@spirecorp.com

www.spiresolarchicago.com

ALLIANT ENERGY™

Renewable Portfolio Standard Working Group Meeting

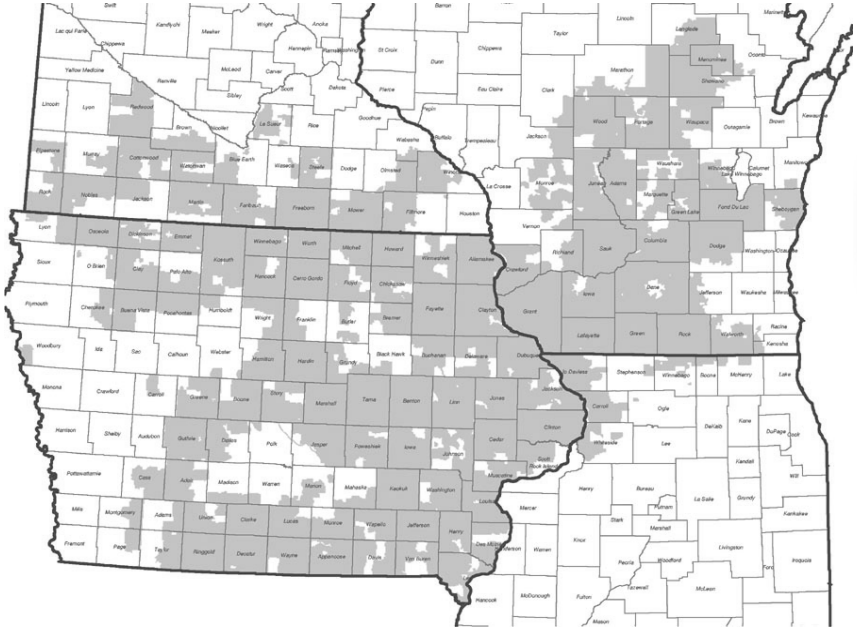
Illinois Commerce Commission
Chicago

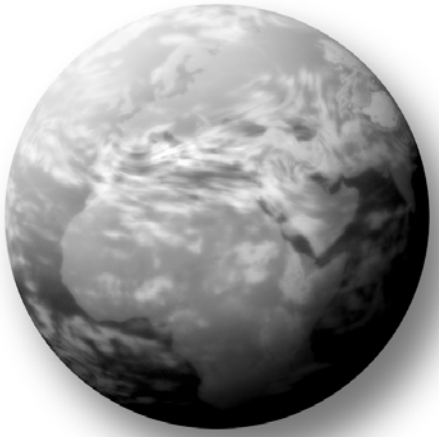
April 5, 2005

Bill Johnson, Alliant Energy

Who is Alliant Energy?

- **Alliant Energy serves 1.2 million customers throughout a four-state territory (Iowa, Wisconsin, Minnesota and Illinois)**
- **Serve approximately 53,000 farm customers.**





ALLIANT ENERGY.

Generation Diversity

- Coal
- Natural Gas
- Renewable Energy Sources
- Distributed Resources

Alliant Energy's - Wisconsin Biogas Project

- 10 MW generation
- Farm, food processor, landfill & sewage treatment sources
- 3-year project
- 5-year contracts
- 800kW max. per location
- 6 cent/kWh (customer owned), 4.9 cents on-peak, 8.0 cents off-peak

ALLIANT ENERGY.

10 Megawatts ?

- 50,000 tons of coal each year
- 500 coal cars
- 5 unit trains
- Enough electricity for ~11,000 homes

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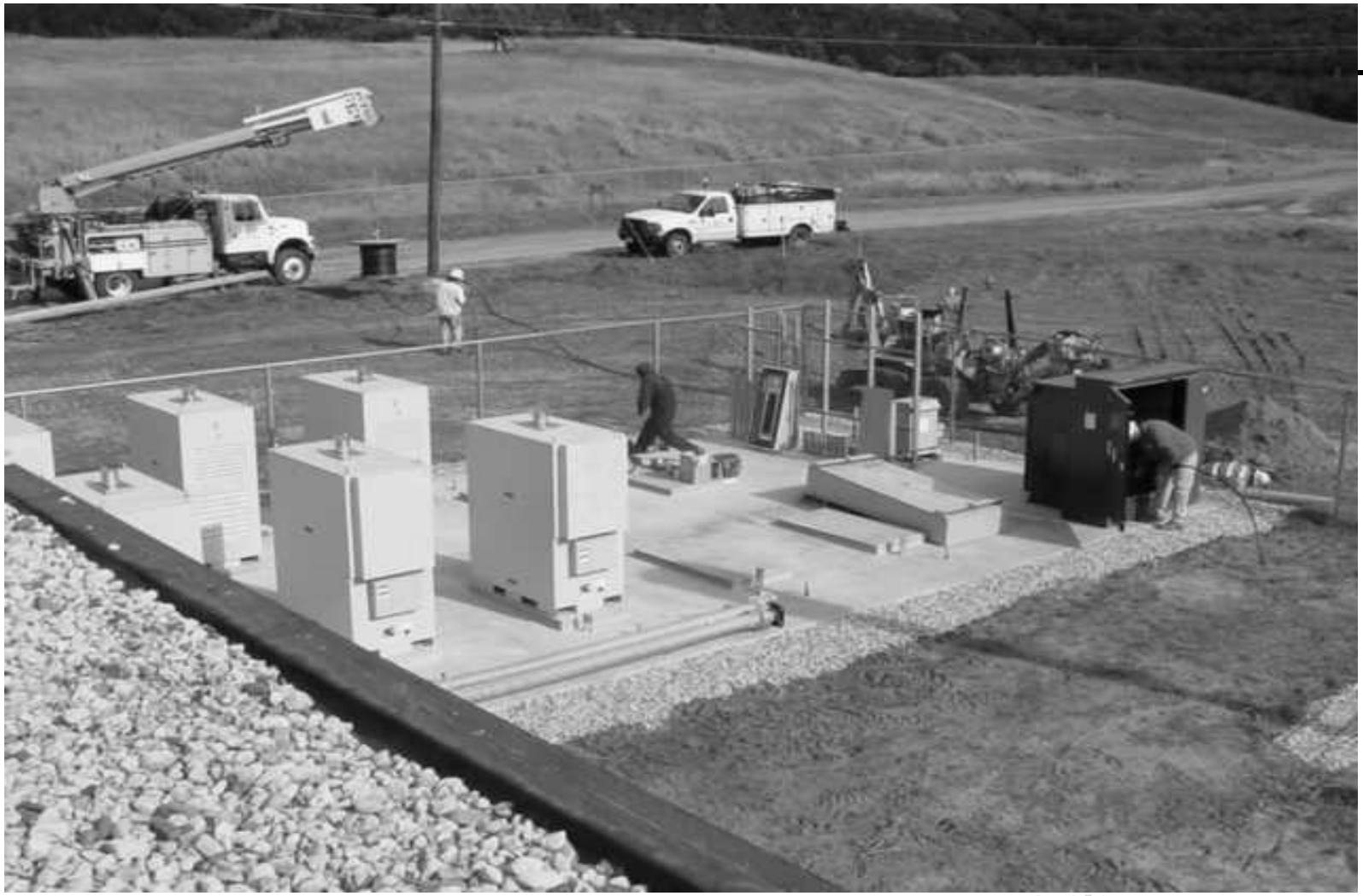
Landfill Gas



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Food Processing Industry, Environmental Issue

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Deere Ridge Farm, Anaerobic Digester, Amherst, WI

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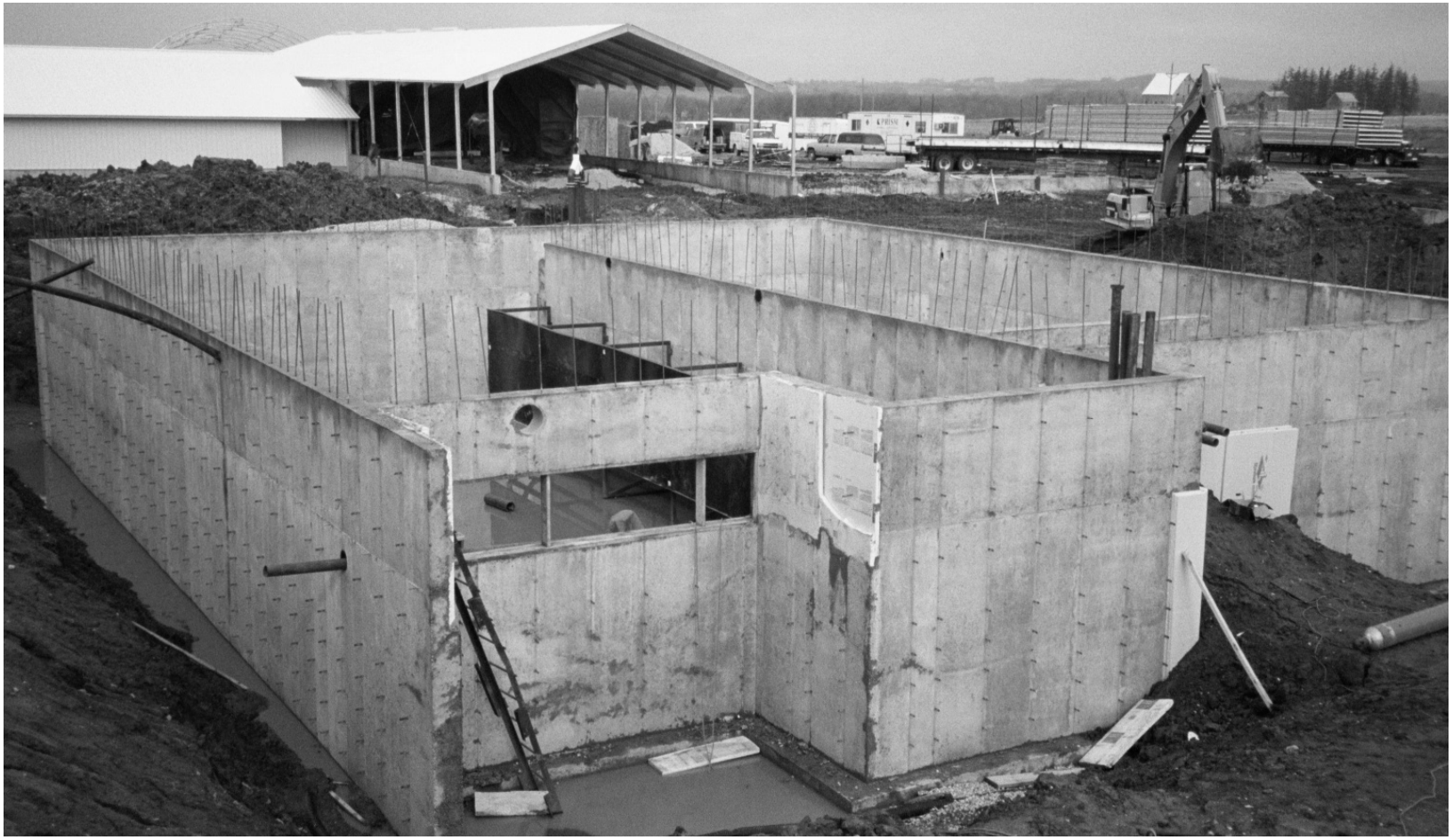
Plug Flow
Construction Overview



ALLIANT ENERGY.

Heat Recovery System

- Utilize heat from exhaust of engine or microturbine
- Heat digester
- Heat buildings
- Heat for anything that needs hot water
- Absorbtion refrigeration

Benefits of an Anaerobic Digesters

- Reduce odors 90-95%
- Use gas to generate electricity for use or sale
- Use the heat from the engine to heat digester and for other uses.
- Valuable byproducts

  -Can use solids for high quality compost or bedding
- Reduce greenhouse gas emissions
- Weed seed and fly pest control

ALLIANT ENERGY.

OTHER EMERGING BIOMASS OPPORTUNITIES

Biomass Energy Feedstocks

Midwest Biomass Sources

Grain Processing	Livestock Waste	Bio-Crops &Ag-Waste	Food Processing	Municipal Waste
•Ethanol	•Dairy	•Poplar Trees	•Cheese	•Landfills
•Wet Corn Milling	•Swine	•Switch grass	•Vegetables	•Waste Treatment
•Soybean	•Poultry	•Corn Stover	•Cattle/Hog Processing	•Refuse
			•Other	

Midwest Has Majority of Biomass Fuel in US

ALLIANT ENERGY.

Crop Residue Opportunity

- 116 million tons in corn belt (2001 DOE estimate)
- 150 million tons in USA, 80% as stover
- Options for crop residue
  - **Power generation**
  - **Steam generation**
  - **Dry mill ethanol plants**
  - **Direct conversion to liquid fuels**

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Chariton Valley Switchgrass Project

- Substituting coal for switch grass at 5% level
- 600MW plant, Ottumwa, IA
- Potential for 50,000 acres of switchgrass

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Ethanol and Biodiesel Production

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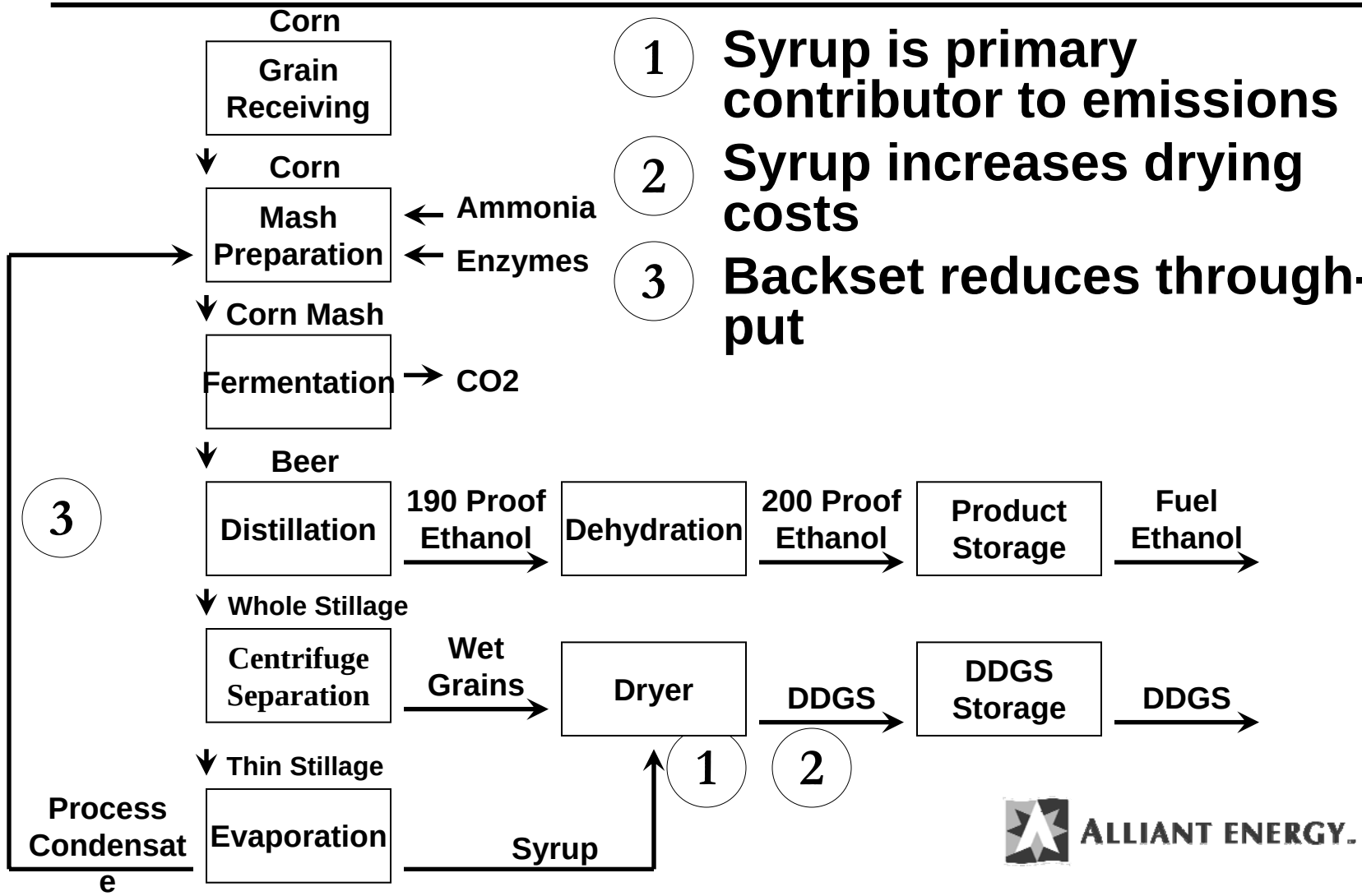
A Look At The Ethanol Process



1. Syrup is primary contributor to emissions
2. Syrup increases drying costs
3. Backset reduces through-put

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Combustion Application

The Technology:

Fluidized Bubbling Bed combustion (FBB) with waste heat recovery boiler.

The History:

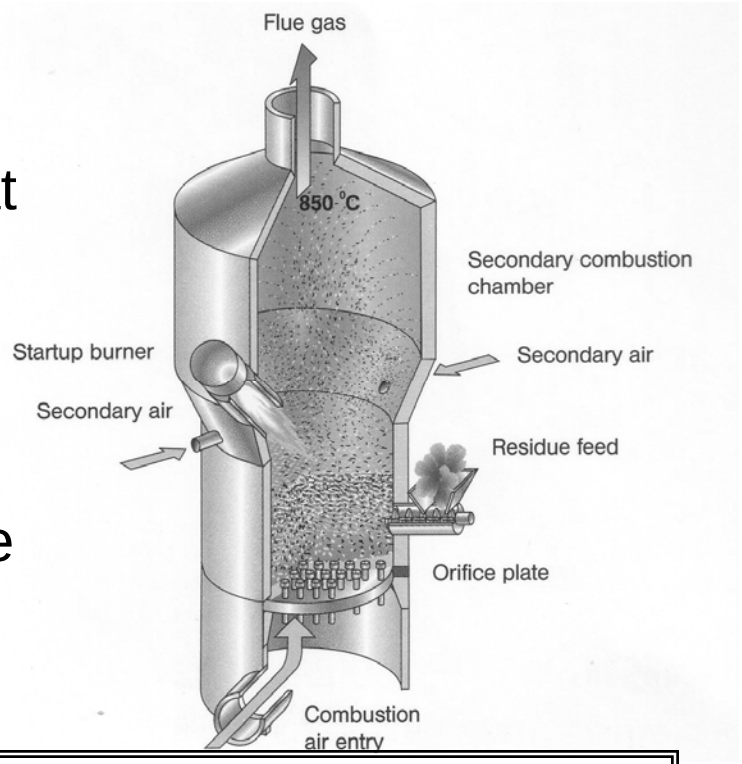
FBB is used for incineration of municipal waste sludge and pulp mill liquors to extract energy value and mineral recovery.

Municipal Waste Sludge:

- 70% nom. moisture content
- 8000 btu/dry lb energy content

The Application:

Patent Pending



Ethanol Corn Syrup
- **70% nom. moisture**
- **9000 btu/dry lb**

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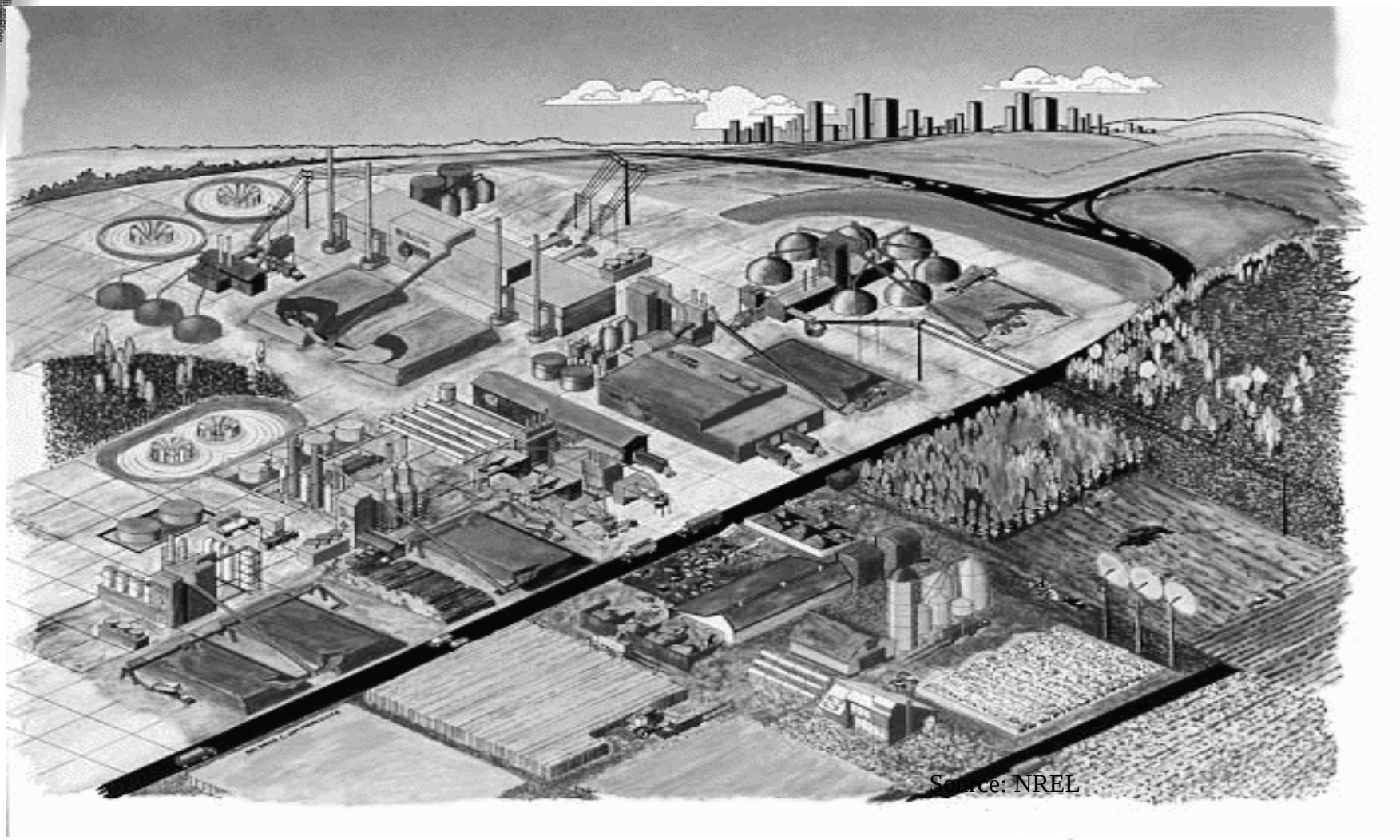
BioRefinery



Source: NREL

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Biomass Challenges

Biomass Project Success Requires

- Favorable power purchase agreements
- Predictable cash flow
- Secondary drivers: waste management or odor control
- Market for secondary products
- Tradable “green qualities”
- Incentives de-coupled from cost of fossil fuels
- Access to financing

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Policy Assistance

Reward risk while encouraging demand

- **Local- tax incremental financing**
- **State-federal, purchase of "green" power**
- **Emission/nutrient management credits**
- **Voluntary green energy purchase tax credits**
- **Energy subsidies, such as ethanol and wind have**
- **CRP allowance for harvest of bio-fuels**

William A. Johnson

Manager, Agricultural Compliance

Alliant Energy

2777 Columbia Dr.

Portage, WI 53901

(608) 742-0824

billjohnson@alliantenergy.com

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Opportunities for Bio-energy

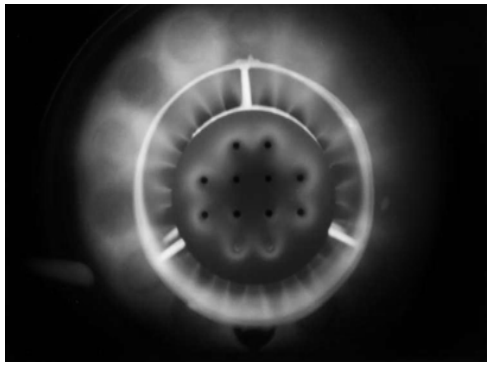
> Daniel S. LeFevers
Gas Technology Institute

daniel.lefevers@gastechnology.org

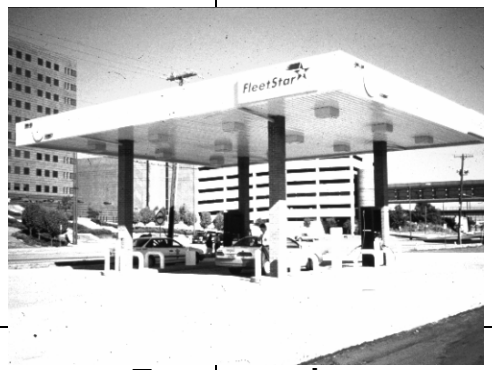
GAS TECHNOLOGY INSTITUTE

- Independent Not-for-Profit R&D Organization
  - Labs, test facilities, library, classrooms, offices
  - 300,000 sq-ft facility on an 18-acre research campus
  - 350 employees (70% engineers and scientists

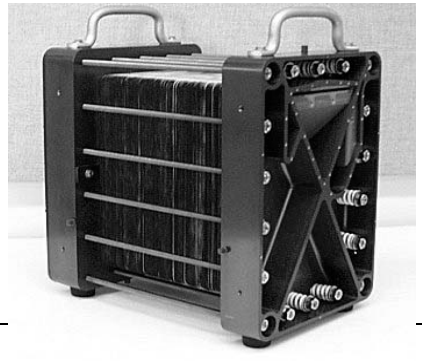
Pipeline Materials



Combustion



Transportation



Fuel Cells

Distributed Generation

Biotechnology

Major Lines of work

- Perform contract research, development and demonstration projects
- Manage technology development programs for others (e.g., energy industry, state agencies)
- Provide technical services for clients (performance and materials testing, technology and market assessment)
- Provide education and training (technical, institutional and business)
- Commercialize new energy related technologies through a variety of business arrangements

Commercialization and Intellectual Property Development

- GTI averages 20 – 25 technology licensing agreements annually
- Over 400 existing products have GTI developed technology
- GTI averages 20 – 25 patent applications annually
- GTI currently holds over 800 patents

Why is GTI interested in Renewable Energy?

For nearly 50 years, GTI has strategically pursued development of gasification technologies

> To ensure full-capacity utilization of gas supply infrastructure

> Extend the life of existing commercial natural gas resources and develop the technology base and infrastructure for sustainable supply of clean gaseous fuels.

Bio-mass Gasification Background

- Advanced Gasification of Biomass is Environmentally Sound
- Industry and Government Agencies may Cost-share Development
- gaseous fuels could be used at industrial sites with no access to natural gas.

Impact on Economy and Energy Security

- National commitment to develop fossil fuels during the first half of the 20th century has led to abundance of fossil fuels and economic prosperity during the latter half of the 20th century
- Similar commitment now in biomass can lead to energy prosperity during the latter half of 21st century
- In Illinois Corn Stover represents substantial opportunity for electricity production
  - 100 tons per day = 5MW
  - Midwest States potential 10 – 15 gigawatts
- Illinois Municipal Waste Water could provide approximately 2,000,000 MW hours of electricity.
- Applications/where feasible should use CHP systems to increase efficiency

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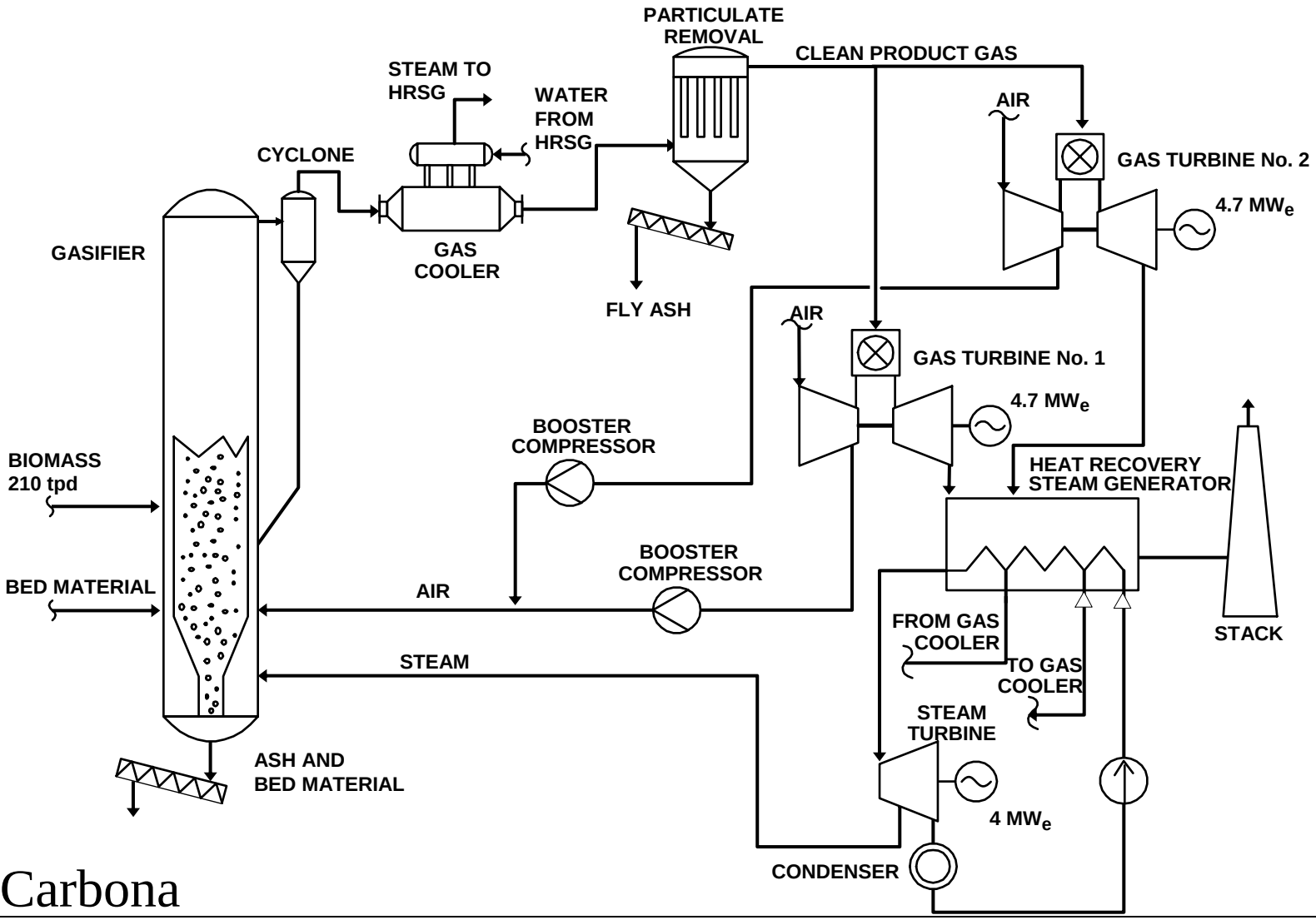
IGCC Project in Andhra Pradesh, India



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Carbona

India IGCC Proces Design Basis

Fuel

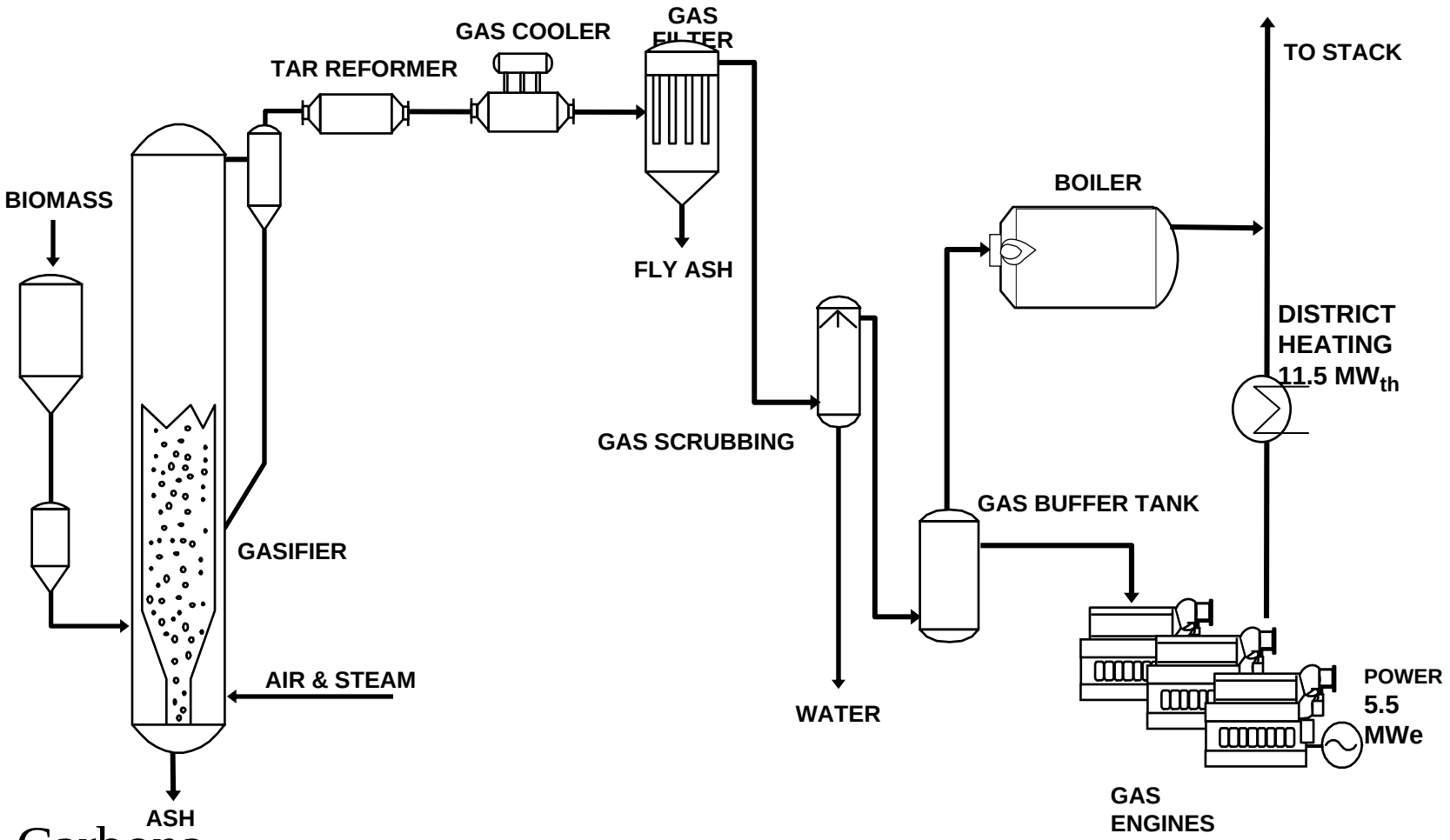
- **Wood chips and woody biomass from plantations**
- **Moisture content 20 wt %**
- **9,000 Btu/lb (dry)**
- **Feed rate 210 tons per day**

Power

- **Gas turbines 9.5 MWe**
- **Steam turbine 4.0 MWe**
- **Net power 12.5 MWe**

Net Electric Efficiency: 37%

Skive Project, Denmark



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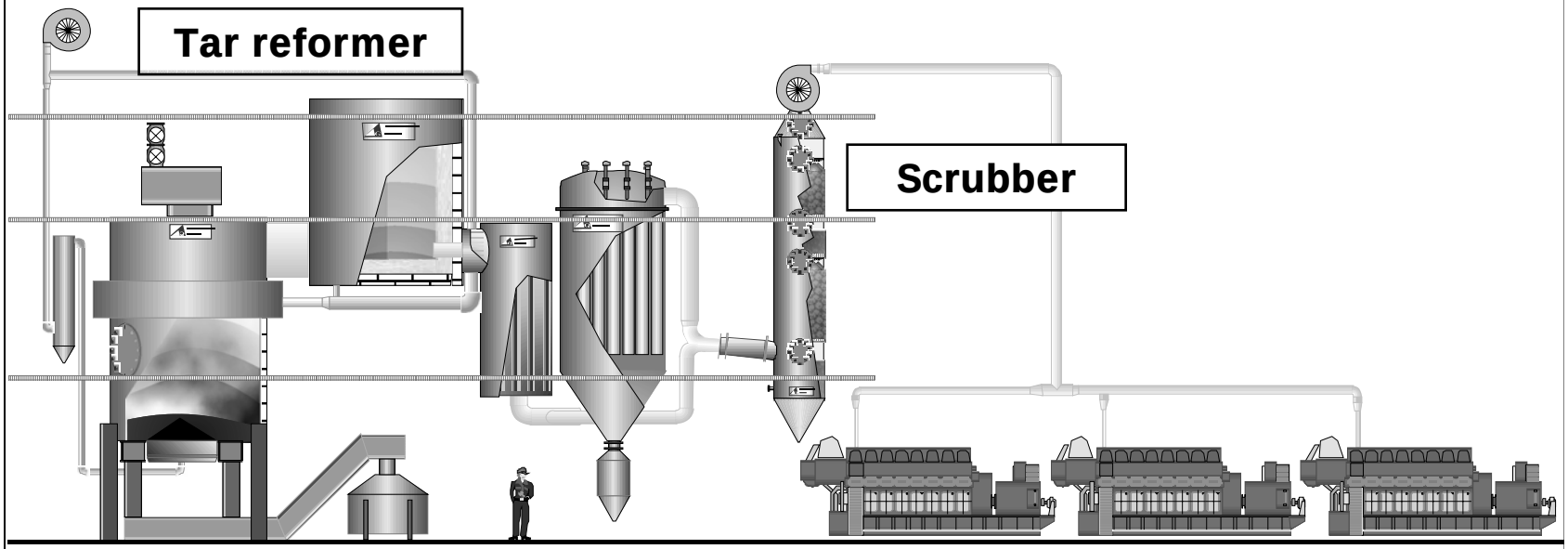
Carbona

Skive Project Design Basis

- **Fuel:**
  - **Wood pellets**
  - **Moisture content 9.5 wt%**
  - **10,000 Btu/lb (dry)**
  - **Feed rate: 110 tpd**
- **Power and heat:**
  - **Power generation max. 5.4 MW**
  - **District heat 11.5 MW**
- **Plant Efficiency:**
  - **Electrical efficiency 28 % (LHV)**
  - **Overall efficiency 87 % (LHV)**

Novel Power Plant: 1.8 MWe + 3.3 MWth

- Kokemäki, Finland
- electric efficiency 28 %
- supplied by Condens OY



Novel gasifier

Gas cooler and Filter

3 Gas engines

The Kokemäki Novel CHP Plant

- **Integrated to the existing Kokemäki district heating plant**
- **Fuel drying by waste heat from the plant**
- **Wood fuel**

Fuel capacity	**7200 kW**
Power output	**1800 kW_e**
District heat output	**4300 kW**
Heat output to the fuel dryer	**430 kW**

- **Plant commissioning underway**

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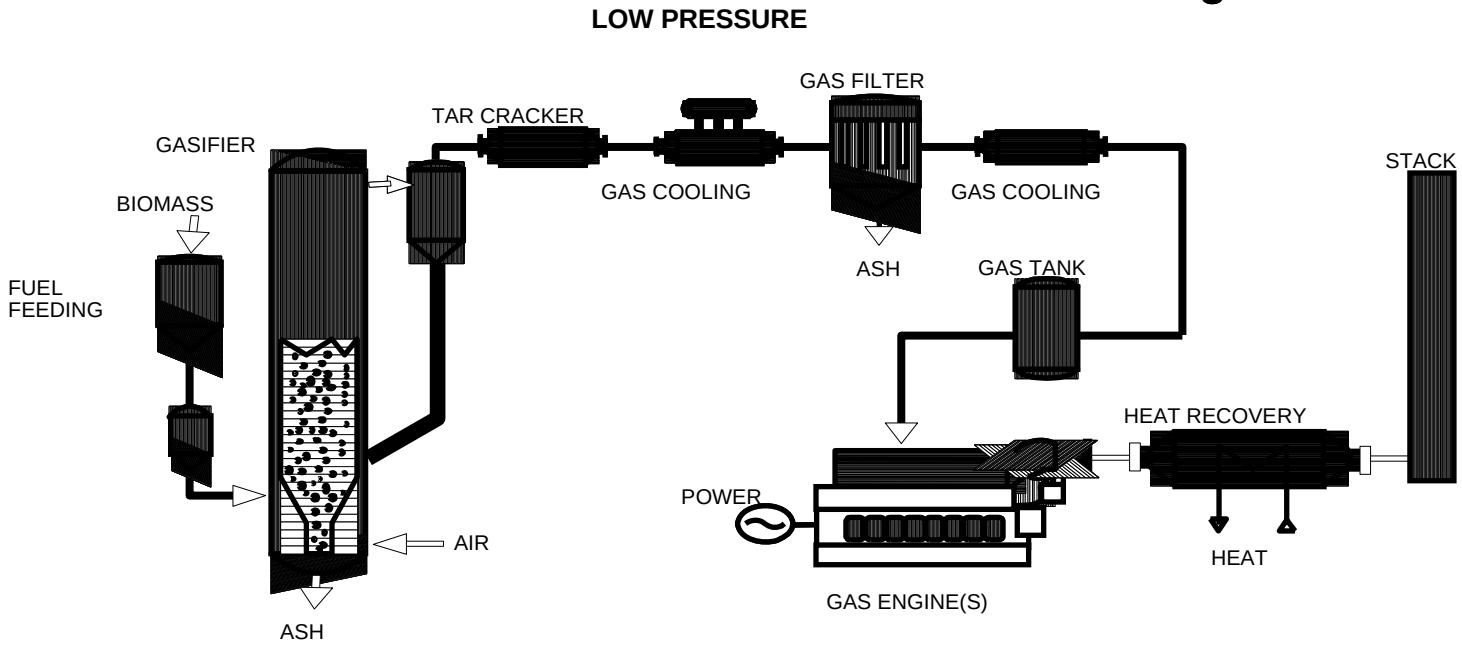
CHP Forest Residue Project

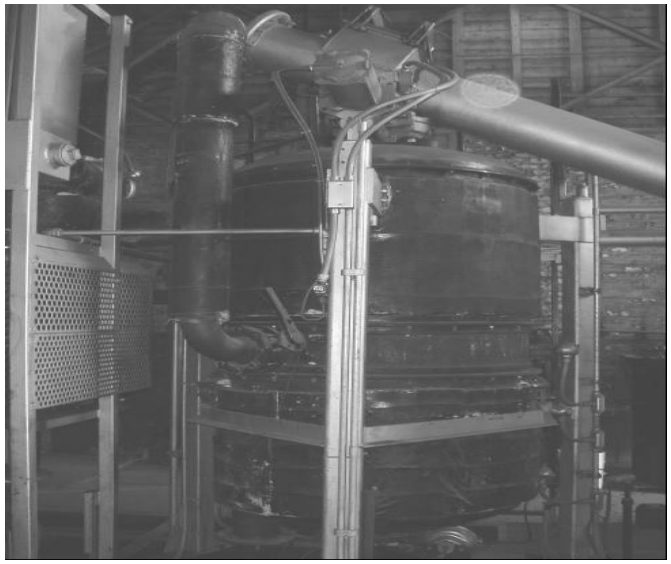
- 12 tons per day forest residue
- Produce 600 kWe, 1,800 kWth
- Electric Efficiency 28%, overall 85%
- Transportable unit
- Project team: GTI, Carbona, TSS

Gasification **- Gas Engine**



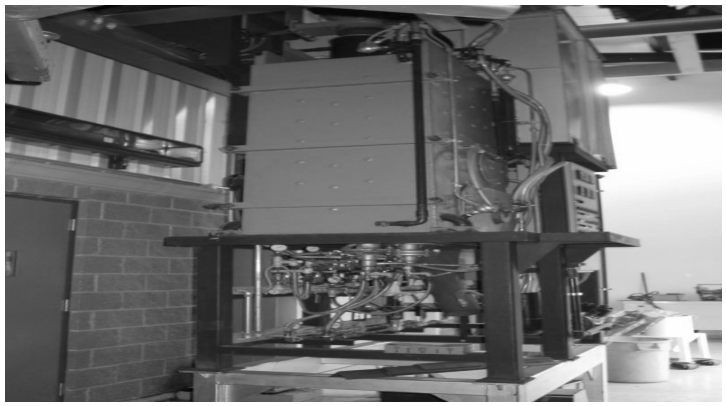
gasifier | **Gas cooler and Filter** | **Gas engine**

Other Biomass Gasification Projects

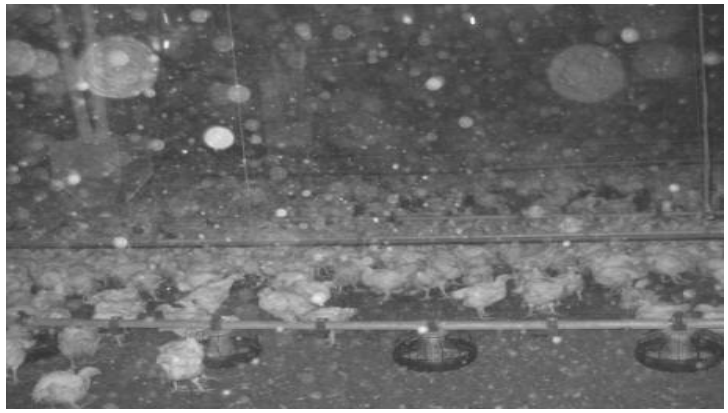


2 ton per day Biomass Gasifier for H_2 in UM, Minnesota, Xcel Energy

60 ton per day Chicken Litter Gasifier in Georgia, ERI & USDA



Biomass Gasification Tar and Oil Catalytic Reforming, USDOE EE

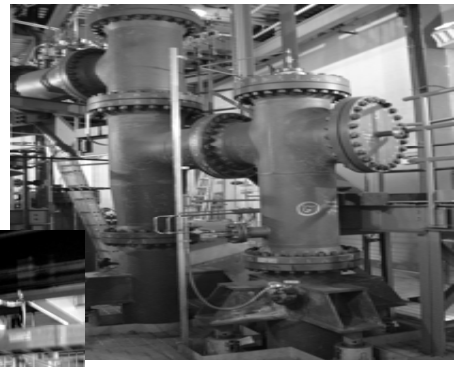
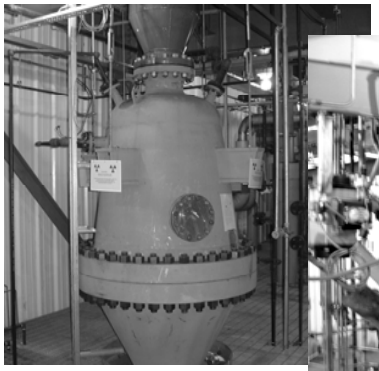


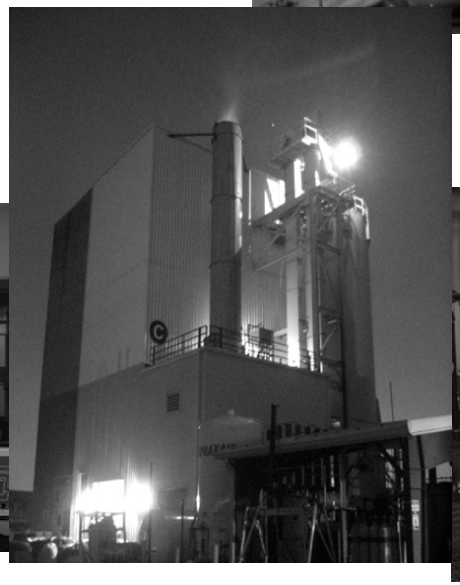
GTI Gasification R&D Facility

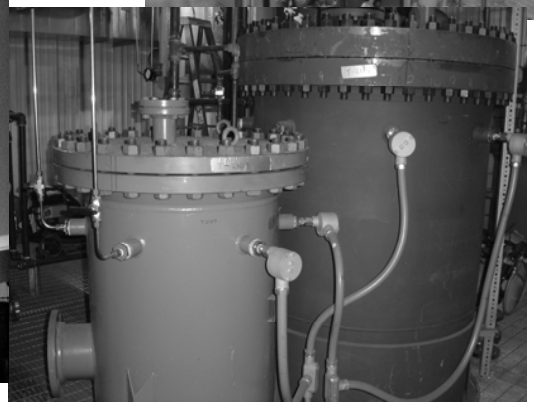
- **GTI's State-of-the-Art Gasification Pilot Plant Test Platform**
- **Flexible Fuel Capability**
  - **Coal: ~ 10-20 tons/day**
  - **Biomass: ~ 20-40 tons/day**
- **Operational Flexibility**
  - **Pressure ~ 400 psig**
  - **Air/Oxygen Operation**
- **Plug and play systems integration and testing (Feed, Gasifier, Cleanup, End-use)**
- **Commissioned in Dec 04**

Flex Fuel Gasification R&D Facility

- **Solids feed system**
- **Gasifier**
- **Cyclones**
- **Gas conditioning unit**
- **Emissions & Controls**



Power from Animal Waste

What are the issues and opportunities?

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Challenges for the CAFO Industry

- **Manure volumes per site are growing.**
  - **Larger feeding operations**
  - **Automation is tripling the volumes (H_2O)**
- **Rising energy costs in some areas of the U.S.**
- **OSHA worker safety issues from NH_3**
- **Animal mortality rates rising**
- **Groundwater & Surface Water Contamination**
  - **NO3**
  - **Organics**
  - **Pathogens**

Advanced Anaerobic Digestion Can Help. . .

- Maximize the potential benefits that can be obtained from the anaerobic digestion of animal manure
- Provide a potential environmental solution for the swine raising industry for the improved protection of human health and the environment and for the reduction of animal mortality

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Potential Benefits Offered by Anaerobic Digestion

- Reduced disposal for sludge solids
- Energy generation
- Nutrient conservation
- Groundwater protection
  - Nitrates
  - Organics
  - Pathogens
- More water reuse / less wastewater
- Reduced animal mortality
- Improved worker exposure & safety

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Is your farm right for a Waste to Energy system?

- Minimum size - 300 head of Dairy Cows or 2000 Swine (50kw)
- Predictable Manure Production
  - Are these animals in confinement year around
  - Does you animal population fluctuate by more than 20% a year.
- Manure should end up at one collection location
- Manure should be free of excess, bedding, sand, rocks and other materials
- Will need separator if sand bedding is prevalent

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Is your farm right for a Waste to Energy system? Continued . . .

- Do you have a need for the energy and/or heat recovery?
- Is your manure compatible with bio-gas technology?
  - 2% to 10% bio-solids is best
  - How much water management is necessary?
- Can you. . .
  - Pay regular attention to system operations?
  - Provide necessary repairs and maintenance?
- Do you. . .
  - Have the desire to see the system succeed?

Utility Programs to encourage waste to energy deployment on farms

- Special rates to encourage electric production to help meet renewable portfolio standards
- Involvement with farmers to respond to federal RFP's for renewable energy grants
  - USDA
  - USDOE
- Utility Ownership of Energy Production Equipment on Farms

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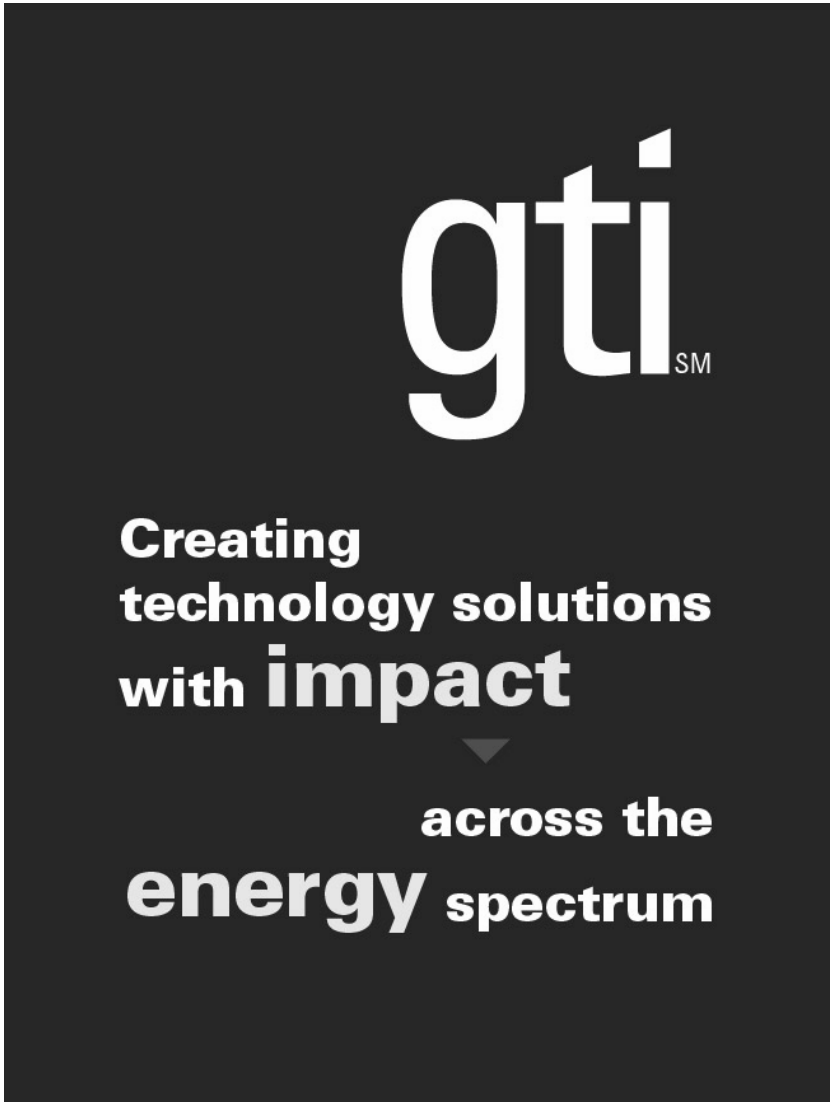
What will move this market?

- Education for Farmers, Utilities and businesses
- Realization of stricter future regulations
- Financial benefits for emissions reductions
- Advancements in waste to energy technologies and systems
- Investments by larger companies in systems development and deployment
- Commitment by CAFO operators and government

Observations (issues) regarding Status of Marketplace

- Unsophisticated systems deployment
- Minimal systems technology advancements occurring with Federal and State Grants
- Farmers like to “do it themselves”, least cost option almost always deployed
- Economics often based on exaggerated information regarding operational reliability and gas production
- Little or no movement to create “off the shelf” integrated systems (Closed loop system development crucial for emission credits and future regulations)



For more information:

Daniel S. LeFevers
Associate Director, State and
Municipal Project Development

T: 847/768-0877
F: 847/768-0501
daniel.lefevers@gastechnology.org
www.gastechnology.org

gti SM

“Illinois Wind Resource Potential”

Dennis Elliott
Principal Scientist
National Renewable Energy Laboratory

Renewable Portfolio Standards Working Group
of the Sustainable Energy Plan Initiative

April 5, 2005

Illinois Wind Electric Potential (Installed Capacity)

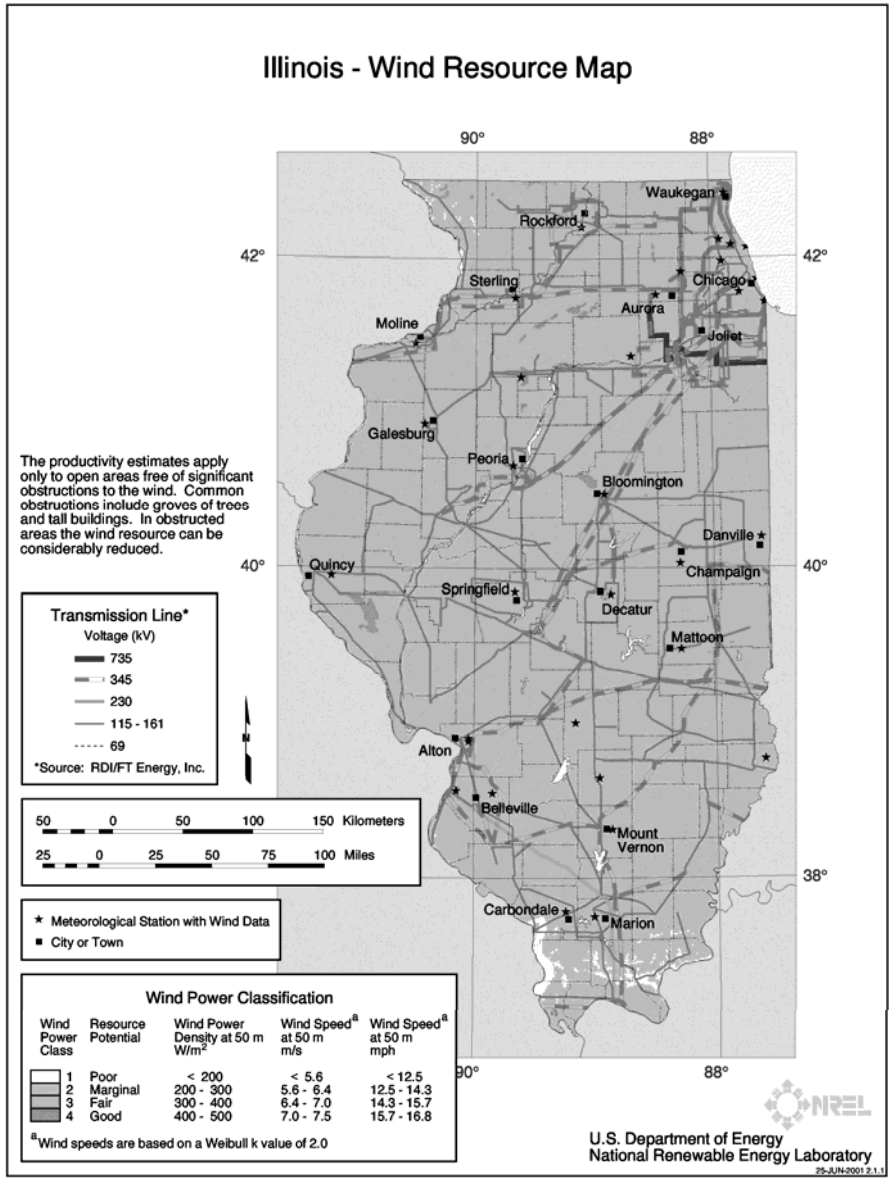
	Total before exclusions	Developable
• Class 3+	6,260 MW	5,790 MW
• Class 4	3,160 MW	3,080 MW
• Total	9,420 MW	8,870 MW

Assumes ~12 MW/sq. mile (section) of windy land area

- Class 3+ lands = 380 - 400 W/m^2
- Class 4 lands = 400 - 440 W/m^2

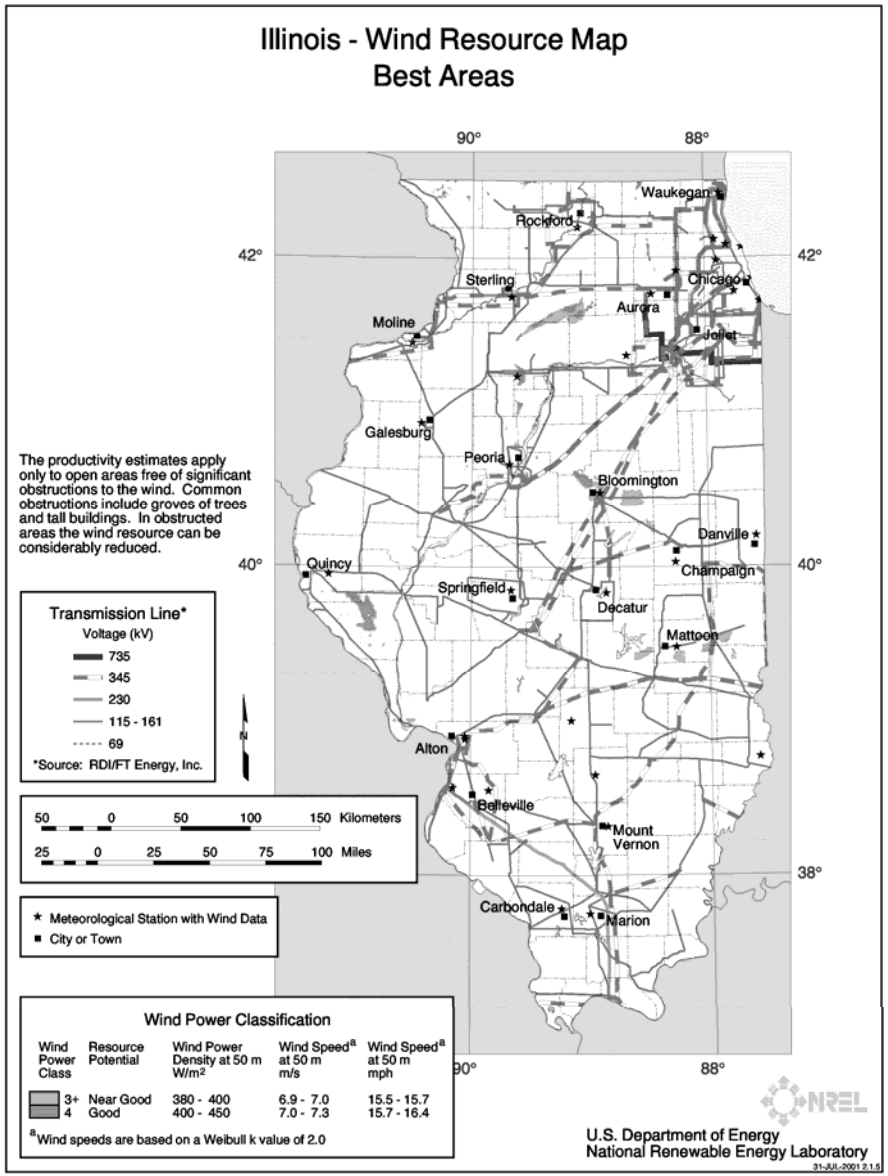
These estimates were produced in 2001. Areas excluded were: national wildlife refuges; state protected lands (natural areas, natural preserves, parks, fish and wildlife areas, and conservation areas); urban areas; and major water bodies.

Illinois Wind Resource Map (at 50-m height)



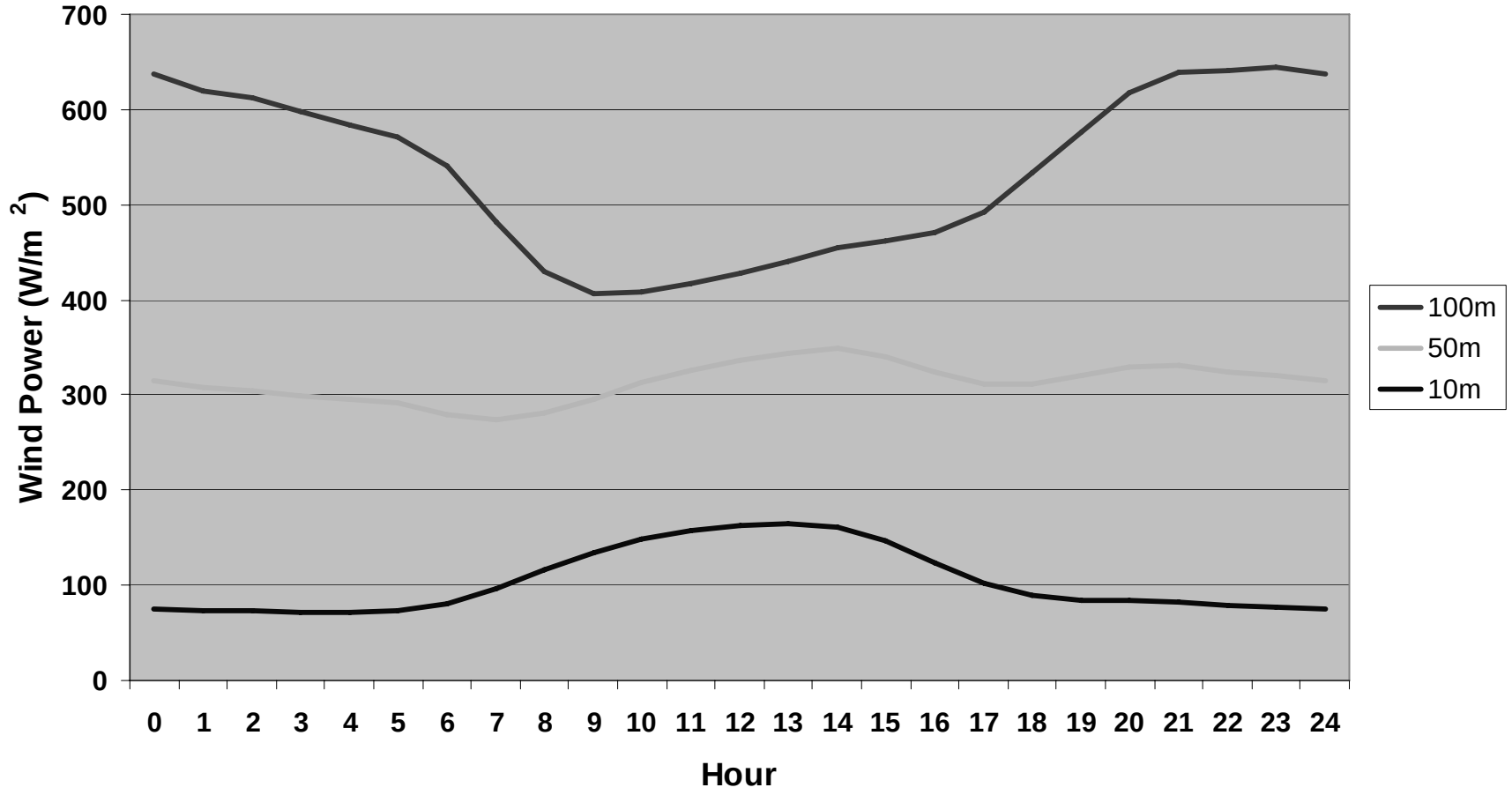
- Shows Class 4 regions where Class 2 and 3 resource was projected in the 1987 atlas
- Highest wind resource areas found in central and northern Illinois
- 3,000 more MW of potential installed capacity for Class 4 than DOE's 1991 wind electric potential study
- Estimated accuracy of new wind map
  - –Within 10% of annual speed and 20% of annual power at 80+% of individual sites

Illinois Best Areas for Wind Development



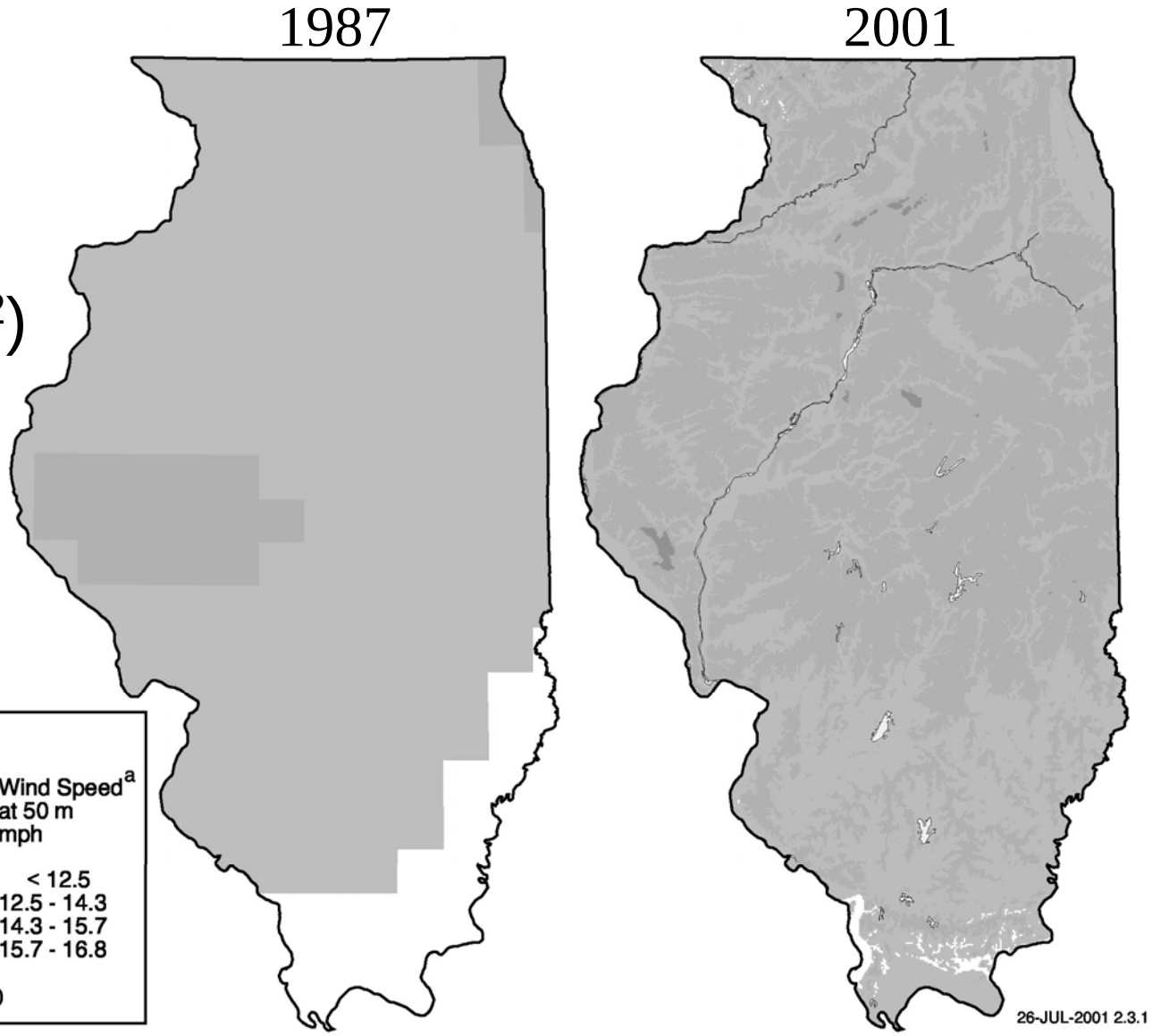
- Shows best areas for utility-scale development (Class 3+ and Class 4 areas)
- Class 3+ areas becoming suitable because of advances in wind turbine technology and taller hub-heights (e.g. 80 m+)
- 9,000 MW of potential installed capacity for Class 3+ and Class 4

Illinois Tall Tower Data



- Wind power can increase dramatically with height above ground which advanced technology and tall towers can exploit

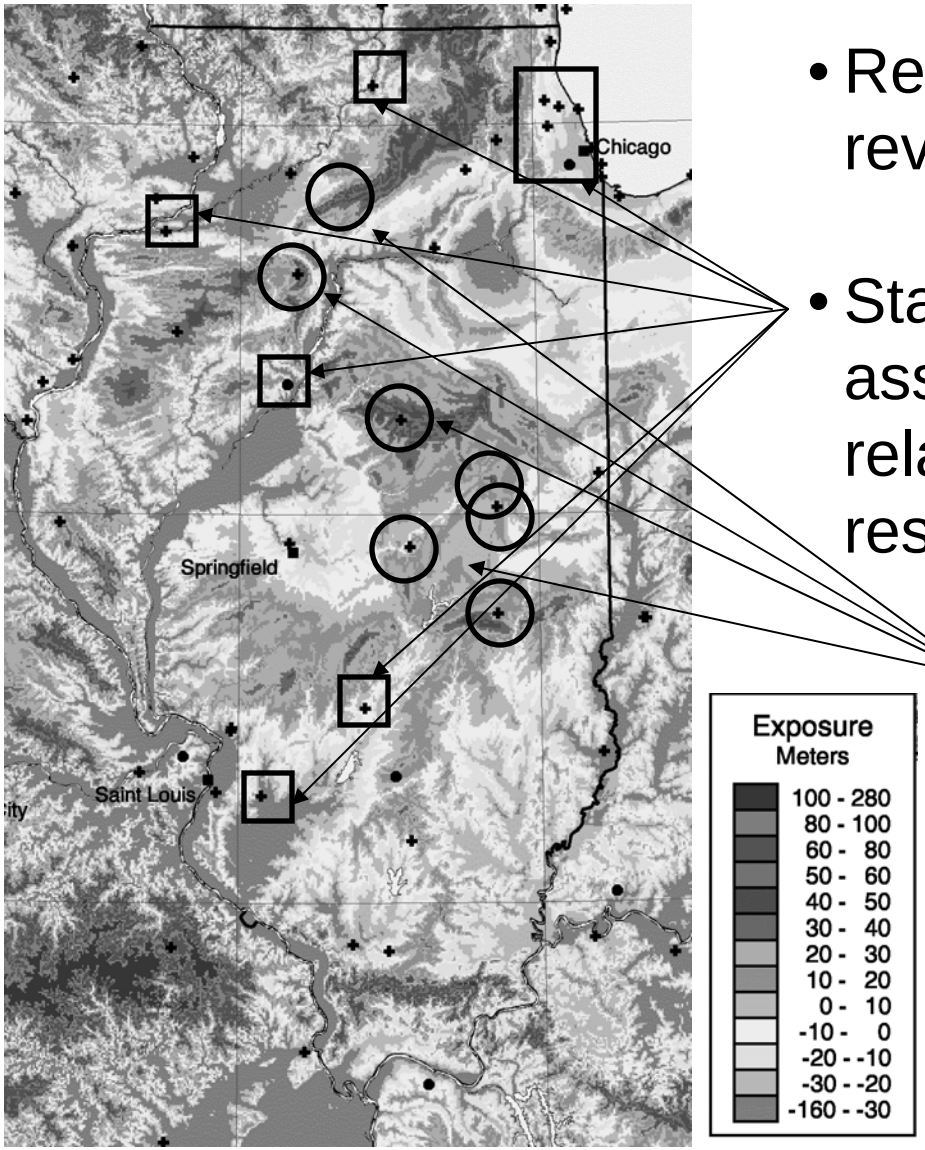
1987 U.S. Wind Atlas Map vs. 2001 High-Resolution (1-km^2) Wind Map of Illinois



Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m^2	Wind Speed[a] at 50 m m/s	Wind Speed[a] at 50 m mph
1	Poor	< 200	< 5.6	< 12.5
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8

[a] Wind speeds are based on a Weibull k value of 2.0



- Relative elevation exposure (R200) reveals that Illinois is not flat
- Stations □ used in the 1987 assessment were generally in relatively low areas of class 2 resource
- Additional stations ○ in relatively high areas of class 3-4 resource were available for the updated assessment

NREL's Wind Mapping System (2001)

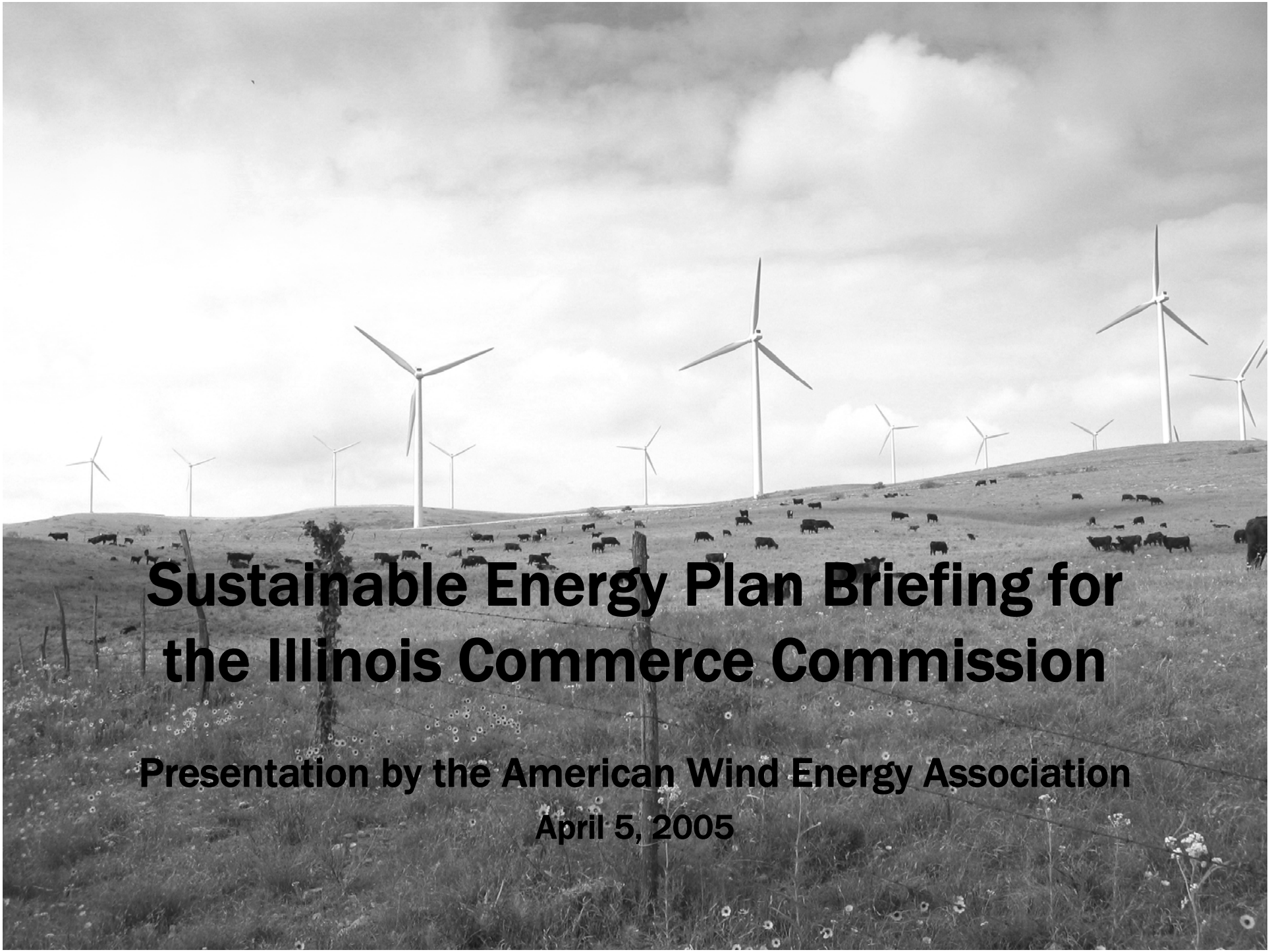
- Computerized mapping system started in 1995 to produce 1-km^2 high resolution maps
- Uses Geographical Information System (GIS) software (ArcInfo® and ArcView®) and digital terrain data (1-km^2)
- Designed for regional wind mapping (not micrositing)
- Empirical and analytical approach
- Based largely on analysis of upper-air data, tall-tower measurements, and high quality meteorological station data

Logic of Mapping System

- Meteorological data, digital geographic data, and GIS software combined in wind power calculation modules
- Uses “top down” method to adjust upper-air winds for estimating base (50-m) wind power density values
- Base wind power density values are adjusted by terrain and stability factors in model

Conclusions on Illinois Wind Resources

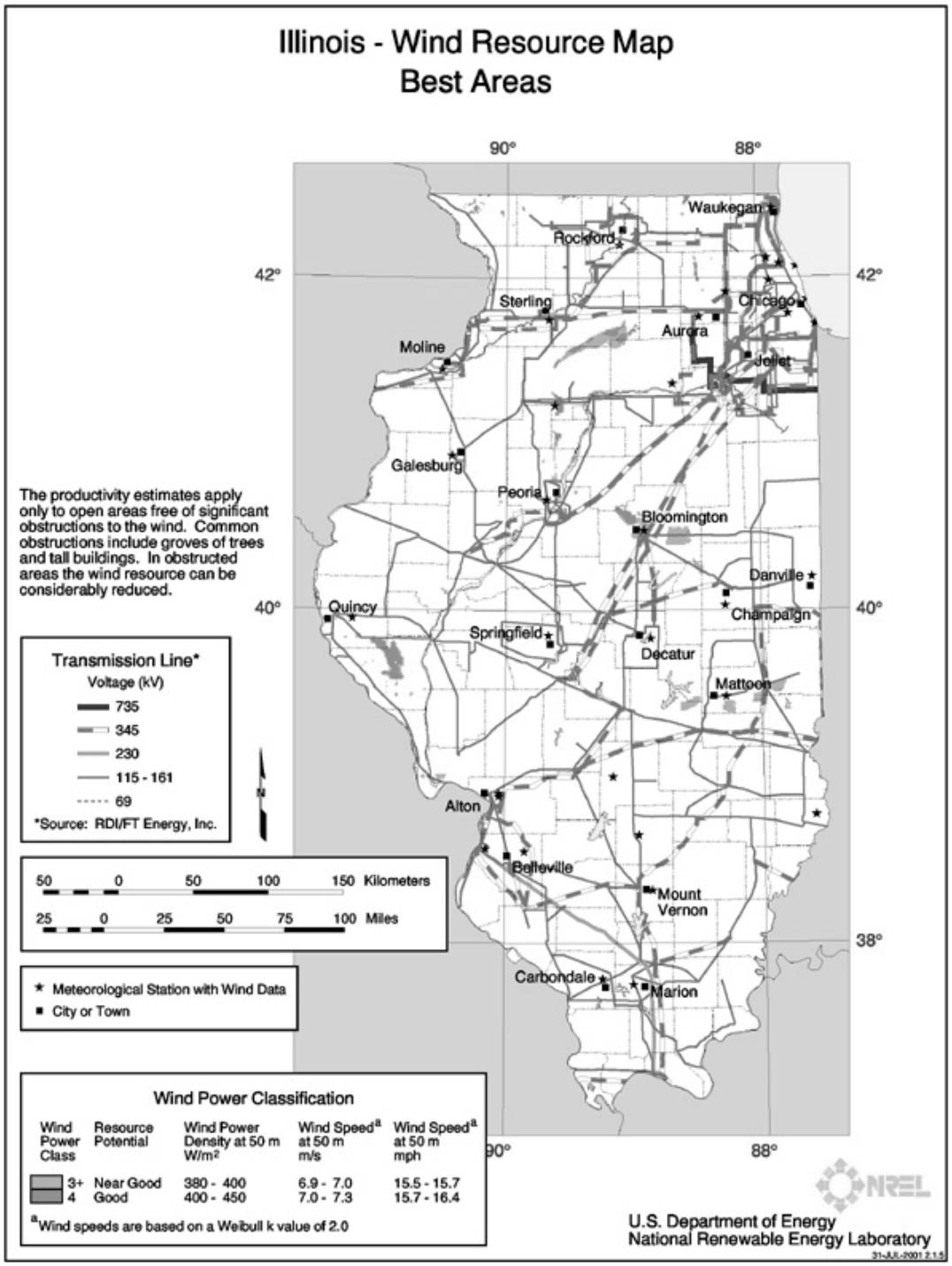
- The new wind map identifies many areas of good (class 3+ and 4) wind resource in Illinois
- Best prospects for utility-scale wind projects:
  - Elevated terrain features in the vicinity of transmission lines, in northern and central Illinois
  - Wind potential of 3,000 to 9,000 MW of installed capacity from best areas
- With advances in wind technology and taller hub-heights, class 3+ areas becoming suitable for development

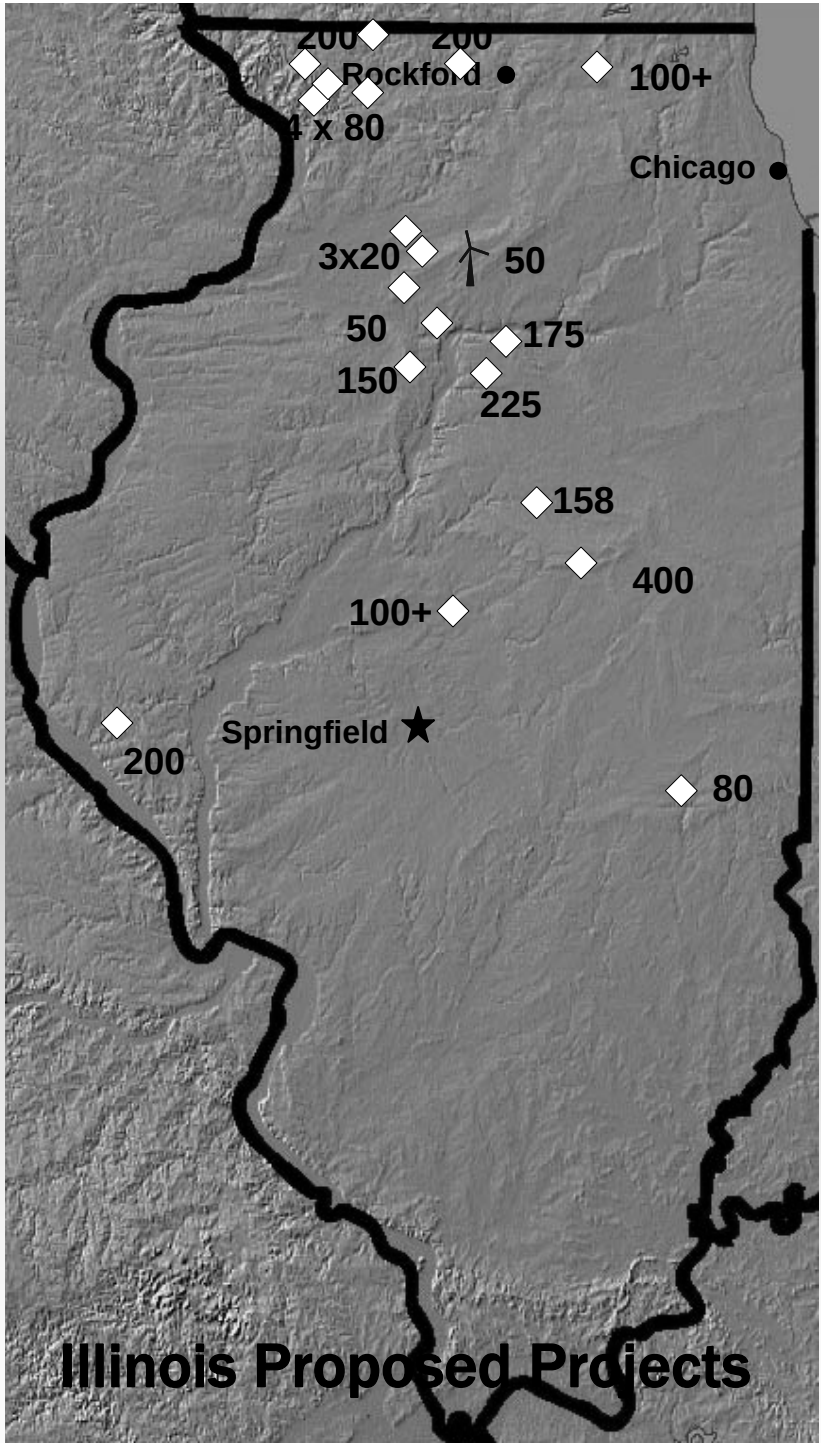


Sustainable Energy Plan Briefing for the Illinois Commerce Commission

Presentation by the American Wind Energy Association

April 5, 2005


Illinois - Wind Resource Map
Best Areas
90°
88°
42°
40°
38°
Waukegan
Rockford
Sterling
Chicago
Aurora
Moline
Joliet
Galesburg
Peoria
Bloomington
Danville
Champaign
Quincy
Springfield
Decatur
Mattoon
Alton
Belleville
Mount Vernon
Carbondale
Marion
The productivity estimates apply only to open areas free of significant obstructions to the wind. Common obstructions include groves of trees and tall buildings. In obstructed areas the wind resource can be considerably reduced.
Transmission Line*
Voltage (kV)
735
345
230
115 - 161
69
*Source: RDI/FT Energy, Inc.
N
50 0 50 100 150 Kilometers
25 0 25 50 75 100 Miles
Meteorological Station with Wind Data
City or Town
Wind Power Classification
Wind Power Class
Resource Potential
Wind Power Density at 50 m W/m²
Wind Speed[a] at 50 m m/s
Wind Speed[a] at 50 m mph
3+ Near Good 380 - 400 6.9 - 7.0 15.5 - 15.7
4 Good 400 - 450 7.0 - 7.3 15.7 - 16.4
[a]Wind speeds are based on a Weibull k value of 2.0
NREL
U.S. Department of Energy
National Renewable Energy Laboratory
31-JUL-2001 2:15


200
200
Rockford
100+
4 x 80
Chicago
3x20
50
50
175
150
225
158
400
100+
Springfield
200
80
Illinois Proposed Projects

Transmission Queue

Queue Num	Queue Date	Control Area	County	Capacity (MW)	Point of Inter-connection	In Service Date	Facility Type
37544-01	15-Oct-02	CE	Lee	20	Sublette Wind Farm	DEC '04	Wind
37549-01	20-Oct-02	CE	LaSalle	25	West Brooklyn Wind	DEC '04	Wind
37678-01	26-Feb-03	CE	Stephenson	80	Baileyville Wind Farm	JAN '04	Wind
37726-01	15-Apr-03	CE	Stephenson	80	Freeport Wind Farm	DEC '04	Wind
37726-02	15-Apr-03	CE	Stephenson	80	Lena Wind Farm	DEC '04	Wind
37757-01	16-May-03	CE	Woodford	158	Benson Wind Farm	JUN '05	Wind
37838-01	5-Aug-03	CE	Stephenson	15	Pearl City Wind Farm	JUN '05	Wind
37860-01	27-Aug-03	AMRN	Coles	80		DEC '05	Wind
37909-04	15-Oct-03	CE	Stark	150	Camp Grove	SEP '05	Wind
37916-01	22-Oct-03	IP	Woodford	80		OCT '05	Wind
37963-02	8-Dec-03	CE	Lee	20	West Brooklyn II	DEC '04	Wind
38000-02	14-Jan-04	IP	McLean	49.5	McLean County #6 Line 6612	DEC '04	Wind
38000-03	14-Jan-04	IP	McLean	79.2	McLean County #7 Line 1582	DEC '04	Wind
38000-04	14-Jan-04	IP	McLean	79.2	McLean County #8 Line 1376	DEC '04	Wind
38004-01	18-Jan-04	CE	LaSalle	175	Heartland Grand Ridge	JUN '06	Wind
38004-02	18-Jan-04	CE	Livingston	225	Heartland Wind livingston	JUN '06	Wind
38026-01	17-Jun-04	AMRN	Ford	65		JUL '06	Wind
38054-01	8-Mar-04	IP	McLean	150		DEC '05	Wind
38091-01	14-Apr-04	CE	Winnebago	200	Wempletown 345kV	JUN '06	Wind
38099-01	22-Apr-04	IP	McLean	150	Mcean County #9 Line 1382	AUG '06	Wind
38134-01	27-May-04	CE	Lee	3.3	Amboy	MAY '05	Wind
38155-02	17-Jun-04	CE	Lee	1.7	Dixon-Mendota 34kV	DEC '04	Wind
38191-01	23-Jul-04	CE	Ogle	20	Rochelle	SEP '04	Wind

Economic Impacts

- Annual landowner payments of $3000 - $5000 per MW
- 100-150 construction jobs per 100 MW for six months, plus local materials
- 6-8 permanent technical jobs per 100 MW
- Property taxes are roughly $5000 per MW (can vary depending on enterprise incentives)

Milestones for 2006 Projects

- Project permits in place: June ‘05
- Commercial arrangements: July ’05
- Tentative turbine order placed: July ’05
- PTC renewal and turbine payment: October ’05
- Long lead time items ordered: Nov ’05
- Civil construction: Jan – Aug ’06
- Turbine delivery and erection: July –Nov ‘06

Delivery/Installation Cycles

- Lesson of 2004 - 2005 is to order turbines early!
- Turbines for 2005 delivery were sold out by late fall of 2004
- Developers and others are making down payments in spring and summer of 2005 to ensure 2006 delivery
- For 2006 projects, suppliers have estimated an ability to deliver and install twelve turbines per week

Typical PPA Terms

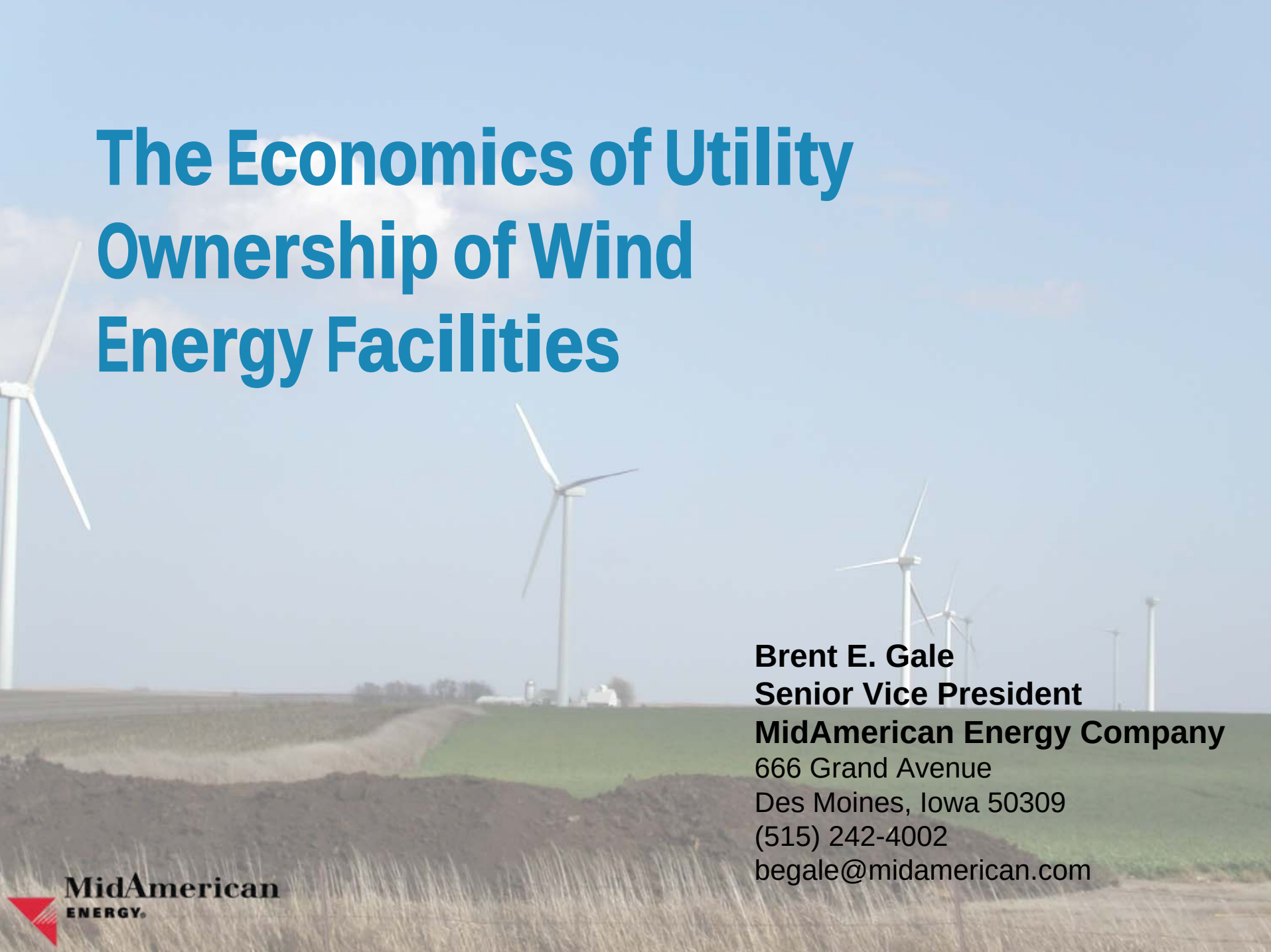
- Fixed pricing for 10 to 20 year term (with or without escalator)
- Utilities pay for all electricity delivered
- Pricing can vary by time of day and time of year
- Developer bears construction and financing cost risk
- Purchaser bears energy price risk

Avian Issues

- Careful siting is key to avoiding avian impacts
- US Fish and Wildlife concurs that construction of the 400 MW wind farm in McLean County will likely have minimal impacts on the federally listed species the Indiana Bat, and recommends post-construction monitoring

Thank You

The Economics of Utility Ownership of Wind Energy Facilities



Brent E. Gale
Senior Vice President
MidAmerican Energy Company
666 Grand Avenue
Des Moines, Iowa 50309
(515) 242-4002
begale@midamerican.com

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MidAmerican Energy 2004-07 Fossil Generation Projects

- **540 MW combined-cycle gas generation plant (GDMEC) placed in service in 2004 in central Iowa**
- **800 MW of super-critical, western-low-sulfur, coal-fired unit (CBEC – 4) under construction in western Iowa with completion in 2007; MidAmerican's share is 480 MW**

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MidAmerican Energy 2004-05 Wind Generation Project Overview

- **360.5 MW of 1.0 to 1.5MW turbines on 25,000+ acres in northwest and north-central Iowa**
- **65 meter towers – 70 meter rotors**
- **Primarily Class 4 wind resource with 34% capacity factor expected**
- **160 MW placed in service in 2004 in northwest Iowa; remainder in north-central Iowa to be in service in 2005**

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MidAmerican Energy 2004-05 Wind Generation Project Overview [continued]

- **37% - 40% capacity factor possible with 80 meter towers and 77 meter rotors, but customer economics less favorable based on 2004 costs**
- **Comparative 2005 turbine, tower and blade prices for longer blades and taller towers improve customer economics; but**
  - **Limited 2005 deliverability**
  - **Exchange rate risk**
  - **Higher prices**

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MidAmerican Energy Fuel Diversity – Nameplate Capacity

Type	2004			2008	
	MW	%		MW	%
Nuclear	785.0	14.4%		655.0	10.8%
Coal	2,870.9	52.7%		3,486.3	57.4%
Gas [1]	1,364.2	25.1%		1,364.2	22.5%
Oil [1]	70.0	1.3%		56.0	0.9%
Wind [2]	112.5	2.1%		473.0	7.8%
Hydro	4.5	0.1%		4.5	0.1%
Methane	11.5	0.2%		11.5	0.2%
Refuse	2.0	0.0%		-	-
Purchase [3]	224.7	4.1%		24.7	0.4%
Total [4]	5,445.3	100.0%		6,075.2	100.0%

[1] Included in gas fuel capacity is 380.8 MW of dual fuel capability. Oil is alternate fuel.

[2] The nameplate capacity for the wind is 112.5 MW. The proposed wind projects are 360.5 MW in nameplate capacity.

[3] Purchases include an unknown mix of fuel.

[4] Individual totals may differ due to rounding.

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MidAmerican Energy Fuel Diversity – Accredited Capacity

Type	2004			2008	
	MW	%		MW	%
Nuclear	816.9	14.7%		686.9 [1]	12.2%
Coal	2,868.9	51.6%		3,484.3	61.8%
Gas	1,537.0	27.7%		1,294.0	22.9%
Oil	70.0	1.3%		56.0	1.0%
Wind	20.5 [2]	0.4%		81.8 [3]	1.4%
Hydro	3.2	0.1%		3.2	0.1%
Methane	11.5	0.2%		11.5	0.2%
Refuse	2.0	0.0%		-	-
Purchase [4]	224.7	4.0%		24.7	0.4%
Total [5]	5,554.8	100.0%		5,642.4	100.0%

[1] Two of the nuclear units have been accredited above nameplate capacity.

[2] July 2004 accreditation for 112.5 MW of contracted wind power.

[3] Projected accreditation for 112.5 MW of contracted wind power and 360.5 MW of owned wind power.

[4] Purchases include an unknown mix of fuel.

[5] Individual totals may differ due to rounding.

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MidAmerican Energy Fuel Diversity – Energy

Type	2003			2008	
	GWh	%		GWh	%
Nuclear	6,145	21.5%		5,387	19.3%
Coal	18,595	65.1%		20,914	74.7%
Gas	287	1.0%		185	0.7%
Oil	2	0.0%		2	0.0%
Wind	283	1.0%		1,359	4.9%
Hydro	23	0.1%		26	0.1%
Methane	89	0.3%		86	0.3%
Refuse	0	0.0%		-	-
Purchase [1]	3,136	11.0%		20	0.1%
Total [2]	28,560	100.0%		27,979	100.0%

[1] Purchases include an unknown mix of fuel.

[2] Individual totals may differ due to rounding.

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MidAmerican Energy Comparative Generation All-In Costs

- **Existing Coal Units: <2.5 cents per kWh**
- **Existing Nuclear Units: <3.0 cents per kWh**
- **New Coal [CBEC – 4]: 3.0 cents per kWh**
- **New Gas Combined Cycle: >6.0 cents per kWh**
- **New Gas Combustion Turbine: >10.0 cents per kWh**

MidAmerican ENERGY

Wind Project Economics – 2004 All-In Cost per kWh Without Credits

Assumptions:

- **$1050/kW capital cost**
- **34% capacity factor**
- **50-50 capital structure**
- **7% debt cost; 12.2% equity return**
- **20-year depreciation life**
- **$25,000 annual O & M per MW**

20-year levelized cost per kWh = 5 cents

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Wind Project Economics With 2004 Federal Production Tax Credit

- **Wind Without Federal Production Tax Credit:**

  5.0 cents per kWh [1]

- **Wind With 2004 Inflation-Adjusted Federal Production Tax Credit:**

  3.0 cents per kWh [1]

[1] 2005 costs appear to be about 5.2 cents per kWh and 3.2 cents per kWh, respectively, using the same financing assumptions and 2005 turbine and tower costs.

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Caution

The foregoing costs do not include substation and transmission costs which can total millions of dollars.

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Wind's Place in the Portfolio

- **Wind is variable, largely non-dispatchable, and not reliable for serving Midwest peak conditions**
- **Wind supplements baseload generation; it is not a substitute for it**

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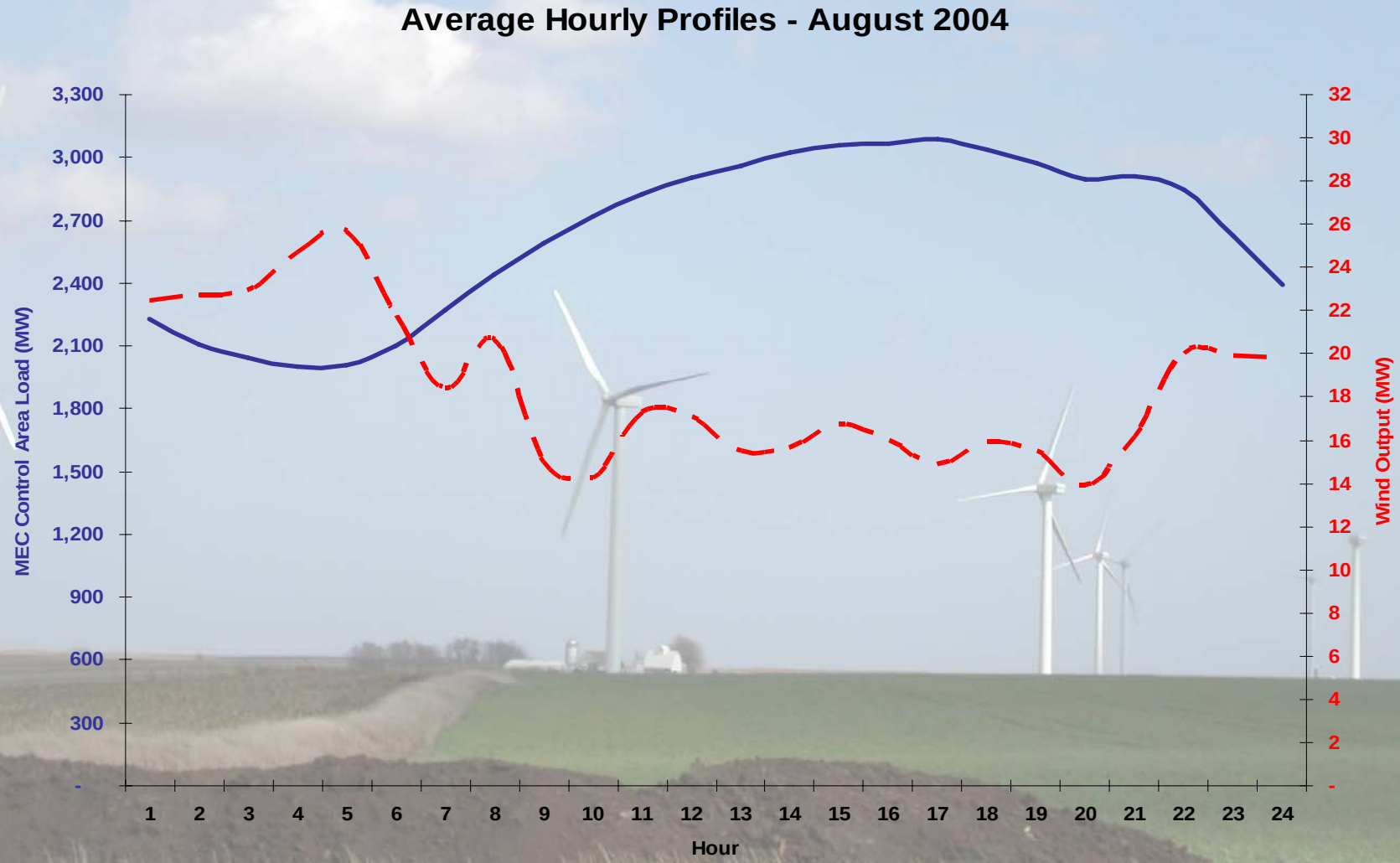
Summer Peak Month Coincidence



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Historical Annual Load/Output

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Offsets to the Variability and Non-Dispatchability of Wind Power- Benefits of Utility Ownership

Cash Flows

- **Federal Production Tax Credit**
- **Sale of Renewable Energy/CO2 Credits**
- **State Incentives**
- **Increased Wholesale Energy Sales**
- **Capacity Credit**
- **Federal Bonus Depreciation (2004)**

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Issues to Consider for the Wind Energy Power Purchase Alternative

- Debt leverage risk
- Developer counterparty business risk
- Operational/delivery risk
- Transmission risk
- Dispatchability/minimum load
- Class cost allocation
- Ownership of renewable and environmental credits

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Prerequisites for a Diverse Generation Portfolio

- **A clear statement of state energy policy; and**
- **Modification of state least-cost standards via:**
  - **Substitution of reasonable cost standard; or**
  - **Exception for renewables; or**
  - **Requirement to recognize externalities including the benefits of portfolio/fuel diversity**

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What Is Needed to Spur Development of Renewables?

- **Elimination of state barriers**
- **A national renewable credit trading program**
- **Continuation of the federal Production Tax Credit at some level until the credit trading market is robust**
- **State Renewable Production Standard mandates are NOT required and are counterproductive**

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QUESTIONS?

APPENDIX C

Illinois' Sustainable Energy Initiative

ComEd's Proposed Implementation Plan
Renewable Portfolio Standard

ICC Workshop – April 21, 2005

Arlene A. Juracek
Vice President EED - Energy Acquisition

Introduction

The Governor has proposed ambitious goals for the use of renewable resources by retail electricity providers in Illinois.

Renewable Standard
- 2% by 2006
- Increases 1% each year; 8% by 2012

Renewable Mix
- Preferably Illinois generation
- 75% wind
- 25% landfill gas and other as defined in 1997 law

Renewable Contracting
- Long-term contracts; at least 10 years
- Competitive procurement; ICC oversight and process approval
- Cost recovery

ComEd supports these goals but recognizes the specific challenges in implementing them successfully.

Implementation Challenges

ComEd
An Exelon Company

✓ Minimize the impact on customers' bills and impact on customer choice (i.e., competitive neutrality).

✓ ICC must make findings consistent with its authority under existing law.

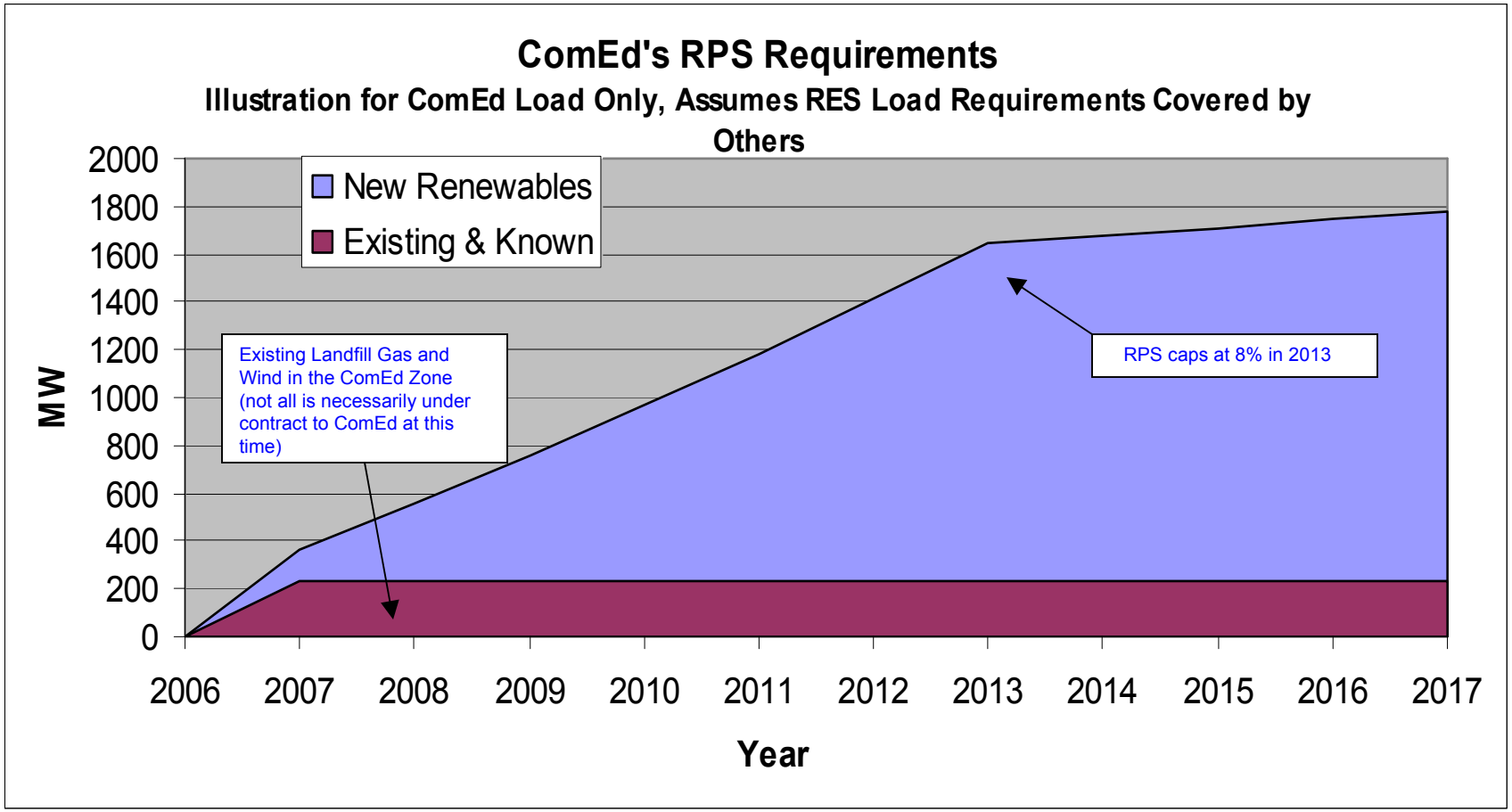
✓ Full and timely cost recovery in utility rates based on ICC's findings.

✓ Recognize early action, in-place resources as part of the mix.

✓ Recognize a broad and creative array of resources that can contribute to supply diversity and long-term price stability.

✓ Leverage existing markets to simplify the process.

Significant New Wind Construction Required



- New landfill gas is limited; new wind is needed to reach goals.
- 200-400 MW of new wind is needed to meet 2007 and 2008 targets.

ComEd's Proposal - Meet Proposed Targets as Follows:

ComEd
An Exelon Company

- **Procure Renewable Resources not already under long-term contract to ComEd via a competitive bidding process.**

  - •RFP for energy and renewable energy certificates (RECS) to cover ComEd load obligation only.

  - •Generation may directly bid, or through aggregators/marketers.

  - •Laddered 10-year solicitation (similar to tranches) for output from a fixed amount of resources over the 10 year period.

  - •Each subsequent solicitation procures an incremental 10 year tranche to facilitate ramp-up of RPS targets.

For example, Solicitation 1 – 2% of projected 2007 energy for 10 years (less any existing long-term contracts).

Solicitation 2 - 1% of 2008 energy for 10 years.

Solicitation 3 - 1% of 2009 energy for 10 years.

(Consider synchronizing with PJM Planning Year.)

ComEd's Proposal - Meet Proposed Targets As Follows:

ComEd
An Exelon Company

- **Limit consumer impact by capping annual expenditures for first few years.**

  •Quantity of resources to be procured in Solicitations 1 and 2 capped at the lesser of the target MWh of energy/RECs required and that amount of energy/RECs that can be purchased and create no more than a 0.5% impact on bundled revenues from ComEd's retail customers projected for the calendar year.

  •Includes recovery for existing long-term contracts in 2007 and beyond.

  •ComEd believes the Governor's targets for first few years are achievable under these constraints, under current market assumptions.

  •Revisit goals after Solicitation 2 to assess changing market conditions and costs.

ComEd's Proposal

ComEd
An Exelon Company

- **Resources procured via this process are a fixed price hedge against volatile energy prices.**

  •Renewable resources typically not subject to escalating fuel prices.

  •RECs are retained and retired against ComEd voluntary goal.

  •Energy sold to PJM in the real-time spot market per PJM market rules.
  (generators >10 MW at the nodal price; <10 MW at the zonal price, offset against CPP-H hourly energy purchases).

  •Cost recovery rider passes through to retail customers the difference between fixed contract prices and PJM revenues/avoided costs (essentially the implicit cost of the RECs).

  •At times, PJM revenues will exceed contract costs; credit passed on to consumers.

ComEd's Proposal

- **In order for the Plan to work, the Commission must find that this procurement of renewable supply resources is an accepted "utility function" (e.g. as a long-term supply price hedge) and that all the costs associated therewith are prudently incurred in light of the benefits realized by customers in their electric service and rates.**

  - A rider mechanism will be required to be in place to recover procurement costs.

  - ICC pre-approval of solicitation process, and approval of contracts are necessary to minimize risk to all stakeholders.

  - Further risk mitigation such as "regulatory out" contract clauses will be necessary.

  - Market for renewable resources will be influenced by many external forces, there should be no penalty for missing targets if insufficient resources are bid.

ComEd's Proposal

- **Recognize a broad and creative array of resources that contribute to supply diversity and long-term price stability.**

  - Behind the meter customer-installed facilities such as wind, photovoltaic, bio-mass digester installations that reduce customer load should count towards the goal.

  - Allowing aggregators/marketers to bid can bring small resources to market more effectively.

  - For Solicitation 3 and beyond, expand RFP to projects within PJM.

- **This is not a competitively neutral solution, unless RESs voluntarily comply with the Governor's goals.**

Summary

ComEd
An Exelon Company

- **Our goal is that in the post-2006 auction environment, renewables procurement produces the intended outcomes cost effectively for all stakeholders, such that there is minimal operational and supply risks to ComEd, the participants and winners in both the declining price auction and renewables solicitation, and ComEd's customers.**

- **ComEd believes that its proposal, coupled with the regulatory action described above, can accomplish that goal, by addressing the implementation challenges it has identified.**

Next Steps

ComEd
An Exelon Company

- Obtain feedback from Sustainable Energy Initiative stakeholders, including PJM.
- Develop detailed solicitation parameters.
- Develop standard form contracts.
- Structure an RFP process that will result in delivery beginning 1-1-07 of energy and RECs sufficient to meet the Governor's goals in accordance with this high level plan.
- Develop a cost-recovery tariff to enable appropriate pass-through of residual costs not recovered from PJM.
- File, for ICC approval, the standard contracts, RFP process and associated tariffs to accomplish the RPS goals.
- Conduct the RFP once all regulatory approvals are obtained, including approval for cost recovery.

Ameren Utilities' View on Implementing of the Governor's Sustainable Energy Plan

RPS Working Group

Michael Moehn – VP Corporate Planning

Bob Mill – Director, Regulatory Policy

April 21, 2005

Governor's RPS Proposal

- Applicable to Utilities and ARES
- 2% of energy sales in 2006, increasing 1% annually until, in 2012, 8% is generated by renewable resources
- 75% of renewables to come from wind
- For Ameren's Illinois Control Area, the Plan would require wind renewables of 225 MW in 2006, growing to 950 MW in 2012
- Ameren Utilities presented their initial views at the March 16th workshop

Implementing the Governor's Plan

- The Governor's Plan challenges both Utilities and ARES to enter into RPS contracts for retail loads
  - Load uncertainty (switching) faced by Utility and ARES may require a shorter term focus for RPS contracting
  - We are told that wind developers need long term contracts to secure favorable financing, leading to lower-cost renewable power

Implementing Governor's Plan (Cont'd)

- Limiting resources to only those produced in Illinois limits use of potentially superior RPS resources produced from other nearby states once the best Illinois sites are developed
- The earliest renewable resources could be under contract is late 2006
- The Ameren Utilities do not believe any penalty provisions are needed to achieve the desired goals

Implementing Governor's Plan (Cont'd)

- Combining RPS within the Post-06 Auction Process may not be the Optimal Approach, Leading to Higher RPS Costs
  - Increments of a % of each tranche may be too small for a supplier to economically procure
  - Each supplier's contract would expire each 1 to 3 years, limiting opportunity for suppliers to enter into RPS contract terms longer than 3 years
  - Difficult to monitor RPS compliance across dozens of tranches and suppliers
  - Market for RPS Energy Certificates not developed

Our Preferred RPS Structure

- Utilities become Responsible for All Procurement of Renewables in Illinois
  - Allows for longer term contracts with developers, which will minimize overall RPS cost to customers
    - Buying in bulk may result in lower cost
    - Should aid developers in obtaining lower financing costs for projects
  - Utility would base “RPS Requirements” on Delivery Services (DS) load
    - Reduces risk of load uncertainty since ALL customers will take DS
    - Easier to monitor compliance with RPS goal
  - All RPS costs recovered in charges applicable to <u>all</u> DS Customers, not effecting competition

How Would Utilities Manage RPS Under Ameren's Method?

- Utilities not required to take physical delivery of RPS energy
  - Utilities receive "Energy Certificates" verifying RPS energy is generated per their contract
  - The Energy Certificates are retired to achieve RPS goals
  - Producer sells generated energy into LMP market
  - Some physical arrangements still possible
- Utility contracts for RPS on basis of difference between "market price" and RPS "contract price"
  - Contract is financial to Utility
  - Pricing for Renewable Power is set at time of contract

The Supply Contract

- Utility enters into financial contract for RPS Energy Certificates
  - The value for generated energy is fixed at time of contract
  - Set at a specific price per kWh for each renewable certificate generated
- The actual net price paid by Utility customers will vary based on the following:
  - Developer and utility settle on a “formula” that computes the difference between:

    1) a Fixed RPS unit energy price; and

    2) the LMP revenue received by Developer/Producer.
  - During periods of high LMP, Utility could receive a credit (where LMP exceeds the price of renewables)
- This approach provides a real RPS price hedge for both Utility customers and for ARES customers

How Would The Ameren Utilities Proposed Structure Be Implemented

- Utilities file tariff with ICC that:
  - Defines the competitive procurement process for RPS
  - Provides a pre-approval procedure for ICC acceptance of winning bids
  - Establishes a DS rider mechanism for recovery of RPS costs

Ameren Utilities' RPS Structure

- The Advantages
  - The Utility and others can easily monitor RPS progress
  - The purchase of RPS energy does not alter the Post-06 declining clock auction process
  - The project Developers have certainty of long-term contracts
  - State Energy Policy is implemented efficiently and customers have a financial RPS hedge
  - ARES are not involved in meeting an RPS Goal

Benefits of Proposed Structure

- Regulatory Oversight Enhanced
  - RPS Compliance Monitoring is simplified
  - Keeps regulatory oversight of renewable energy with the Utilities that ICC currently regulates
- Competitive Market Development
  - Allows ARES to freely compete for customers and load using all available energy resources
  - All customers participate in “renewables” equally
  - More favorable to competition
  - This method does not impact bidding or supply strategies of Auction suppliers

Benefits of Proposed Structure (Cont.)

- Developer and Environmentalist Perspective
  - Longer term contracts will result in more favorable costs for Renewables
  - Our Plan results in more certainty for Renewables project development
    - Utility being responsible for all RPS contracting provides funding certainty, increasing likelihood of favorable financing
  - Renewable energy will reduce reliance on traditional generation in region

Benefits of Proposed Structure (Cont.)

- Customer Perspective
  - ICC monitors overall cost of renewables program
    - If renewables exceed a reasonable cost as established by ICC, they can reject bids and customers avoid that cost
  - The charges for RPS will be reviewed by the ICC for accuracy
  - All customers have a financial hedge against traditional generation through RPS

Consumer Protections

- RPS energy would be procured in a competitive process, with prices approved by the ICC
- RPS cost recovery in DS rates will be subject to review by ICC to be certain that RPS costs are accurately recovered in rates
  - DS rates will include a reconciliation formula to synchronize DS charges with RPS costs
- ICC will monitor RPS compliance

Conclusion

- Ameren Utilities' have spent considerable time refining their position on RPS
- We are now seeking feedback on this proposed structure
  - A constructive dialogue must take place
- Ameren Utilities are committed to pursuing a balanced RPS strategy that is fair to our customers and to our investors

APPENDIX D

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Illinois' Sustainable Energy Plan

ComEd's Proposed Implementation Plan
Renewable Energy Portfolio Standard

Illinois Commerce Commission
Electric Policy Committee
May 11, 2005

Arlene Juracek
Vice President, Energy Acquisition
Exelon Energy Delivery

Today's Presentation – Details and Challenges

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- Details:
  - Technical, acquisition and regulatory approval timelines
  - Product segments
  - Terms
  - Cost recovery
  - Next steps
- Challenges:
  - New on-line wind by 12/31/2006 is possible, if stakeholders work co-operatively
  - There will be challenges to integrate (1) technical and (2) acquisition timelines with (3) legal/regulatory timelines
  - Success will be achieved if we can co-ordinate critical path events along all three tracks.

Technical Timeline for Wind Development

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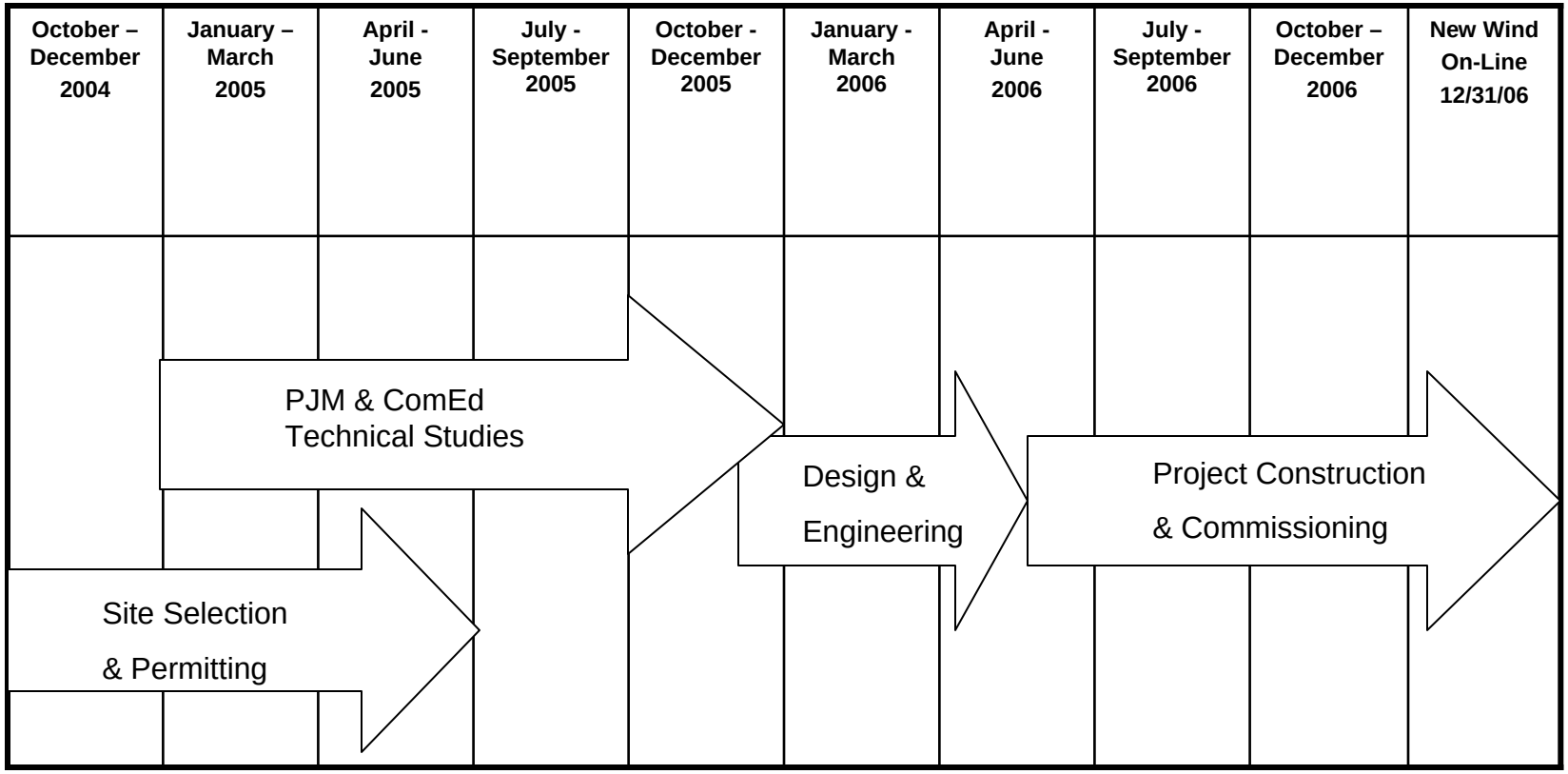

Site Selection & Permitting

- Collect, analyze wind data
- Determine project size, location
- Execute land leasing options
- Complete environmental impact studies
- Apply for zoning permits, county approvals

PJM and ComEd Technical Studies

- PJM Feasibility Study
- ComEd Network Impact Study
- ComEd Facilities Study
- Execute Interconnection Service Agreement (ISA) with developer, PJM & ComEd
- Execute Construction Service Agreement (CSA) w/ developer & ComEd
- The ISA and CSA are required prior to initiating Design & Engineering

Design & Engineering

- ComEd provides developer with tech specs for civil, structural, electrical design
- **Developer orders long lead time equipment (Critical path challenge! Ideally orders would be made in summer 2005.)**
- Developer submits project design
- ComEd accepts developer designs for substation and interconnection work

Project Construction

- Developer pours foundations, erects turbines
- Developer installs distribution system
- Developer constructs substation and transfers to ComEd
- ComEd interconnects facility and tests substation
- Developer commissions turbines

This block of work is typically 12 to 18 months, will extend into 2007

Acquisition Timeline for Wind RPS

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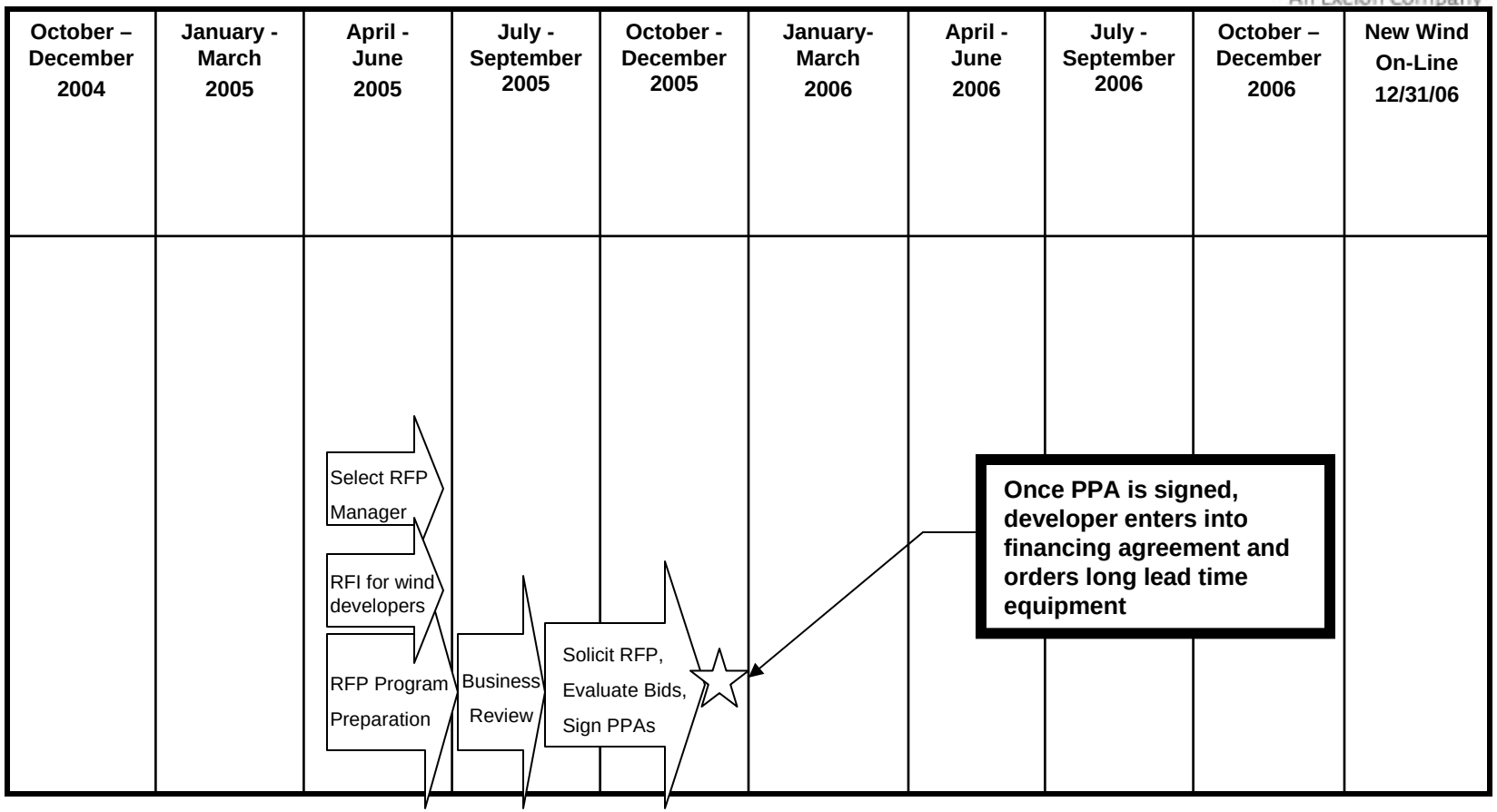

Select RFP Manager

- Develop scope of work for RFP Manager
- Solicit bids
- Evaluate responses, select Manager

RFI for wind developers

- Purpose is to identify those projects that are sufficiently ready to meet 12/31/06 production goal.
- Set up developer self registration process
- Collect information on project status and interest
- Present results to ICC

RFP Program Preparation

- Prepare RFP Protocol
- Prepare RFP Response Format
- Develop selection criteria
- Prepare standardized PPA
- Prepare RPS cost recovery mechanism

Business Review

- Utility Governance Board approves RPS acquisition (Sarbanes/Oxley)

Solicit RFP

- Initiate RFP process
- Gather, evaluate responses
- Identify winning bidders
- Notify ICC, all other parties of results
- Sign PPAs

Combined Timelines for Wind Development and RFP

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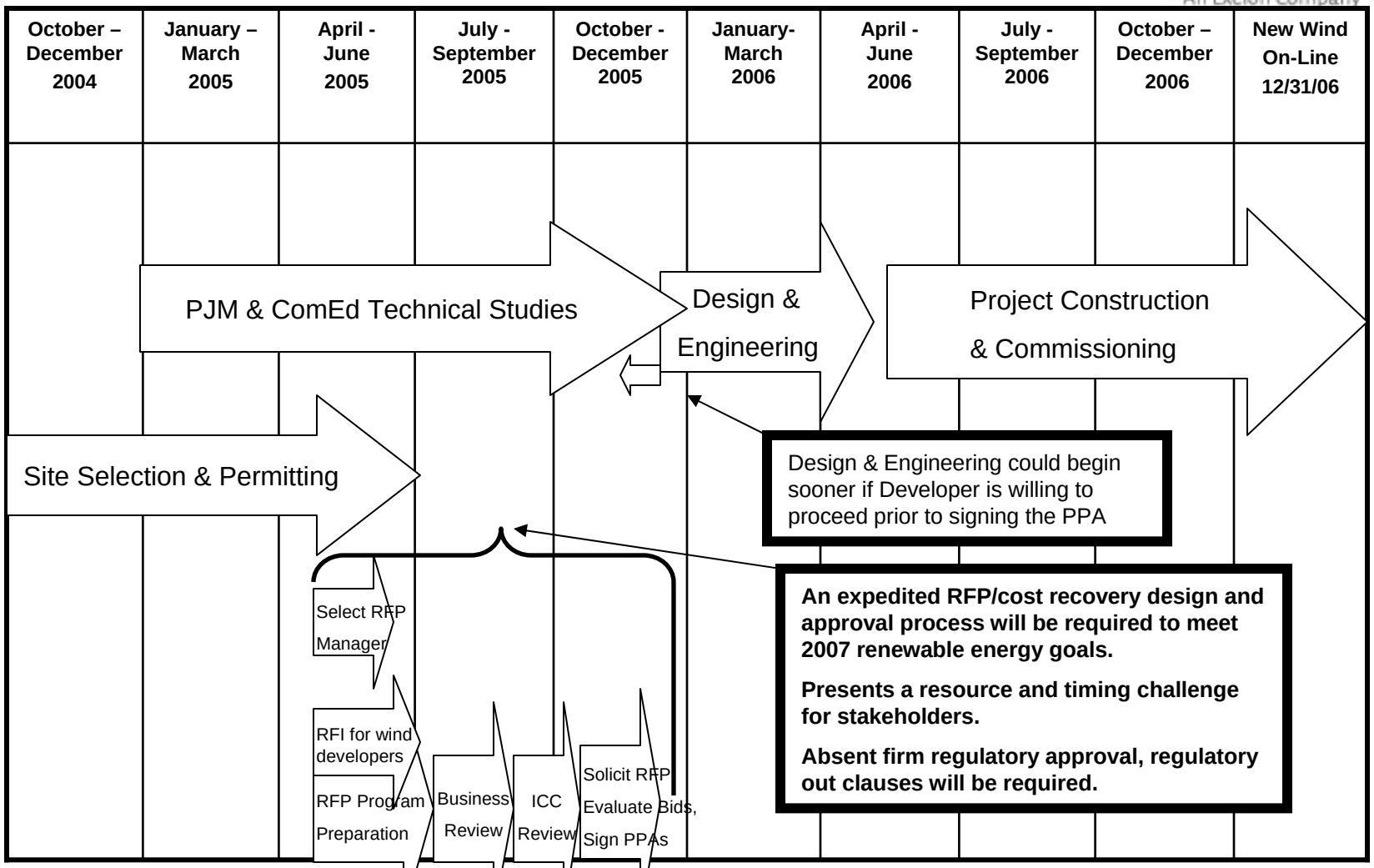

ICC Review

- File RFP process & cost recovery mechanism
- ICC reviews & approves

Timeline Challenges

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- While some critical path activities can be performed in parallel, others are done sequentially
  - Long lead time equipment determines the delivery date for energy and RECs and requires some certainty of a contract
  - Project financing usually requires an executed PPA
  - PPA execution requires regulatory certainty
  - Regulatory certainty requires process and cost-recovery approval
  - Approvals require stakeholder agreement to mitigate risk of appeal
  - Stakeholders, including utility Board of Directors, must agree on the terms of the deal

Timeline Summary

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- Using a RFP acquisition approach incorporating an independent RFP manager ensures unbiased results
- Preparing a rigorous RFP program and standard PPA will expedite the acquisition process
- Expedited review and approval of the acquisition and cost-recovery process will be required
- If parties are willing to build given uncertainty, new wind deliverability is possible by December 31, 2006
- It is a tight schedule with no margin for unexpected events

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ComEd Proposes a 3-Segment Solicitation

Wind Product

ComEd purchases energy and RECs from up to 250 MW of wind projects located in IL for the initial RFP solicitation for delivery December 31, 2006

Non-Wind Products (Quantity TBD)

- ComEd purchases energy and RECs from Tier I resources and RECs from Tier II resources for delivery beginning 2007
- Eligible resources located in IL for the initial RFP solicitation

  Tier I Resources
  - Landfill gas and digester gas to energy
  - Biomass
  - Small Hydro
  - Solar

  Tier II Resources
  - Behind the meter renewable energy generators
  - Includes net metering customers

Later solicitations may consider out-of-state resources. REC trading rules will be helpful.

Cost Recovery

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- A cost recovery mechanism must be filed with the RFP program for ICC approval
  - PPAs entered into under an approved RFP program must be considered prudent for cost recovery
  - RFP design and administration costs incurred prior to 1/1/2007 must be accrued and amortized post-2006 per the approved mechanism
  - PPAs for energy and RECs entered into prior to ICC approval of the RFP program should be considered prudent if the all-in price is at or below the highest winning bid submitted in the RFP
  - Any RECs purchased prior to 12/31/2006 can be banked for future use and the costs accrued and amortized post-2006

- Results of the RFP will be reported to the ICC for market monitoring purposes

Next Steps

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- Begin selection process for independent manager to administer the RFP
- Solicit Request for Information from wind developers
  - Need to assess status of current projects
- Begin preparing RFP process
  - Prepare RFP Protocol
  - Prepare RFP Response Format
  - Develop selection criteria
  - Prepare standardized PPA
  - Prepare RPS cost recovery mechanism
- Continued open dialog with all stakeholders

Appendix

Proposed Terms

Proposed Terms

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Wind Product

- Delivery Points:
  - Facilities greater than 10 MW – the generator bus
  - Facilities 1 –10 MW interconnected at 34 KV, the generator bus
  - Facilities under 10 MW – the ComEd Zone
- Target annual capacity factor of 32%
  - Supplier penalty for actual deliveries at less than 24% capacity factor equals difference between delivery at 24% and actual delivery X $25/MWh
  - Penalties may be paid in the form of RECs from eligible wind resources
  - Actual performance in excess of 32% can be banked against future underperformance via a tracking account
- Contract term of 15 years
- Delivery term begins on or before 12/31/2006 for the first solicitation
- ComEd will pay only avoided cost for energy delivered prior to 1/1/2007 (generator retains RECs) unless ICC approves recovery for costs incurred prior to 1/1/2007
- Generators submit two bids: with and without a Federal PTC
- Pricing to be “back-end loaded” to mitigate near term rate impacts and allow maximum participation within customer impact constraints

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Non-Wind Products – Tier I Resources

- Delivery Points:
  - Same as for wind
- Target capacity factor:
  - Generator will specify annual MWh production based on actual or expected production
  - Supplier penalty for actual deliveries at less than 75% of specified MWh equals difference between delivery at 75% and actual delivery X $25/MWh
  - Penalties may be paid in the form of RECs from eligible resources
  - Actual performance in excess of specified production can be banked against future underperformance via a tracking account
- Contract term of 10 years
- Term begins on 1/1/2007 or during 2007 for first solicitation
- Clarify role of existing QSWEF contracts.

Proposed Terms

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Non-Wind Products – Tier II Resources (behind the meter)

- Target quantity of RECs:
  - Generator or aggregator will specify an annual quantity of RECs based on actual or expected production
  - Supplier penalties – same as for Tier I Resources
  - No underperformance penalties assessed on facilities under 40 KW or aggregations of facilities under 40 KW
- Contract term of 3 years
- Term begins on 1/1/2007 or during 2007 for the first solicitation

Ameren Utilities' Plan on Implementing of the Governor's Sustainable Energy Plan

Electric Policy Committee
May 11, 2005

Michael Moehn – VP Corporate Planning
Bob Mill – Director, Regulatory Policy
Rick Voytas – Manager, Corporate Analysis

Sustainable Energy Plan For the Ameren Utilities

- Plan for Energy Efficiency and Demand Response
- Plan for RPS
- Collaboration with Stakeholders
- Timetable for Implementation
- Conclusion

Ameren's RPS and Energy Efficiency Goals

- Applicable to Ameren Utilities
- 2% of energy sales (less than 1MW) in 2006, increasing 1% annually until, in 2012, 8% is generated by renewable resources
- For Ameren's Illinois Control Area, the RPS goal would require wind renewables of 125 MW in 2006, growing to 530 MW in 2012
- 10% of annual load growth in 2006 growing to 25% of annual growth in 2015
- For Ameren's control area, the energy efficiency goal would require 20,000 MWH in 2006, growing to 60,000 MWH in 2015

Energy Efficiency & Demand Response

The Ameren Utilities have adopted a strategy that will achieve both near-term and long-term goals

- ***Long-term,*** Ameren proposes implementation of energy education and pricing programs
  - We believe informed energy consumers will make better energy usage decisions
  - Increasing energy efficiency awareness is a longer-term proposition
  - More challenging to measure success
- ***Near-term,*** traditional energy efficiency programs can achieve measurable savings of energy and demand
  - Can typically be implemented quickly with an immediate impact
  - Can contract for cost effective strategies and measures
  - May not encourage behavioral change of participants
  - Easier to measure energy savings
  - Estimated annual savings target is about 21,000 MWHrs
- A balanced approach is required!

Ameren's Proposal For Potential Long-Term Energy Efficiency Programs

Our Long Term Vision of Energy Efficiency

- Depend on customers to make informed decisions on energy efficiency options, i.e., appliances, lighting, home construction, windows, insulation
- Customers respond to real time energy prices by adjusting their daily load shape
  - Washing / drying delayed until hourly prices decline
  - Customers pre-cool home on summer days
- We believe this is the only way to achieve sustainable energy efficiency…
  - Rebates and freebies not as effective in promoting education and behavioral change

Ameren's Proposal For Potential Near-Term Energy Efficiency Programs

Our Near-Term Vision of Energy Efficiency

- Achieve immediate total annual energy savings of approximately 10% of Ameren annual sales growth rate in Illinois – approximately 20,000 MWH per year

- Build upon "best practice" programs utilized across the nation

Examples Of Most Likely Near-Term Energy Efficiency Programs

- RES New Construction
  - Work with builders etc. to promote improvements in building shell and appliance efficiencies beyond basic building code and standard practice levels
- RES Lighting
  - Reduce market price and encourage purchase of compact fluorescent lamps (CFL)

Examples Of Most Likely Near-Term Energy Efficiency Programs

- Small Commercial Audit
  - Offer reduced costs on energy audits to identify energy efficiency opportunities and possible credits for verified energy efficiency improvements

Example Of Education Based Energy Efficiency Program

Target market: High school students and their families

- Combine classroom instruction with a household energy survey to educate high school students and their families about:
  - household energy usage
  - electric bill disaggregation
  - customized recommendations for cost effective energy efficiency measures

Proposed Metric For Education Based Programs

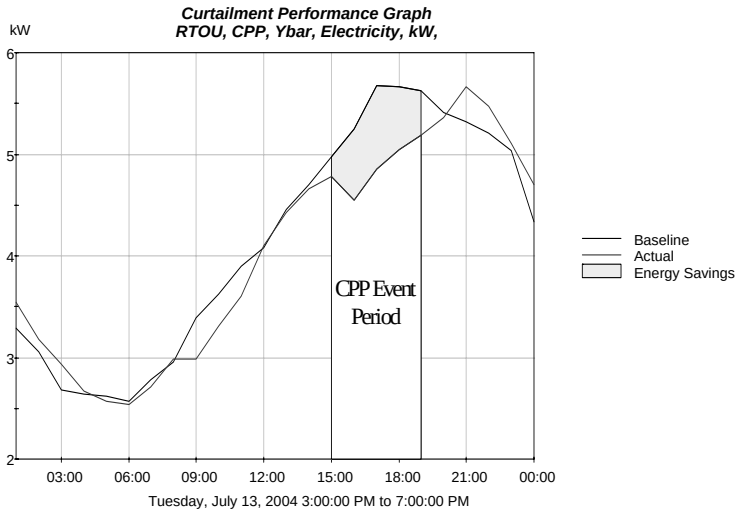
- Near-term MWH savings difficult to identify
- Measure success in terms of a customer “energy efficiency awareness index”
- Evolve metric over time to a measurement of customer behavioral changes
- Ultimate goal: Use customer behavior changes to model estimates of MWH impacts attributable to education and information programs

Near-Term Demand Response (DR) Proposal

- Principle: Price is powerful information. Customers prefer choice and control over energy consumption. Price of energy leads to knowledge of energy options. Knowledge of energy options leads to responsible energy consumption behavior.

- Proposed program: Residential Real-Time Pricing (RTP)

CPP Event Day
July 13, 2004 – CPP



Residential RTP - Timeline

Define Program

- Define scope, goals, and objectives
- Research Technologies
- Investigate other utility programs
- Define Program Framework
- Identify stakeholders and get feedback
- Prepare Regulatory Filing

Detail Design

- Regulatory Approval
- Define details of Program
- Define system and process changes
- Identify vendors
- Identify supporting entities
- Test systems and processes
- Prepare Supporting Materials & Training

Implementation

- Participant recruitment
- Consumer education
- Focus groups
- Implement Program

Evaluation

- Focus groups
- Participant Group
- Technology
- Impacts of RTP rate
- Financial Benefits

Oct. 2005	*July 2006*	*Jan 2007*	*Sept / Oct 2008*

Completion Of Stages

Program Begins

Ameren

Renewable Energy Proposal

Our Preferred RPS Structure

- Utilities become responsible for procurement of renewables in Illinois (Excludes Customers ≥ 1 MW)
  - Allows for longer term contracts with developers, which will minimize overall RPS cost to customers
    - Buying in bulk may result in lower cost
    - Should aid developers in obtaining lower financing costs for projects
  - Utility would base “RPS Requirements” on Delivery Services (DS) load for applicable customer segments.
    - Reduces risk of load uncertainty since ALL customers will take DS
    - Easier to monitor compliance with RPS goal
  - Renewable costs/credits reflected in separate tariff applicable to DS Customers < 1 MW.

How Would Utilities Manage RPS Under Ameren's Method?

- Utilities not required to take physical delivery of RPS energy
  - Utilities receive "Energy Certificates" verifying RPS energy is generated per their contract
  - The Energy Certificates are retired to achieve RPS goals
  - Producer/developer sells generated energy into LMP market
  - Some physical arrangements still possible
- Utility contracts for RPS on basis of difference between "market price" and RPS "contract price"
  - Contract is financial to Utility
  - Pricing for Renewable Power is set at time of contract

The RPS Supply Contract

- The actual net price paid by Utility customers will vary based on the following:
  - Producer/developer and utility settle on a “formula” that computes the difference between:
    1) a Fixed RPS unit energy price; and
    2) the LMP revenue received by Developer/Producer.
  - During periods of higher LMP, Utility will receive a credit (where LMP exceeds the price of renewables)
- This approach provides a price hedge for Utility customers and for those taking supply from ARES

Implementation Plan

How Would The Ameren Utilities Implement their Plans?

In our Working Group Presentations, we discussed our framework and the need to file tariffs

- Ameren Utilities would file tariff with ICC that:
  - Defines the renewable procurement processes
  - Provides a pre-approval procedure for ICC acceptance of winning bids
  - Establishes a rate mechanism for recovery of costs
- Much of the detail still under development
  - Collaboration with the stakeholders is an important step.

Benefits of a Collaboration Process

- An expedited collaborative process will be helpful
  - Finalize plan details with input from stakeholders
    - Ameren does not have all the answers
  - Will help shorten formal proceedings
    - Will hopefully eliminate contested issues
  - May result in greater uniformity between utility proposals
  - Help establish a process for non-wind renewable projects

RPS Collaborative Process

- Collaborate with the renewables industry and other stakeholders to finalize filing:
  - Long-term supply contracts for wind and non-wind projects
  - Process for wind and non-wind renewables procurement
  - Definitions for renewable certificates/credits
  - Metrics for measuring goals
  - Process for purchases from small projects
  - Address IDC issues
  - Cost recovery charge and tariff provisions

Energy Efficiency/Demand Response Expedited Collaborative Process

- Collaborate with energy efficiency experts and other stakeholders to develop:
  - Terms for energy efficiency contracting
  - Measures to be bid
  - Process for soliciting bids
  - Role of education programs
  - Metrics for achieving goals
  - Cost recovery charge and tariff
  - Address IDC issues

Proposed Timetables for Implementation

RPS Timetable – (Limited to wind projects)

Working Group Meetings and ICC Policy Meeting	ICC, Utilities Collaborative Process, Preparation of Tariff	ICC Approval of Renewable Tariff	Renewable Procurement Process	Renewable Projects are Operational
April – May 2005	June-August 2005	November 2005	December 2005	December 2006

Energy Efficiency-Demand Response Timetable

Working Group Meetings and ICC Policy Meeting	Development of Program Design & Procurement Process and Preparation of Energy Efficiency Tariff	ICC Proceeding to Approve Tariff	Competitive Procurement Process	Implement Programs
April-May 2005	June-August 2005	November 2005	July-Aug 2006	Nov-Dec 2006

Conclusion

- Ameren Utilities' have spent considerable time refining their positions on the Sustainable Energy Plan
- We have laid out a Plan to collaboratively involve Stakeholders in the final development of our proposed structure
- We plan to file tariffs to implement these programs and to ensure recovery of their costs
- Ameren Utilities are committed to pursuing a sustainable energy strategy that is fair to our customers and to our investors