Protecting the Environment, Keeping Electricity Affordable and Reliable, and Powering State Economies

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Company Overview

- 5.1 million customers in 11 states

- Industry-leading size and scale of assets:

<table>
<thead>
<tr>
<th>Asset</th>
<th>Size</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Generation</td>
<td>~38,300 MW</td>
<td># 2</td>
</tr>
<tr>
<td>Transmission</td>
<td>~39,000 miles</td>
<td># 1</td>
</tr>
<tr>
<td>Distribution</td>
<td>~208,000 miles</td>
<td># 1</td>
</tr>
</tbody>
</table>

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

- 38 Billion USD total assets

AEP enjoys significant presence throughout the energy value chain
Current State Policymaker Interests

- Ensuring electricity remains affordable, reliable and secure from domestic sources
- Addressing rising electricity demand
- Moderating electricity price increases
- Sustaining the engine of economic growth
- Increasing environmental protection
American Families Pinched By Rising Fuel Costs

Household energy costs

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;$10K</td>
<td>46%</td>
</tr>
<tr>
<td>$10-30K</td>
<td>20%</td>
</tr>
<tr>
<td>$30-50K</td>
<td>16%</td>
</tr>
<tr>
<td>&gt;$50K</td>
<td>7%</td>
</tr>
</tbody>
</table>

1 in 3 households

Total household energy expenditures for residential and transportation costs as a % of after-tax family income, 2007

Source: ABEC Household Energy Survey–2006 (based on DOE/EIA data)
Electricity Fuel Costs

Cost of Fuels at U.S. Electric Utility Plants, 2001-2006

- **Natural Gas**: Average Cost = 5.7, Volatility = 2.0
- **Petroleum**: Average Cost = 4.4, Volatility = 1.3
- **Coal**: Average Cost = 1.4, Volatility = 0.1

Graph showing the cost of fuels (Coal, Petroleum, Natural Gas) from January 2001 to April 2006.
High Increases in Demand Urgently Requires New Generating Capacity

Growth and Retirements Spur Need for Additional Capacity
(335 GigaWatts Projected to be Added Over 2002-2025)

Source: US DOE/EIA ‘2004 Annual Energy Outlook’
Decisions on the Type of Installed Coal-Fired Generation Will Be Made Very Soon

Retail Cost Per kWh & Percent of Coal Generation

Average Retail Price
Per kWh for all Sectors & Percent of Coal Generation

- <6.0¢
- 6.0¢-7.0¢
- 7.0¢-8.5¢
- >8.5¢
- Hydro

$\phi =$ Average retail price per kilowatt hour for CY/2006.
% = percent of total generation from coal for CY/2006.

Source: Energy Information Administration, May 2007
AEP Toolkit for Developing State Clean Energy Policy

• April 23, 2007 AEP report (updates 2006 draft) on state policy precedents for financial incentives and indemnification to rapidly build advanced coal fueled generation plants
• AEP PowerPoint presentation: Protecting the Environment Keeping Electricity Affordable and Reliable and Powering State’s Economies
• AEP state clean energy development concept bill dated 1-24-07
• One-page summary of the concept bill
AEP’s View of Financial Regulatory Certainty (Concept Bill)

- Projects approved as “in the public interest”, “reasonable and necessary” and “for economic development” and not least cost test
- Pre-approval of pre-construction and construction investments for generation and transmission
- Enhanced rate of return on investment
- Cash return of construction while in progress (CWIP) at weighted average cost of capital (WACC) and return on and of investment
- No look back for prudence; no post in-service for prudence review
State Investment Recovery
Policy Examples

Investment Recovery
• Indiana (Code Section 8-1-8.8)
• Kentucky (Code Section 278)
• Arkansas (Act 755)
• Virginia (SB 1416)

Cost Reductions (e.g., tax credits)
• Many States
• See AEP research report
IOGCC CCS Legal and Regulatory Guide

- Property Rights
- Experimental Projects
- Commodity vs. Waste
- Covered Facilities
- Trust Fund
- User Fee

- Cooperative Agreements
- EOR Projects
- Liability Release
- Right of Access
- Permit Transfer
- Permit Requirements

www.iogcc.state.ok.us
Appendix

Background and Reference Materials
Coal-Fired Path Toward Near-Zero Emissions

* Estimate
Source: EPA’s Clean Air Markets database; EIA 2004 Annual Energy Outlook; GE Energy; SFA Pacific.
AEP’s long-term CO₂ reduction commitment

**Existing Programs**
- Existing plant efficiency improvements
- Renewables
  - 800 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

**New Program Additions**
- 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

**AEP’s reductions/offsets of CO₂:**
- 2003-2005: 31 MMT
- By 2010 (proj.): Additional 15 MMT

**AEP’s reductions/offsets of CO₂:**
- 2011+: 5 MMT/YEAR
### IGCC & Ultra-supercritical

#### IGCC
- AEP plans to build first two 600+ MW IGCC facilities in the US
  - Meigs County, OH & Mason County, WV
- Seeking regulatory approval
- **IGCC benefits include:**
  - World-class efficiency and environmental performance
  - Superior efficiency on eastern bituminous coal
  - Flexible byproduct processing (Poly-generation opportunities; Hydrogen production)
  - Conducive to carbon capture & storage
- **Challenges include:** High capital cost; Currently not economical for low-BTU coals; More IGCC must be built to reduce cost

#### Ultra-supercritical
- AEP plans to build first two ultra-supercritical coal plants in the US
  - Hempstead County, AR (600-MW) & Red Rock, OK (950-MW)
- Seeking regulatory approval
- **Ultra-supercritical benefits include:**
  - World-class efficiency and environmental performance
  - Lower emissions than traditional PC units using PRB coal
- **Challenges include:** Ultra-supercritical units will require different technology for carbon capture when compared to IGCC

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**Ultra-supercritical is the best choice for AEP’s PRB-coal plants**
IGCC technology
Chilled ammonia technology program

**Project Validation**
- 30 MWt (megawatts thermal) scale (a scale up of Alstom/EPRI 5 MWt field pilot, under construction at WE Energies)
- <0.1MM tonnes CO₂ per year
- In operation 4Q 2008
- Approximate total cost $50 – $80M
- Using Alstom “Chilled Ammonia” Technology
- Located at the AEP Mountaineer Plant in WV
- CO₂ for geologic storage

**2008 Commercial Operation**
- Mountaineer Plant (WV)
- MOU (Alstom)
- Chilled Ammonia
- CO₂ (Battelle)

**2011 Commercial Operation**
- Northeastern Plant (OK)
- MOU (Alstom)
- Chilled Ammonia
- CO₂

**Commercial Scale Retrofit**
- ~ 200 MWₑ scale (megawatt electric)
- ~ 600 MWₜ scale (megawatt thermal)
- ~1.5MM tonnes CO₂ per year
- In operation late 2011
- Approx. capital $250 – $300M (CO₂ capture & compression)
- Approx. O&M cost $12M per year
- Energy penalty ~ 35 – 50 MW steam, 25 – 30 MW for CO₂ compression
- Retrofit SCR & Wet FGD Required: ~$225 – $300M (required for CO₂ capture equipment)
- Located at AEP’s Northeastern Plant Unit 3 or 4 in Oklahoma
- CO₂ for Enhanced Oil Recovery (EOR) or geologic storage

Phase 1 will capture and sequester 100,000 metric tons of CO₂/year

Phase 2 will capture and sequester 1.5 Million metric tons CO₂/year
Schematic of the chilled ammonia process
Oxy-coal CO$_2$ capture & storage project

Demonstration Scale
- 10 MW$_e$ scale
- Teamed with Babcock & Wilcox at its Alliance Research Center and 16 other utilities
- Demo completed 3Q 2007
- AEP funding of $50k

Commercial Scale
- Retrofit on existing AEP sub-critical unit (several available)
- 150 – 230 MW$_e$ scale retrofit
- 4,000 – 5,000 tons CO$_2$ per day
- Teamed with B&W
- AEP funding of ~ $200k – $3M for feasibility study
- Feasibility study completed 2Q 2008

Combustion conversion technology for existing coal fleet -
- longer lead time with enhanced viability
- and long-term potential
FutureGen

$1 Billion, 10-year demo project to create world’s first coal based, near-zero emission electricity & hydrogen plant with permanent CO₂ storage

Alliance membership includes AEP, Anglo American, BHP Billiton, China Huaneng, CONSOL, E.ON US, Foundation Coal, Peabody, PPL, Rio Tinto, Southern Company, Xtrata

FutureGen provides promise as next-generation power production facility
Integrated gasification combined cycle

• IGCC is a clean coal technology that combines two technologies – coal gasification and combined cycle -- to offer the benefits of a low cost fuel with superior thermal and environmental performance.

• The IGCC process uses a gasifier where coals or other carbon containing fuel react with pure oxygen to form what is commonly called synthesis gas, or “syngas”. Syngas is a mixture of carbon monoxide, carbon dioxide, hydrogen sulfide, and hydrogen. This syngas then is cleaned to remove the particulate and sulfur compounds. The sulfur compounds are converted to elemental sulfur or sulfuric acid, and ash is converted into glassy slag. Mercury is removed in a bed of activated carbon.

• Coal gasification allows the removal of contaminants before the coal gas is combusted, as opposed to installing costly controls that capture emissions from the exhaust gas stream. The process is more efficient and results in lower emissions of NOx, SO2, mercury and CO2. Carbon dioxide capture is also expected to be more cost effective from an IGCC plant than from pulverized coal plants.

• Combined-cycle plants generate electricity more efficiently than do conventional coal fired plants. A typical IGCC plant employs one or more gas turbines, a heat recovery steam generator (HRSG) and a steam turbine. The syngas is fired in a gas turbine. The hot exhaust from the gas turbine passes to the HRSG, which produces steam that drives a steam turbine. Power is produced from both the gas and steam turbines.

• One of the advantages of an IGCC plant is fuel flexibility, particularly the ability to use higher-sulfur coals while maintaining low sulfur emissions. The selected technology is well suited to the higher BTU coals, such as bituminous Appalachian coals readily available in AEP’s eastern service territory.

• AEP is currently working with a technology provider to develop a firm price for an IGCC facility to be built in our eastern service region. AEP intends to seek regulatory recovery approvals in advance of building the plant.
Polygeneration Potential of Gasification

- Power & Steam
- Naphtha
- Waxes
- Fischer-Tropsch Liquids
- FT Diesel
- Car Fuel
- Coal
- Gasification
- Synthesis Gas
- Methanol
- Dimethyl Ether
- Methyl acetate
- Ethylene & Propylene
- Oxo Chemicals
- Acetic Anhydride
- Acetic Acid
- VAM
- Ketene
- Diketene & Derivatives
- PVA
- Oxygen
- Fuel Gas
- Coal
- H₂ and CO₂ from Syngas Gas Cleaning
- Hydrogen
- CO₂ Separation

H₂ and CO₂ from Syngas
Gas Cleaning

Oxygen
Fuel Gas
Coal
H₂ and CO₂ Separation

Hydrogen
CO₂
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 Climate Strategy

• Our strategy includes:
  — Proactive on GHG policy - IETA, EPRI, Pew Center, e8, etc.
  — Science/technology R&D - FutureGen, Carbon Capture and Sequestration, EPRI, MIT, etc.
  — Taking voluntary action now (e.g., Chicago Climate Exchange (CCX), EPA Climate Leaders and SF-6 Program, Asia-Pacific Partnership, DOE1605B, BRT Climate Resolve) - Demonstrating voluntary programs can work and setting policy precedents thru CCX
  — Recent Awards/Recognition
    • “Climate Leader”
    • EPA 2005 Climate Protection Award; 2004 SF-6 Award
    • CERES Climate Strategies 2006 Top Score Electric Cos.
AEP Climate Strategy

• More actions to reduce or limit GHGs:
  – Advanced clean coal plants: Integrated gasification combined cycle (IGCC), ultra-supercritical pulverized coal, and FutureGen
  – Retirement of less efficient capacity
  – Emission offsets (e.g., forestry, methane)
  – Renewables (e.g., biomass firing, wind)
  – Supply and demand side management
Chicago Climate Exchange Overview

- An unprecedented voluntary greenhouse gas emission reduction and trading pilot program administered by 100+ companies and organizations
- Total member emissions = About 240 MM metric tons CO₂ equivalent (~ 4% US CO₂ emissions)
- Member commitment to reduce GHG emissions below a "baseline" (average 1998-2001 levels):
  - 1% in 2003
  - 2% in 2004
  - 3% in 2005
  - 4% in 2006
  - 4.25% in 2007*
  - 4.5% in 2008*
  - 5% in 2009*
  - 6% in 2010*

*Extension Period

AEP Info:
- Current Baseline = 155 MM metric tons (adjusted for divestitures)
- Reduction or offset of about 46 MM metric tons of CO₂ during 2003-10
- 2003-05: Reduced 29 MM Tons
- AEP one of 14 founding members and first to commit to extension period.