

LSU Alternative Energy Conference

Wind Energy and AEP

Presented by
Jay Godfrey
Director
Renewable Energy Supply
American Electric Power

Baton Rouge, LA
April 25, 2007



Summary

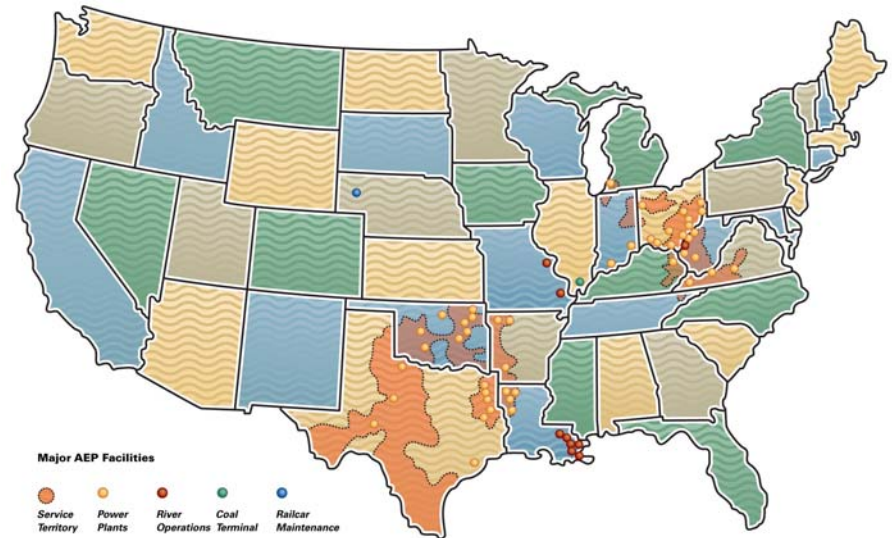
- AEP Overview
- AEP and Wind Energy
- Wind Energy Basics
- Conclusion

Company Overview

- 5.1 million customers in 11 states
- Industry-leading size and scale of assets:

<u>Asset</u>	<u>Size</u>	<u>Industry Rank</u>
Domestic Generation	~38,200 MW	# 2
Transmission	~39,000 miles	# 1
Distribution	~208,000 miles	# 1

Source: Company research & Resource Data
International Platts, PowerDat 2005



- Coal & transportation assets
 - Control over 8,000 railcars
 - Own/lease and operate over 2,600 barges & 51 towboats
 - Coal handling terminal with 20 million tons of capacity
- 20,000 employees

AEP Generation Portfolio				
Coal	Gas	Nuclear	Hydro	Wind
67%	24%	6%	2%	1%



AEP ENJOYS SIGNIFICANT PRESENCE THROUGHOUT THE ENERGY VALUE CHAIN

AEP's Climate Strategy



GLOBAL ROUNDTABLE
ON CLIMATE CHANGE



- **Being proactive and engaged in the development of climate policy**
 - International Emissions Trading Association (IETA)
 - Electric Power Research Institute (EPRI)
 - Pew Center on Global Climate Change
 - e8
 - Global Roundtable on Climate Change
- **Investing in science/technology R&D**
 - FutureGen Alliance
 - US DOE research on carbon capture and sequestration at our Mountaineer Plant
 - EPRI – combustion technologies
 - MIT Energy Laboratory
 - B&W – Oxy-Fuel
- **Taking voluntary, proactive action now, demonstrating voluntary programs can work and setting policy precedents thru CCX**
 - Chicago Climate Exchange (CCX)
 - EPA Climate Leaders
 - EPA SF-6 Emission Reduction Partnership for Electric Power Systems Program
 - Asia-Pacific Partnership
 - DOE 1605B- voluntary reporting of GHGs Program
 - Business Roundtable Climate Resolve
 - Numerous forestry activities
- **Evaluating longer term investment decisions such as new generation and carbon capture and storage (e.g., IGCC, Ultra-supercritical)**

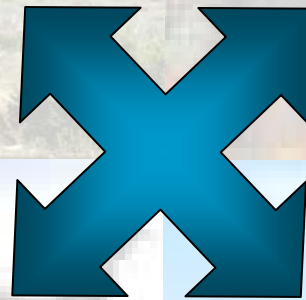


AEP MUST BE A LEADER IN ADDRESSING CLIMATE CHANGE

AEP's Long-term GHG Reduction Portfolio

Renewables (Biomass
Co-firing, Wind)

Supply and Demand
Side Efficiency



Off-System Reductions
and Market Credits
(forestry, methane, etc.)

Commercial Solutions of
New Generation and
Carbon Capture &
Storage Technology



**AEP IS INVESTING IN A PORTFOLIO OF GHG REDUCTION
ALTERNATIVES**

AEP's Long-term CO₂ Reduction Commitment

Existing Programs

- Renewables
 - 777 MWs of Wind
 - 300 MWs of Hydro
- Domestic Offsets
 - Forestry – 0.35MM tons/yr @ \$500K/year
 - Over 63MM trees planted through 2006
 - 1.2MM tons of carbon sequestered
- International Offsets
 - Forestry projects have resulted in 1MM tons of carbon sequestered through 2006
- Chicago Climate Exchange

AEP IS COMMITTED TO A 5MM TON/YR REDUCTION IN CO2 EMISSIONS WHICH OFFSETS APPROXIMATELY HALF OF THE EMISSIONS PROJECTED FROM NEW GENERATION PROJECTS PREVIOUSLY ANNOUNCED



AEP's Long-term CO₂ Reduction Commitment

New Program Additions

- Incremental Reduction quantity: 5MM tons/yr
- Timing: Implement during 2007 to take effect/receive credits by 2011
- Methods
 - +1000 MWs of Wind PPAs – 2MM tons/yr
 - Domestic Offsets (methane) – 2MM tons/yr
 - Forestry – Tripling annual investment to increase to 0.5MM tons/yr by 2015
 - Fleet Vehicle/Aviation Offsets – 0.2MM tons/yr
 - Additional actions to include DSM and end use energy efficiency, biomass and power plant efficiency – 0.2MM tons/yr

New Technology Additions

- Commercial solutions for existing fleet
 - Chilled Ammonia
 - Oxy-Fuel



AEP Wind Experience

- 5 MW Ft. Davis Wind Farm: Early AEP R&D Project (1996 - 2004) Decommissioned
- 75 MW Southwest Mesa PPA: Project built on AEP owned land (1998) SWEPCo
- 150 MW Trent Wind Farm: AEP owned / developed IPP wind farm (2001) AEPEP
- 160 MW Desert Sky Wind Farm: AEP owned IPP wind farm (2001) AEPEP
- 147 MW Weatherford PPA: (2005) PSO
- 151 MW Blue Canyon II PPA: (2005) PSO
- 94.5 MW Sleeping Bear PPA: Completion in mid 2007 PSO



New 360 MW RFP for Wind

- Issued RFP on behalf of two AEP owned utility units in April 2007: Indiana Michigan Power (100 MW) & Appalachian Power (260 MW)
 - Bids due 4/30/07
 - Expected online date 12/31/08
- Favorable paths to cost recovery for above market purchases of wind energy
 - Recovery methodology via fuel recovery clause in each jurisdiction
- Part of goal to add 1,000 MW of new wind PPAs by 2011
 - When combined with existing owned generation and purchased energy, AEP would control approximately 1,800 MW of wind by 2011



Wind Energy Overview

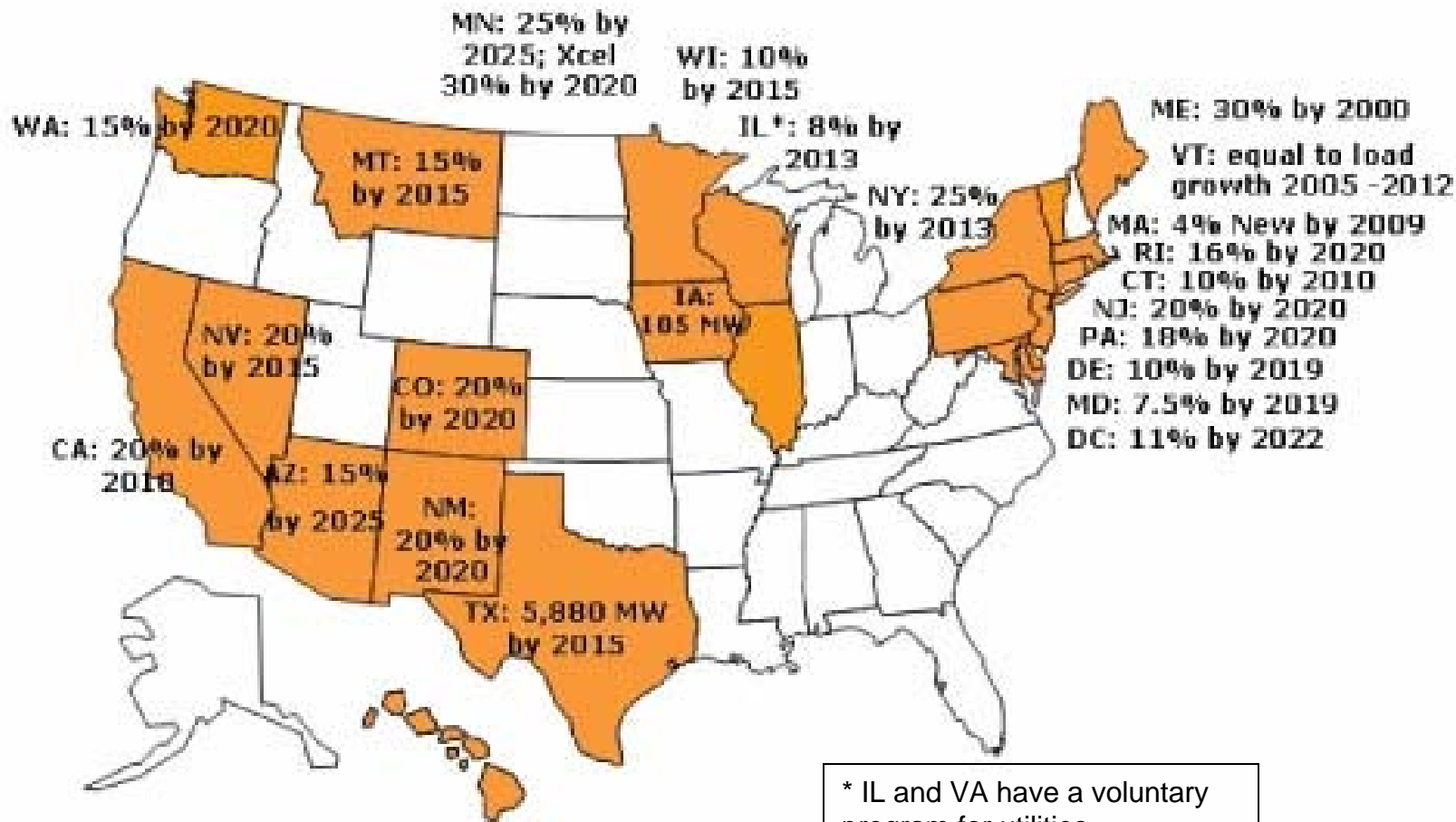
The Basics of Wind

- Growth of Wind in the U.S
 - Fastest growing technology (28% per year) in past decade
 - Why? Demand due to improved economics and environmentally driven demand from customers and policy makers
- Technology
 - Turbines are becoming larger and more efficient
- Integration / Transmission
 - Distributed, usually in rural areas
 - Intermittent – wind does not always blow
- Cost of energy
 - High CAPEX - \$1,700 / kW +
 - No fuel cost – wind is free

Major Growth Drivers

- **Utility Industry Commitment**
 - Many utilities and others have committed ahead of Federal legislation to reduce greenhouse gas emissions
- **Economics**
 - Wind energy is beginning to close the gap vis-à-vis other sources
- **Fuel Diversity**
 - Increased focus on domestic sources of energy
- **Customers Choice**
 - Some consumers / businesses are asking for some portion of Renewables in their energy mix
 - Recent example: Whole Foods and Vail Ski Resorts
- **Policy**
 - Some states have enacted Green Tariffs
 - 23 States + D.C. have some form of Renewable Portfolio Standard (RPS)
 - Established mainly in states with either higher retail energy costs or good wind resource (or both)

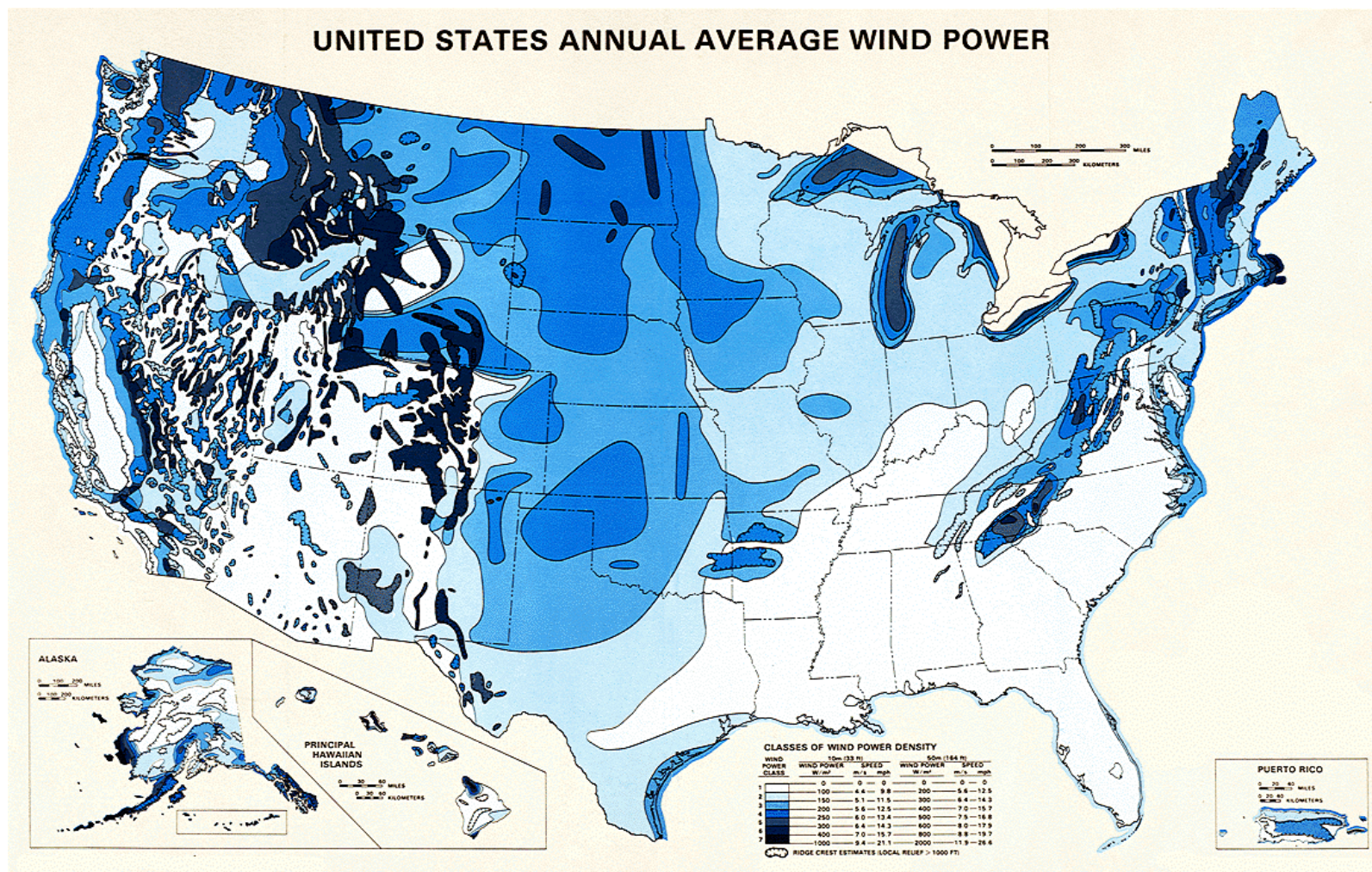
23 States with RPS *



* IL and VA have a voluntary program for utilities

Source: Pew Center on Global Climate Change – 2007

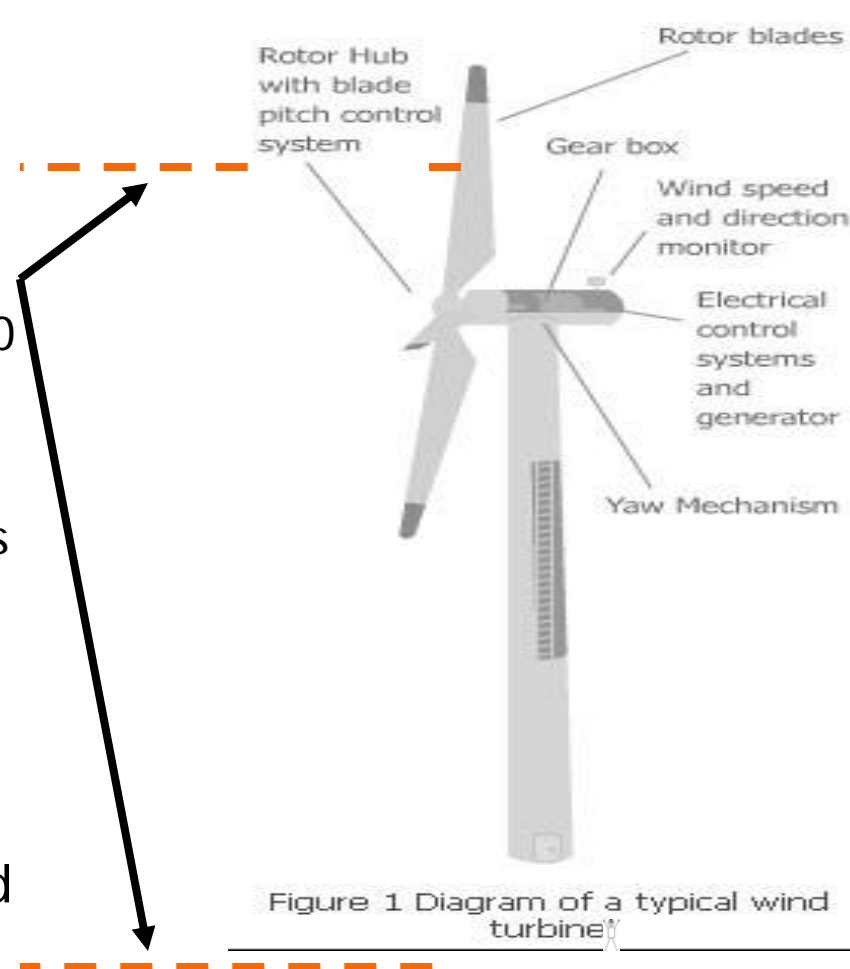
US Wind Map – Macro View



**Note: Extensive work on mapping wind in specific regions and states has been undertaken since this map was originally produced by the DOE.
 See www.eere.gov/windandhydro/windpoweringamerica/wind_maps.asp**

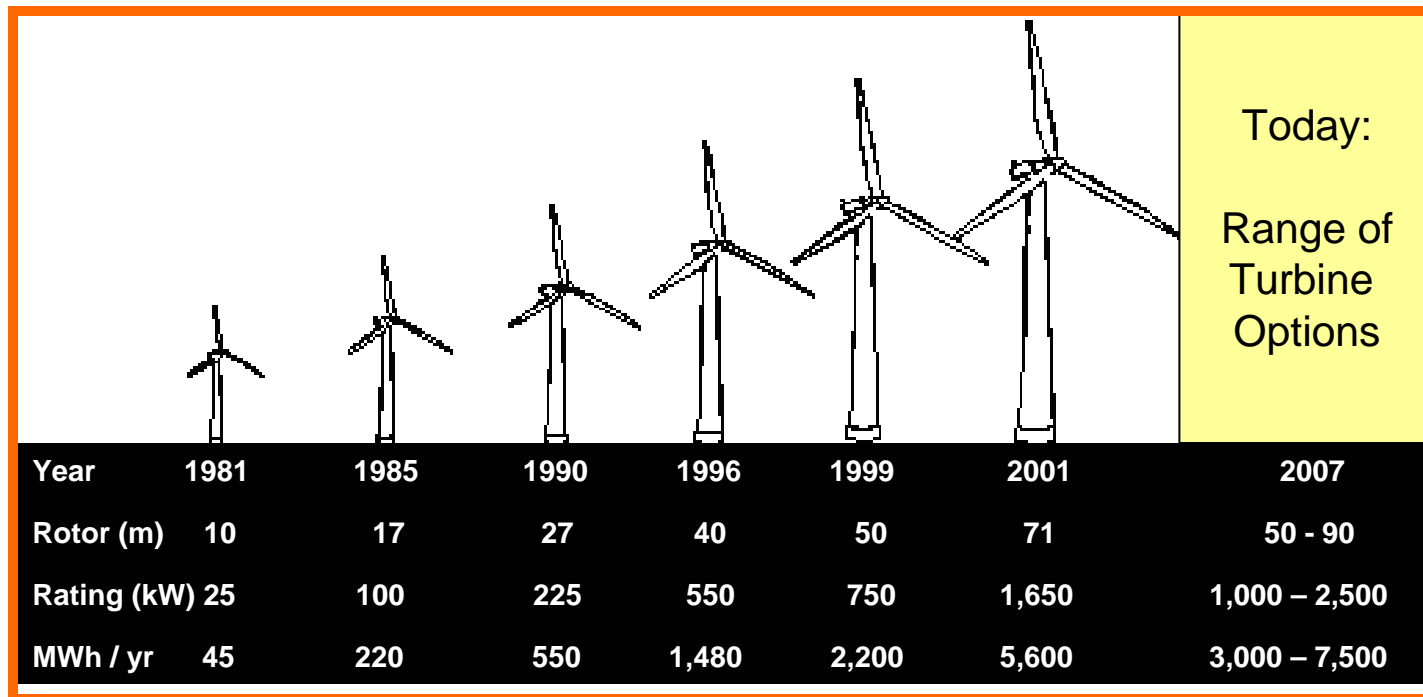
Wind Turbine Basics

- Upwind Turbine
 - Points into wind
- Taller than statue of liberty
 - Tower ht. = 200 to 250 ft.
- Wing-span of 747
 - Swept area of blades is 200 to 250 ft.
- Typical project:
 - 20 to 100 turbines
 - 20 MW to 250 MW
- Over 10,000 MW installed in U.S.



Technology Evolution

- Turbine size and efficiency has increased over past two decades by over 1000%

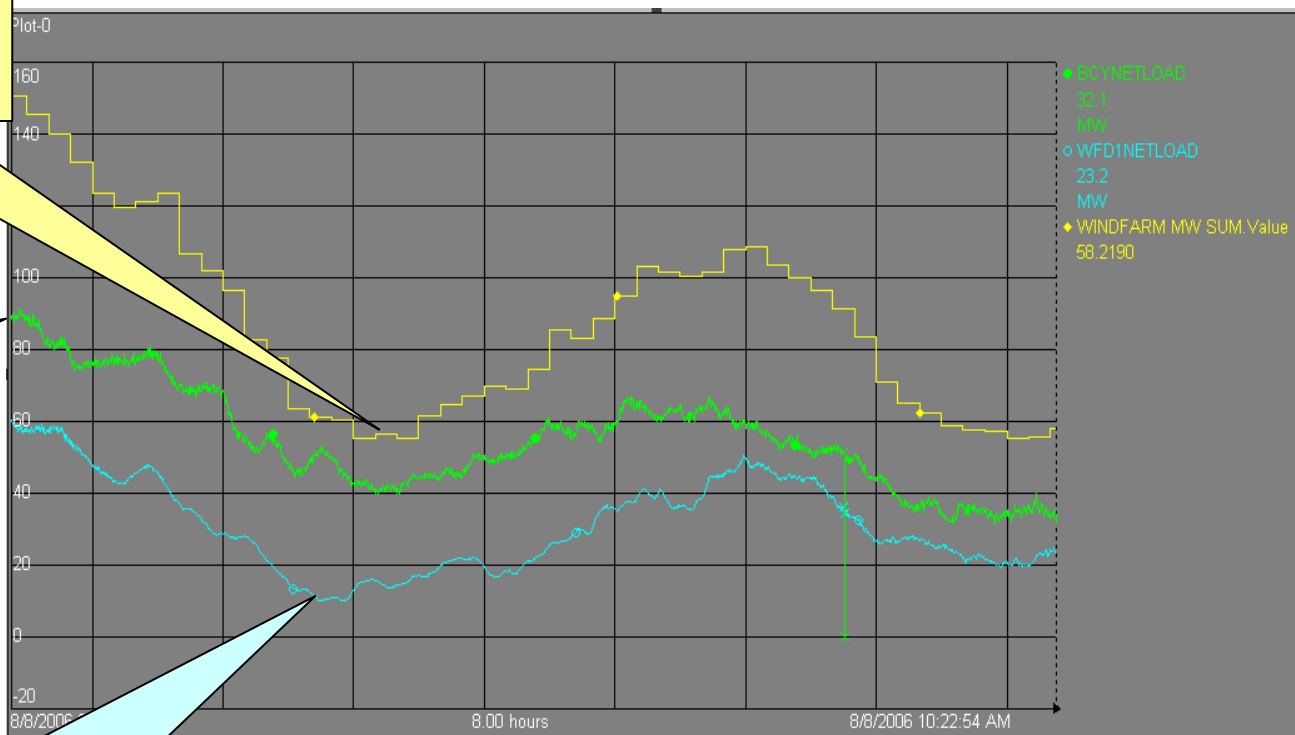


Portfolio Effects of Wind

Summed output for two PSO wind projects in 10 minute averages
Note: Capacity factor high of 50% and low of 19%

Output for 8 hour period from one of two PSO wind farms shown in 4 second increments
Note: High of 58% capacity factor

Output for 8 hour period from one of two PSO wind farms shown in 4 second increments
Note: Low of 11% capacity factor



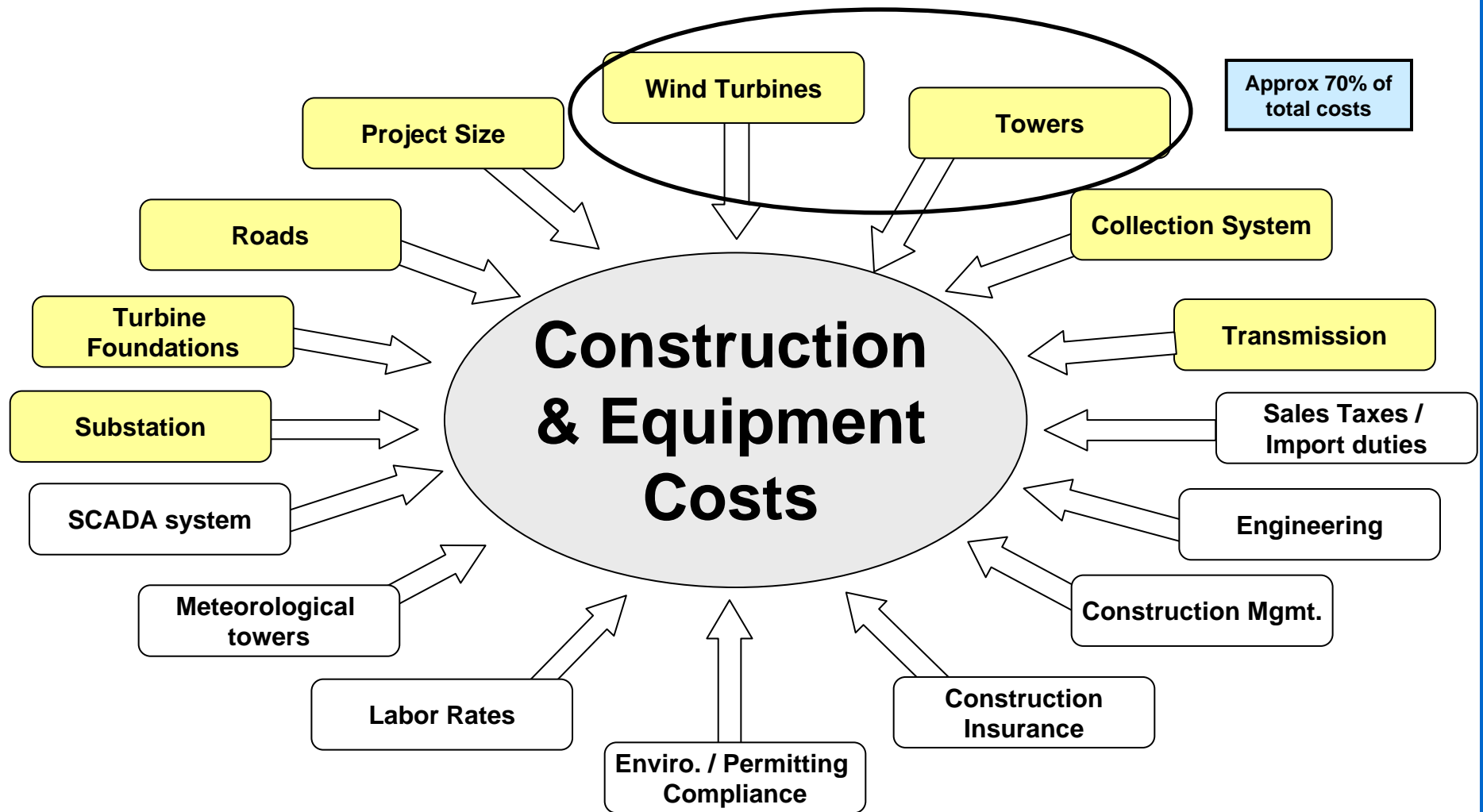
Progress on Integration of Wind

- The Utility Wind Integration Group (UWIG) was established in 1989 to provide a forum for utility wind applications and to serve as a source of credible information on the status of wind technology and deployment
 - U.S. DOE and NREL provide funding to group
 - 94 members in US, Canada and Europe, including IOUs, public power and rural co-ops, as well as associate member corporate, government, and academic organizations
- Recent UWIG paper on wind integration is on point
 - Summarizes 5 articles from the November / December 2005 issue of IEEE's Power & Energy Magazine: www.uwig.org



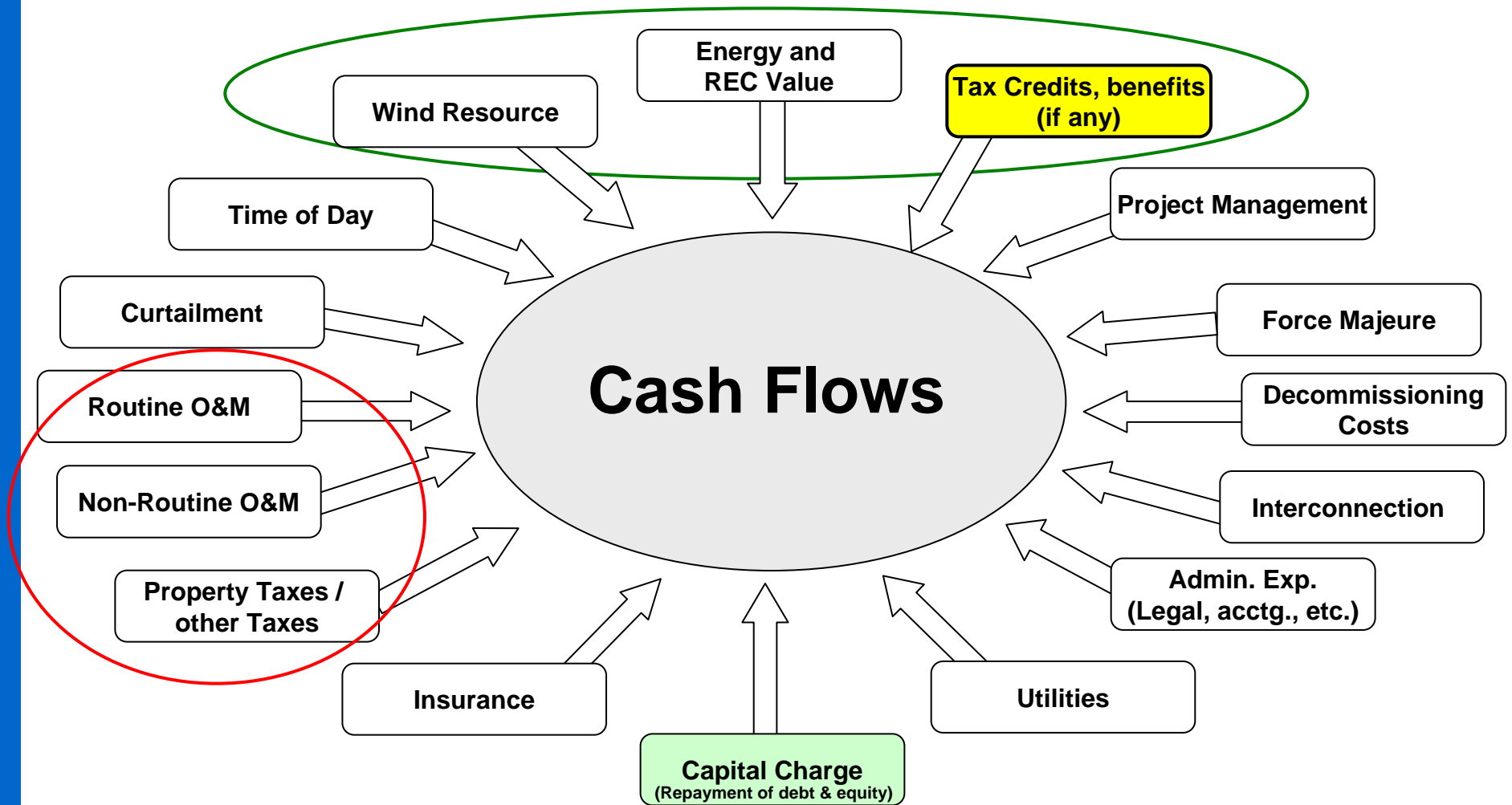
*Accelerating the Integration of Wind
Generation into Utility Power Systems*

Upfront Capital Costs



Installed cost of wind is now approximately \$1.7 Mil / MW

Revenues and Expenses

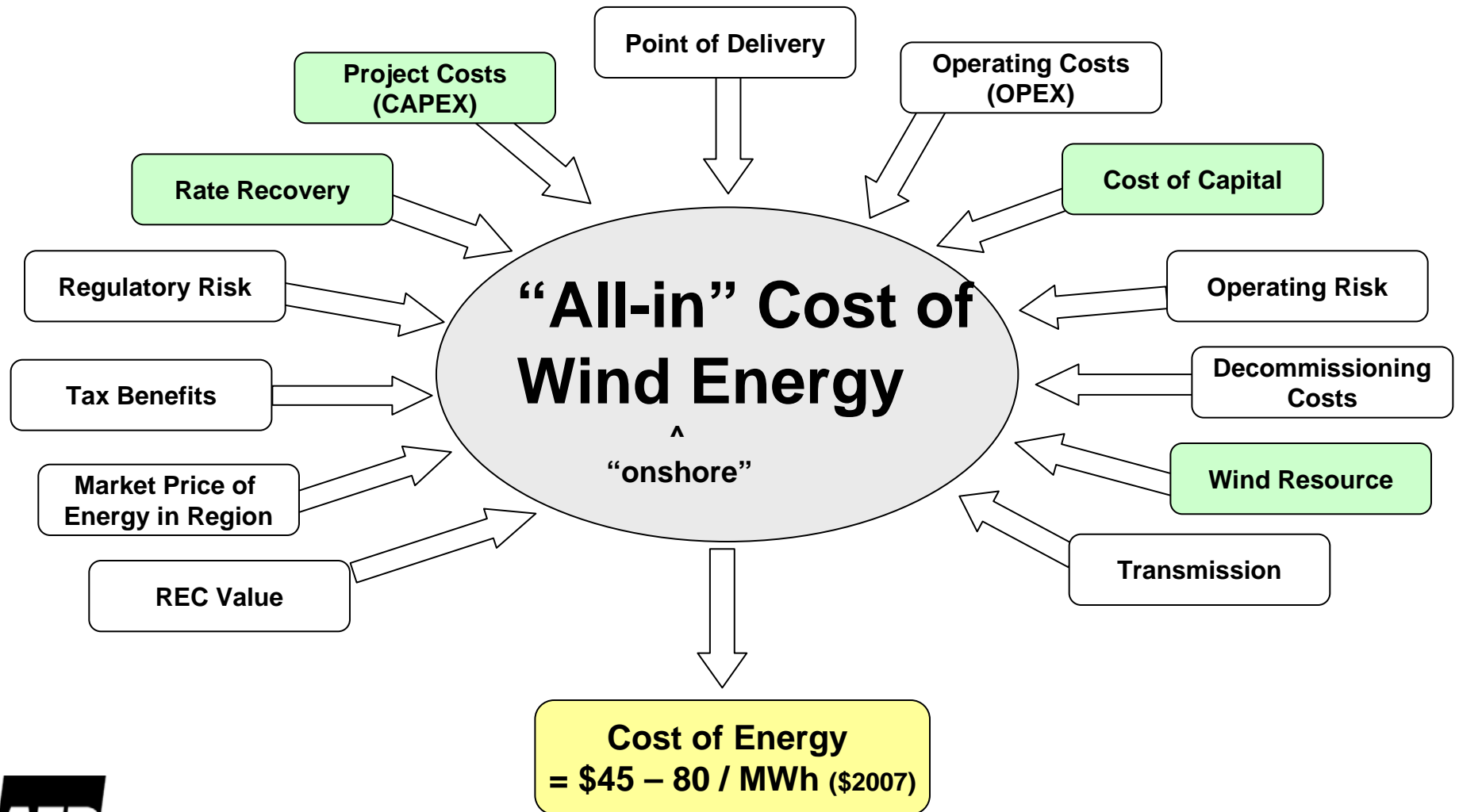


Federal Tax Benefits

- Federal §45 Production Tax Credits
 - \$19 / MWh for first 10 years of operation, based on production
 - Expires on 12/31/08; bill to extend to 2013 in U.S House of Representatives (HR 197)
- MACRS Depreciation
 - Wind project enjoy 5 –year accelerated tax depreciation

Federal Tax benefits represent up to 2/3 of wind project NPV to project owners and serve to buy-down the cost of wind energy

The Bottom Line



Wind Development Building Blocks

- Wind Resource
- Real Estate Issues
- NIMBY / Community Acceptance
- Transmission / Dispatch
- Permits
- Power Off-taker / PPA
- Regulatory Recovery
- Engineering
- Turbine Selection
- Operations Plan
- Financial Projections

Conclusion

- Not all regions have the same indigenous resources with regards to renewables
- AEP proactively supporting a broad range of portfolio actions through its current investments in environmental retrofits, clean coal and renewables
- Regulatory and economic barriers must be addressed in order that these types of activities continue

Questions

Jay Godfrey
Director
Renewable Energy Supply
American Electric Power
155 W. Nationwide Blvd.
Columbus, OH 43215
(614) 583-6162
jfgodfrey@AEP.com



Appendix

AEP's Climate Position

- AEP supports a reasonable approach to carbon controls in the US
- AEP has taken measurable, voluntary actions to reduce its GHG emissions and will support a well-thought out US mandate to achieve additional, economy-wide reductions
- Climate change is a global issue and AEP supports the US taking a leadership role in developing a new international approach that will address growing emissions from all nations, including developing countries such as India and China
- A certain and consistent national policy for reasonable carbon controls should include the following principles:
 - Comprehensiveness
 - Cost-effectiveness
 - Realistic emission control objectives
 - Monitoring, verification and adjustment mechanisms
 - Technology development & deployment
- Regulatory or economic barriers must be addressed
- Recognition provided for early action/investment made for GHG mitigation
- Inclusion of adjustment provision if largest emitters in developing world do not take action



A reliable & reasonably-priced electric supply is necessary to support the economic well-being of the areas we serve

AEP's View of Financial Regulatory Certainty

- Projects approved with public interest, not least cost test
- Pre-approval of pre-construction, construction, operating, maintenance investments for generation and transmission
- Reasonable rate of return on investment
- Extra rate of return for investments in specified technologies (e.g., IGCC, wind, other renewables)
- Real time recovery of full investment, not when project is in operation
- Accommodation if new technology does not fully perform as expected or costs are higher than expected

State Investment Recovery Policy Examples

- Indiana (Code Section 8-1-8.B)
- Kentucky (Code Section 254)
- Virginia (SB 1416)
- Arkansas (Act 755)