

## Summary of Testimony of Michael G. Morris, Chairman, President, and CEO, American Electric Power before the House Select Committee on Energy Independence and Global Warming September 6 2007

**American Electric Power (AEP) is one of the nation's largest electricity generators with over 5 million retail consumers in 11 states. AEP has a diverse generating fleet – coal, nuclear, hydroelectric, gas, oil and wind. But of particular note, AEP is one of the largest coal-fired electricity generators in the U.S.**

Over the past decade, American Electric Power has implemented a portfolio of voluntary actions to reduce, avoid or offset greenhouse gases (GHG). During 2003-05, AEP reduced its GHG emissions by 31 million metric tons of CO<sub>2</sub> by planting trees, adding wind power, increasing power plant generating efficiency, retiring less-efficient units among other measures.

We also continue to invest in new clean coal technology that will enable AEP and our industry to meet the challenge of reducing GHG emissions longer term. This includes plans to build two new integrated gasification combined cycle (IGCC) plants and two, state-of-the-art, ultra-supercritical plants. These will be the first of the new generation of ultra-supercritical plants in the U.S. AEP plans to take the lead role in commercializing carbon capture technology. We signed a memorandum of understanding (MOU) with Alstom for post-combustion carbon capture technology using its chilled ammonia system. Starting with a “commercial performance verification” project in 2009 in West Virginia, we would move to the first commercial-sized project at one of our 450-megawatt coal-fired units at Northeastern Plant in Oklahoma by late 2012. This would capture about 1.5 million metric tons of CO<sub>2</sub> a year, which will be used for enhanced oil recovery.

**AEP supports the adoption of an economy-wide cap-and-trade type GHG reduction program that is well thought-out, achievable, and reasonable.** We believe legislation can be crafted that does not impede AEP's ability to provide reliable, reasonably priced electricity to support the economic well-being of our customers, and includes mechanisms that foster international participation and avoids harming the U.S. economy. In contrast, imposing performance standards on new generation will place significant constraints on our ability and flexibility to adopt least-cost strategies under a market-based cap. Performance standards do not provide additional reductions or environmental benefits under a cap. In the end, cap-and-trade type legislation should include:

- A cap that applies to all sectors of the economy and covers all greenhouse gases;
- An unfettered cap-and-trade framework that maximizes flexibility and minimizes costs;
- AEP is not calling for an indefinite delay until advanced technology such as carbon capture and storage (CCS) is developed. However, as the requirements become more stringent during the next ten to twenty years, and we move beyond the ability of current technology to deliver those reductions, it is essential that requirements for deeper reductions coincide with the commercialization of advanced technology;
- Unrestricted use of real and verifiable domestic and international emissions offsets, such as methane capture from landfills, livestock, forestry and agricultural sequestration;
- Allowances allocated based on historic emissions to electric generators and other sources required to make reductions. At most, only a small number of the allowances (less than five percent) should be auctioned or set-aside for public benefit purposes; this is essential to minimize the cost burden to retail consumers;
- Recognition for companies that have voluntarily taken early actions/investments to mitigate emissions;
- Long-term public and private funding to develop commercially-viable technology solutions (*e.g.*, carbon capture and storage and other clean-coal technologies);
- Legislative provisions to eliminate the legal and regulatory barriers to the use of carbon capture and storage, nuclear, wind or other low or no-carbon technologies or processes;
- Regulatory pre-approval for utility recovery of costs of effective energy efficiency and demand-side management;
- A safety valve on the market price for purchasing allowances to be set at a level that protects the economy;
- Statutory provisions that address inequities that will result if the largest emitters in the developing world, who are manufacturing competitors with the U.S., fail to take comparable actions to cap or reduce their own emissions. If other countries refuse to reduce emissions but seek to continue to sell their goods in the U.S., our proposal would implement an appropriate trade measure to equalize the conditions of global trade. This measure could include a requirement that emission allowances accompany such imports, or border adjustment taxes that are functionally equivalent to America's domestic GHG initiatives, to be applied to products arriving from countries that do not limit their greenhouse gas emissions. Alternatively, the U.S. government could suspend or reduce the stringency of the domestic program until those countries join. (*See attached op-ed by Michael Morris, Chairman, President and CEO of AEP and Edwin Hill, International President of the IBEW.*)

Testimony of  
Michael G. Morris  
Chairman, President, and Chief Executive Officer  
American Electric Power

Before the House Select Committee on Energy Independence and Global  
Warming September 6, 2007

Good morning Mr. Chairman and distinguished members of the House Select Committee on Energy Independence and Global Warming.

Thank you for inviting me here today. Thank you for this opportunity to offer the views of American Electric Power (AEP) and for soliciting the views of our industry and others on climate change technologies and policies.

My name is Mike Morris, and I am the Chairman, President, and Chief Executive Officer of American Electric Power (AEP). Headquartered in Columbus, Ohio, we are one of the nation's largest electricity generators -- with over 36,000 megawatts of generating capacity -- and serve more than five million retail consumers in 11 states in the Midwest and south central regions of our nation. AEP's generating fleet employs diverse sources of fuel -- including coal, nuclear, hydroelectric, natural gas, and oil -- and wind power. But of particular importance for the Committee members here today, AEP uses more coal than any other electricity generator in the Western hemisphere.

## **AEP Voluntary Climate Actions**

Over the past decade, American Electric Power has implemented a broad portfolio of voluntary actions to reduce, avoid or offset greenhouse gas (GHG) emissions. In addition, we continue to invest in new clean coal technology plants and R&D that will enable AEP and our industry to meet the challenge of significantly reducing GHG emissions over the long term. For example, AEP is designing and will build two new generating plants using Integrated Gasification Combined Cycle (IGCC) technology in West Virginia and Ohio, as well as two highly efficient new generating plants using the most advanced (e.g., ultra-supercritical) coal combustion technology in Oklahoma and Arkansas. We have implemented 14 selective catalytic reactors (SCRs), and 10 Flue Gas Desulphurization units, with others currently under construction, and we are a leader in developing and deploying mercury capture and monitoring technology. In addition, we continue to invest in new clean coal technology plants and R&D that will enable AEP and our industry to meet the challenge of significantly reducing GHG emissions in future years. We are also playing a leading role in the FutureGen project, which, once completed, will be the world's first near-zero CO<sub>2</sub> emitting commercial-scale coal-fueled power plant. This plant will capture and sequester 90 percent of its (GHG) emissions.

Since joining the Chicago Climate Exchange and EPA Climate Leaders several years ago, AEP has voluntarily reduced its GHG emissions during 2003-05 by a total of 31 million metric tons of CO<sub>2</sub> equivalent. We did so by planting tens of millions of trees, adding several major wind generation projects, significantly increasing the generating efficiency of our larger coal-fired power plants, mothballing or retiring older and less efficient coal- and oil/gas-fired steam units, and achieving record levels of generation from our zero-emitting Cook Nuclear plant.

## **AEP's Major New Initiative to Reduce GHG Emissions**

I have announced several major new initiatives to reduce AEP's GHG emissions and to advance the commercial application of carbon capture and storage technology. Our company has been advancing technology for the electric utility industry for more than 100 years. AEP's recent announcement continues to build upon this heritage. Technology development needs are often cited as an excuse for inaction. We see these needs as opportunities for action.

AEP has signed a memorandum of understanding (MOU) with Alstom, a worldwide leader in equipment and services for power generation, for post-combustion carbon capture technology using Alstom's chilled ammonia system. It will be installed at the 1300-megawatt Mountaineer Plant in New Haven, W.Va as a "30-megawatt (thermal) commercial performance verification" project in mid-2008 and capture up to 100,000 metric tons of carbon dioxide (CO<sub>2</sub>) per year. Once the CO<sub>2</sub> is captured, we will store it. The Mountaineer site has an existing deep saline aquifer injection well previously developed in conjunction with Department of Energy (DOE) and Battelle. Working with Battelle and with continued DOE support, we will use this well (and develop others) to store and further study CO<sub>2</sub> injection into deep geological formations.

Following the completion of commercial verification at Mountaineer, AEP plans to install Alstom's system on one of the 450-megawatt coal-fired units at its Northeastern Plant in Oologah, Oklahoma. The system is expected to be operational at Northeastern Plant in late 2012, capturing about 1.5 million metric tons of CO<sub>2</sub> a year. The CO<sub>2</sub> captured at Northeastern Plant will be used for enhanced oil recovery.

AEP has also signed an MOU with Babcock and Wilcox to pursue the development of Oxy-coal combustion that uses oxygen in lieu of air for combustion. The Oxy-coal combustion forms a concentrated CO<sub>2</sub> post combustion gas that can be stored without additional post combustion capture

processes. AEP is working with B&W on a “30-megawatt (thermal) pilot project.” The results are due in mid-2007 and then these results will be used to study the feasibility of a scaled up 100 – 200MW (electric) demonstration. The CO<sub>2</sub> from the demonstration project would be captured and stored in a deep saline geologic formation or used for enhanced oil recovery application.

In March, AEP voluntarily committed to achieve an additional five million tons of GHG reductions annually beginning in 2011. We will accomplish these reductions through a new AEP initiative that will add another 1000 Mw of purchased wind power into our system, substantially increase our forestry investments (in addition to the 62 million trees we have planted to date), as well as invest in domestic offsets, such as methane capture from agriculture, mines and landfills.

AEP has also implemented efficiency improvements at several plants in its existing generation fleet. These improvements include new turbine blading, valve replacements, combustion tuning, and installation of variable speed drives on rotating equipment. Such improvements are currently reported through the Department of Energy’s 1605 (b) program to the extent they produce creditable reductions in greenhouse gas emissions. However, we are limited in the efficiency improvements we can make due to the ambiguities in the existing New Source Review program, and support further clarification and reform of this program to encourage efficiency improvements.

### **AEP Perspectives on a Federal GHG Reduction Program**

While AEP has done, and will do much more, to mitigate GHG emissions from its existing sources, we also support the adoption of an economy-wide cap-and-trade type GHG reduction program that is well thought-out, achievable, and reasonable. We believe legislation can be crafted that does not impede AEP's ability to provide reliable, reasonably priced electricity to support the economic well-being of our customers, and includes mechanisms that foster international

participation and avoid creating inequities and competitive issues that would harm the U.S. economy. AEP supports reasonable legislation, and is not calling for an indefinite delay until advanced technology such as carbon capture and storage (CCS) is developed. However, as the requirements become more stringent during the next ten to twenty years, and we move beyond the ability of current technology to deliver those reductions, it is essential that requirements for deeper reductions coincide with the commercialization of advanced technology. The technologies for effective carbon capture and storage from coal-fired facilities are developing, but are not commercially engineered to meet production needs, and cannot be artificially accelerated through unrealistic reduction mandates. For these reasons, we do not believe that performance standards on new sources can or will meet our needs and/or the needs of our customers, regulators, and the nation, since these standards place significant constraints on ones ability and flexibility to adopt effective least-cost strategies without any additional environmental benefits.

A sound national policy for reducing GHG emissions, based on a cap-and-trade type approach, should include the following design elements:

- The cap should apply to all sectors of the economy and cover all greenhouse gases.
- An unfettered cap-and-trade framework should be used to maximize flexibility and minimize the costs of the program.
- The reduction levels should be gradually phased in over time to reflect the lead-time necessary for demonstrating and deploying new low-and zero-emitting technologies on a broad commercial scale. Setting reasonable and achievable emissions caps is critical to ensure that the power industry can provide reliable electricity and ensure the continued economic competitiveness for U.S. workers and industries.

- Minimize costs through unrestricted use of real and verifiable domestic and international GHG emissions offsets, such as methane capture from landfills, livestock and coal mines, forestry and agricultural sequestration and clean power development.
- As part of a comprehensive cap and trade system, all allowances should be allocated based on historic emissions without cost to the electric power sector and other sources that will be required to make reductions. At most, only a small number of the allowances (less than five percent) should be distributed through auctions or set-asides for general public benefit purposes. This approach is essential to minimize the cost burden to retail consumers, to safeguard competitiveness of U.S. industries, and to avoid harm to the U.S. economy.
- Recognition should be provided to those companies that have voluntarily taken early actions and investment to mitigate GHG emissions.
- Long-term public and private funding should be provided to develop commercially-viable technology solutions (*e.g.*, carbon capture and storage for new and existing plants and other clean-coal technologies).
- Legislative provisions should be included to eliminate the legal and regulatory barriers to the use of carbon capture and storage, nuclear, wind or other low or no-carbon technologies or processes.
- Regulatory pre-approval should be provided for utilities to recover the costs of effective energy efficiency and demand-side management programs.
- A safety valve for purchasing allowances should be included to establish a price ceiling and be set at a level that adequately protects the U.S. economy.

- Statutory provisions should be included for addressing inequities that will result if the largest emitters in the developing world, who are manufacturing competitors with the U.S, fail to take comparable action to cap or reduce their own emissions.

### **All Greenhouse Gases Should be Covered, on An Economy-Wide Basis**

AEP believes mandatory emission reduction legislation must be premised upon a market-based cap-and-trade system that includes all significant emitting sectors of the U.S. economy. With regard to greenhouse gases and specifically CO<sub>2</sub> emissions, no one sector accounts for a majority of U.S. emissions. Instead, GHG emissions are ubiquitous, generated by multiple sectors, including electricity generation, transportation, various manufacturing processes, and residential and commercial fuel use. Adopting an economy-wide approach will improve the overall effectiveness of limiting GHG emissions nationally and expand opportunities to achieve those GHG reductions in a least-cost manner, while spreading the cost across the entire economy. The overall cost of the program will be lowered by enabling companies to take advantage of the most cost-effective reductions possible from all major source categories across the economy. An economy-wide approach prevents distortions driven by imposing disproportionate burdens on certain sectors while excluding others. In contrast, a sector approach – if limited to electric generating units and other large combustion sources – arbitrarily limits reduction obligations and costs to these sources. AEP urges that any cap-and-trade program not only be economy-wide, but also assign a compliance burden to each sector that is consistent with that sector’s contribution to the problem.



## **Phased-in Timing and Gradually Increasing Level of Reductions Consistent with Technology Development**

As a practical matter, implementing climate legislation is a complex undertaking that will require procedures for measuring, verifying, and accounting for GHG emission, as well as for designing efficient administration and enforcement procedures applicable to all sectors of our economy. Only a pragmatic approach with achievable targets and reasonable timetables – that does not require too many reductions within too short a time period – will succeed. Past experience with the Clean Air Act Amendments of 1990 (which involved a vastly simpler SO<sub>2</sub> allowance trading system for just the electric power sector), strongly suggests that a minimum of five years will be necessary to have the administrative mechanisms in place for full implementation of the initial GHG emission targets.

AEP also believes that the level of emissions reductions and timing of those reductions under a federal mandate must keep pace with developing technologies for reducing GHG emissions from new and existing sources. The technologies for effective carbon capture and storage from coal-fired facilities have not yet been perfected, and cannot be artificially accelerated through unrealistic reduction mandates.

While AEP and other companies have successfully lowered their average emissions and emission rates during this decade, further substantial reductions will require the wide-scale commercial availability of new clean coal technologies. AEP believes that the electric power industry can potentially manage much of the expected economic (and CO<sub>2</sub> emissions) growth over the course of the next decade (2010-2020) through aggressively deploying renewable energy, further gains in supply and demand-side energy efficiency, and new emission offset projects. As previously stated, AEP supports reasonable legislation, and is not calling for an indefinite delay of GHG

reduction obligations until advanced clean coal technology is developed. However, as the reduction requirements become more stringent, and move beyond the ability of current technology to deliver those reductions, it is important that those stringent requirements coincide with the commercialization of advanced technology. This includes the next generation of low- and zero-emitting technologies. In the case of coal, this means demonstration and full-scale deployment of new IGCC units with carbon capture, new ultra-supercritical or oxy-coal plants with carbon capture and storage, as well as broad deployment of retrofit technologies for carbon capture and storage at existing coal plants. The next generation of nuclear technology will also play an important role in meeting significant reduction targets.

However, today's costs of new clean coal technologies with carbon capture and storage are much more expensive than current coal-fired technologies. For example, carbon capture and storage using current inhibited monoethanolamine (MEA) technology is expected to increase the total cost of electricity from a new coal fired power plant by about 65 percent and even the newer chilled ammonia carbon capture technology we plan to deploy on a commercial sized scale by 2012 at one of our existing coal-fired units will result in significantly higher costs. It is only through the steady and judicious advancement of these applications during the course of the next decade that we can start to bring these costs down, in order to avoid substantial electricity rate shocks and undue harm to the U.S. economy.

Additionally the MEA technology has limitations under existing plant retrofit conditions. CO<sub>2</sub> capture requires a large volume of steam to regenerate the amine used to capture the CO<sub>2</sub>. Review of several of our existing PC units indicates they can only supply enough steam from the power generation cycle to regenerate the amine necessary to capture about 50% of the CO<sub>2</sub>, without jeopardizing the steam cycle.

In summary, AEP recommends a pragmatic approach for phasing in GHG reductions through a cap-and-trade program. The emissions cap should be reasonable and achievable. In the early years of the program, the cap should be set at levels that slow the increase in GHG emissions. Allowing for moderate emissions increases over the first decade is critical due to limitations on currently available GHG control options. The stringency of the cap would increase over time – first stabilizing emissions and then requiring a gradual, long-term decline in emissions levels. The cap levels should be set to reflect projected advances in new carbon-saving technologies. In the case of the electric power sector, additional time is necessary to allow for the deployment of new nuclear plants as well as the demonstration and deployment of commercial-scale gasification and advanced combustion facilities fully integrated with technologies for CO<sub>2</sub> capture and storage. Substantial GHG reductions should not be required until after the 2020 time frame.

Requiring much deeper reductions sooner would very likely harm the U.S. economy. For AEP and the electric sector, the only currently available strategy to achieve substantial absolute CO<sub>2</sub> reductions prior to 2020 without the full-scale deployment of new technologies will inevitably require much greater use of natural gas, in lieu of coal-fueled electricity, with the undesirable effects of higher natural gas prices and even tighter supplies.

### **Unrestricted Use of Real and Verifiable Emission Offsets of All Greenhouse Gases**

GHG emissions and compliance costs will both be reduced, if all real and verifiable emission credits and offsets are included in any federal legislative program. Climate change is a global problem. Greenhouse gases emitted, avoided or reduced anywhere on Earth ultimately impact the entire globe. Artificially restricting reduction opportunities only increases the cost of compliance.

As an example, some project-based offsets are relatively low in cost because they involve high global warming potential (GWP) gases such as methane and nitrous oxides that can be captured with relatively little investment per CO<sub>2</sub> equivalent ton reduced. Forestry projects often provide lower cost reductions than direct reductions at industrial sources or power plants. In addition, many project-based offsets provide significant land use, aesthetic and other environmental benefits.

Viewed from a global perspective, any given reduction, anywhere, from any source, has the same benefit as any other – so the use of the most economically-prudent, real and verifiable offsets should be strongly encouraged, including offsets arising from initiatives involving forestry, agriculture, methane capture from livestock manure, landfills or coal mines, or other innovations.

### **Emission Allowances Should be Allocated Equitably in a Cap-and-Trade System with Limited Auctions**

Under various proposed cap-and-trade systems, an emission allowance would permit the release of one ton of CO<sub>2</sub> or equivalent and are distributed in limited amounts up to the total GHG emissions cap. This limit on the supply of total allowances results in a market price being set for allowances based on the marginal control costs under the cap-and-trade program. Allocation of these allowances to companies equitably and efficiently is an important principle in allowing a cap-and-trade system to be successful.

If, for example, an electric utility generator under cost of service regulation is allocated emission allowances substantially equal to the GHG emissions permitted by legislation, the cost to consumers eventually is equivalent to the actual cost of reducing or offsetting GHG emissions to the level of the cap. The U.S. has already perfected just such a highly efficient allowance trading system, and it is now successfully being used to address Acid Rain and other national and regional domestic

air quality issues. As a result, AEP strongly recommends that emission allowances be allocated to electric utility generators based on “input fuel” or emissions. Input-based allocations spread the reduction/cost burden evenly and equitably, by distributing emission allowances pro-rata based on historic emissions. So, all existing fossil fuel generating plants would face a similar effective percent reduction requirement. In this way, allowances are distributed to those companies who must bear the burden of reducing CO<sub>2</sub> emissions. Emission/fuel based allocation methods successfully allocated allowances under the Clean Air Act of 1990 (for SO<sub>2</sub>), as well as EPA’s recent Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR) rules governing SO<sub>2</sub>, NO<sub>x</sub> and Hg in the future.

Under this approach a high percentage of the available allowances (e.g., 95-100 percent) would be allocated to electric generators based upon their pro rata share of historical GHG emissions.

AEP supports the use of input fuel or emissions-based allocations among the sources actually emitting regulated pollutants and required to achieve emission reductions. Input fuel-based systems maintain the critical connection between the sources required to achieve reductions and the allowance system used to demonstrate compliance, and have a demonstrated history of successfully and substantially reducing overall costs of compliance through the use of this market mechanism. The allowances should be distributed to those companies who must bear this burden. In contrast, output-based allocation systems provide substantial windfalls for a few companies with significant amounts of nuclear, hydro and/or natural gas generation. Nuclear, hydro and renewables do not have any CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub> or mercury emissions and thus they have no need for the permits for these emissions. Allocating allowances to nuclear and hydro serves only one purpose -- to force fossil fuel-fired generation to buy them back. This represents a direct income transfer from fossil generation to non-emitting sources.

Allocation of allowances to the electric power sector over time must also recognize the continuing and increasing electrification of our economy. As new innovative electro-technologies such as plug-in hybrid electric vehicles become a more significant part of the mix of options to meet future U.S. energy needs and to reduce our GHG emissions, allowance allocations will need to recognize the greater share of U.S. energy needs that electricity generators provide.

AEP supports auctioning five percent or less of the available allowances in order to set an initial market price to facilitate trading, reduce barriers to the entry of new sources, and provide incentives for technological advances and early action to mitigate emissions. However, AEP opposes any proposed cap and trade program with any significant auctions (or set-aside of allowances for public benefit purposes), since these would disproportionately increase compliance costs with no offsetting decrease in GHG emissions.

Auctioning allowances rather than allocating them to electric generators will simply increase electricity generating costs and electricity rates unnecessarily. Under cost of service regulation, the cost of auctioned allowance purchases would be – by necessity – passed on to consumers in addition to the direct costs of compliance. Under an auction, consumer costs and electricity prices would increase substantially more than under a system with no auctioned allowances.

In addition to increased electricity rates for consumers, auctioning a substantial number of emission allowances would cause a major redistribution of income, reduce market efficiency and impair companies' ability to make the needed reductions. Investment in compliance technologies would be forced to compete with large-scale investments needed by private companies to purchase auctioned allowances, even as coal-fired electricity generators make very large investments throughout the next decade to reduce SO<sub>2</sub>, NO<sub>x</sub> and Hg emissions under existing and upcoming Clean Air Act regulatory requirements.

Finally, auctioning a substantial number of emission allowances will affect various regions of the country differently. States and regions in the U.S. that rely more heavily on coal-fueled power, including Michigan, North Carolina, Georgia, Ohio, West Virginia, Indiana, Kentucky, Tennessee, Iowa, Missouri, Oklahoma, Wisconsin, Minnesota, and most of the Western U.S. are likely to experience the largest cost and rate increases due to auctions. For these reasons, any decision to auction substantial number of allowances must compensate for the disproportionate impacts on America's coal-reliant states and regions if Congress is to minimize the economic hardships on specific states, regions, and the nation as a whole.

### **Recognition of Early Actions that Achieve Real and Verifiable GHG Emission Reductions**

Any federal program needs to provide credit for real and verifiable early reductions made on a company-wide basis. Programs such as EPA Climate Leaders, DOE Section 1605(b) and the Chicago Climate Exchange among others provide the appropriate accounting and auditing mechanisms to ensure that the reductions are real and verifiable.

AEP is proud of its accomplishments in reducing its CO<sub>2</sub> and other GHG emissions voluntarily. We believe that early actors such as our company should be rewarded, and not penalized for being proactive in addressing their GHG emissions.

### **Congressional Action Must be Premised Upon that the Reality That Climate Change is caused by GHG Emissions on a Global Basis**

We must keep in mind the context for our nation undertaking extraordinary efforts to limit our domestic GHG emissions. Humanity is confronting worldwide climate change; this is not purely a domestic issue. It would be unconscionable to pass legislation that imposes unilateral caps only upon

America's economy, while ignoring the fact that U.S. reductions will make little difference if other major emitting nations are not taking comparable action. Any reductions we make will be overtaken – literally swallowed up – by huge and rapidly increasing emissions arising from the largest emitters in the developing world. This would be flawed environmental policy and will accomplish very little to deal with global climate change.

Of equal importance, legislation must address the fact that imposition of emission limits by some, but not all, major emitting nations would adversely impact the competitive conditions of trade between nations. This could actually create perverse incentives to inappropriately drive environmentally-responsible American jobs to nations without emission limits, where their production costs would assuredly be less. This scenario would impact America's manufacturing sectors and workers alike – and the potential effects of such a non-global solution could, in a very real sense, undermine our competitiveness in our increasingly global economy.

These sort of practical concerns prompted Mr. Edwin D. Hill, International President of the International Brotherhood of Electrical Workers and me to collaborate in crafting an op-ed. The AEP/IBEW approach reconciles the environmental and economic nexus that frames the global climate issue -- "Trade is the Key to Climate Change" (see copy attached). In this article we offered recommendations on how trade considerations must be part of any U.S. legislation that also requires mandatory domestic emission reductions.

In this article we suggest that any U.S. legislation that would require mandatory U.S. emission reductions must also include a market mechanism that encourages other major GHG-emitting countries to reduce their emissions. If other countries refuse to reduce emissions but seek to continue to sell their goods in the U.S., our proposal would implement an appropriate measure to equalize the conditions of global trade. This measure could include a requirement that emission



allowances accompany such imports, or border adjustment taxes that are functionally equivalent to America's domestic GHG initiatives, to be applied to products arriving from countries that do not limit their greenhouse gas emissions,. Alternatively, the U.S. government could suspend or reduce the stringency of the domestic program until those countries join.

In the best tradition of America's free market cap-and-trade policies, Ed Hill and I believe this approach offers the very real potential to equalize the conditions of global trade with regard to climate change, and to serve as a powerful impetus for other nations to meaningfully join a new global initiative. We are hopeful that all major emitting nations would find it prudent to participate rather than be compelled to pay border adjustment taxes or purchase significant numbers of allowances to offset GHG emissions arising from their production of exported goods and services, especially if they have the opportunity to also derive even greater benefits for their citizens and the world from cleaner development through treaty participation.

This approach would equalize the conditions of global trade with regard to climate change, and it would be a powerful incentive for nations to meaningfully participate in a new world-wide initiative to limit their GHG emissions.

Without an ironclad statutory backstop, the U.S. will have little leverage to negotiate with rapidly developing nations. If Congress were to fail to include these or similar provisions, it would fail to deal with climate change on a global scale because our own GHG emissions would be capped even as other nations' emissions increase and eclipse our own, further endangering our global environment and welfare. I believe American consumers, workers and businesses are ready, willing and able to do their part to address the risks presented by global climate change. But fair play and common sense dictate that we must not do this alone.

## **While Trade is the Key to Climate Change, Technology is the Answer**

The primary human-induced cause of global warming is the emission of CO<sub>2</sub> arising from the burning of fossil fuels. Put simply, our primary contribution to climate change is also what drives the global economic engine.

Changing consumer behavior by buying efficient appliances and cars, by driving less, and by similar steps, is helping to reduce the growth of GHG emissions. However, these steps will never be nearly enough to significantly reduce CO<sub>2</sub> emissions from the burning of coal, oil and natural gas. Such incremental steps, while important, will never be sufficient to stabilize greenhouse gases concentrations in the atmosphere at a level that is believed to be capable of preventing dangerous human-induced interference with the climate system as called for in the U.S.-approved U.N. Framework Convention on Climate Change (Rio agreement).

For that, we need major technological advances to effectively capture and store CO<sub>2</sub>. The Congress and indeed all Americans must come to recognize the gigantic undertaking and significant sacrifices that this enterprise is likely to require. It is unrealistic to assume, and wrong to argue, that the market will magically respond simply by the imposition of severe caps on CO<sub>2</sub> emissions. The result will not be a positive response by the market, but rather a severe impact on the economy. Not when what we are talking about, on a large scale, is the capture and geologic storage of billions and billions of tons of CO<sub>2</sub> with technologies that have not yet been proven anywhere in the world.

Carbon capture and storage (CCS) should not be mandated until and unless it has been demonstrated to be effective, and the costs have significantly dropped so that it becomes commercially available on a widespread basis. Until that threshold is met, it would be technologically unrealistic and economically unacceptable to require the widespread installation of carbon capture equipment. The use of deep saline geologic formations as the primary long-term

geologic formations for CO<sub>2</sub> storage has not yet been sufficiently demonstrated. There are no national standards for permitting such storage reservoirs; there are no widely accepted monitoring protocols. Underscoring these realities, industrial insurance companies point to a lack of scientific data on CO<sub>2</sub> storage as one reason they are disinclined to insure early projects. In a nutshell, the institutional infrastructure to support CO<sub>2</sub> storage does not yet exist and will require years to develop. In addition, application of today's CO<sub>2</sub> capture technology would significantly increase the cost of an IGCC plant, calling into serious question regulatory approval for the costs of such a plant by state regulators. Further, recent studies sponsored by the Electric Power Research Institute (EPRI) suggest that application of today's CO<sub>2</sub> capture technology would increase the cost of electricity from an IGCC plant by 40 to 50 percent, and boost the cost of electricity from a conventional pulverized coal plant by up to 65 percent, which would again jeopardize state regulatory approval for the costs of such plants.

Despite these uncertainties, I believe that we must aggressively explore the viability of this technology in several first-of-a-kind commercial projects. AEP is committed to help lead the way, and to show how this can be done. For example, as described earlier in this testimony, AEP will install carbon capture controls on two existing coal-fired power plants, the first commercial use of this technology, as part of our comprehensive strategy to reduce, avoid or offset GHG emissions.

AEP is also building two state-of-the-art advanced ultra-supercritical power plants in Oklahoma and Arkansas. These will be the first of the new generation of ultra-supercritical plants in the U.S.

AEP is also advancing the development of IGCC technology. IGCC represents a major breakthrough in our work to improve the environmental performance of coal-based electric power

generation. AEP is in the process of designing and constructing several of the earliest commercial scale IGCC plants in the nation.

IGCC technology integrates two proven processes – coal gasification and combined cycle power generation – to convert coal into electricity far more efficiently and cleanly than any existing power plants can. Not only is it cleaner and more efficient than today’s power plants, but IGCC can also be retrofitted in the future for carbon capture at a lower capital cost and with less of an energy penalty than traditional power plant technologies, but only when the technology has been proven.

AEP is also a founding member of FutureGen, a groundbreaking public-private collaboration that aims squarely at making near-zero-emissions coal-based energy a reality. FutureGen is a \$1.5 billion, 10-year research and demonstration project. It is on track to create the world's first coal-fueled, near-zero emission electricity and hydrogen plant with the capability to capture and sequester at least 90 percent of its carbon dioxide emissions.

As an R&D plant, FutureGen will stretch -- and indeed create -- the technology envelope. Within the context of our fight to combat global climate change, FutureGen has a truly profound mission – to validate the cost and performance baselines of a fully integrated, near zero-emission coal-fueled power plant.

The design of the FutureGen plant is already underway, and we are making great progress. The plant will be on-line early in the next decade. By the latter part of that decade, following on the advancements demonstrated by AEP, FutureGen and other projects, CCS technology should become a commercial reality.

It is then, and only then, that commercial orders will be placed on a widespread basis to implement CCS at coal-fueled power plants. That is, roughly around 2020. Widespread deployment assumes that a host of other important issues have been resolved, and there is governmental and

public acceptance of CCS as the proven and safe technology that we now believe it to be. AEP supports rapid action on climate change including the enactment of well thought-out and achievable legislation so that our nation can get started on dealing with climate change. However, the complete transformation of the U.S. electricity system will take time, and we can't put policy ahead of the availability of cost-effective technology. The development of technology must coincide with any increase in the stringency of the program.

What will happen if the Congress does the opposite, and mandates deep reductions in the absence of a proven, viable technology? It is the proverbial road of good intentions, and only dangerous consequences can follow. The most immediate would be a dramatic -- and very likely costly -- increase in the use and price of natural gas by the utility sector, since there would be no other identifiable alternative. This would have significant adverse impacts on consumers and workers by driving up the cost of gas for home heating and cooking, and would further increase costs to any industry dependent upon natural gas as a feedstock, such as chemicals and agriculture with a further exporting of jobs overseas.

A huge challenge that our society faces over the remainder of this century is how we will reduce the release of GHG emissions from fossil fuels. This will require nothing less than the complete reengineering of the entire global energy system over the next century. The magnitude of this task is comparable to the industrial revolution, but for this revolution to be successful, it must stimulate new technologies and new behaviors in all major sectors of the economy. The benefits of projects like FutureGen will apply to all countries blessed with an abundance of coal, not only the United States, but also nations like China and India.

In the end, the only sure path to stabilizing GHG concentrations over the long term is through the development and utilization of advanced technologies. And we must do more than simply call for

it. Our nation must prepare, inspire, guide, and support our citizens and the very best and the brightest of our engineers and scientists; private industry must step up and start to construct the first commercial plants; and our country must devote adequate financial and technological resources to this enormous challenge. AEP is committed to being a part of this important process, and to helping you achieve the best outcome at the most reasonable cost and timelines possible. Thank you again for this opportunity to share these views with you.



## Trade Is The Key To Climate Change

If there's one lesson to be learned from the Kyoto Protocol--an approach the U.S. Senate rejected in a 95-0 vote--it is that we cannot deal meaningfully with global climate change without simultaneously addressing the ramifications for trade and employment here at home. As the debate on climate change again heats up in Congress, it is time to address the interconnection between these global issues and replace the failed Kyoto approach with one that protects the environment and provides economic opportunities and jobs.

The United States should lead the effort to negotiate a successor treaty to Kyoto, which expires in 2012. The caps and provisions in a new treaty cannot cause serious harm to the U.S. economy and must have broad bipartisan support. It must address the fact that imposition of emission controls by some, but not all, major emitting nations disrupts the competitive trade balance between nations and inappropriately shifts jobs to countries without emission controls, where manufacturing costs will be less.

Accordingly, the new treaty should require that allowances--emissions credits--accompany exports from major emitting nations that have not joined a post-Kyoto global cap-and-trade framework or otherwise capped their emissions, in order to cover the emissions generated by the manufacture of those exports.

As a party to a post-Kyoto agreement, the United States would already be in compliance with this provision. Other major emitting countries, if they refuse to join a new treaty or cap their emissions, would, however, be required to provide emissions allowances for their exports to the United States or any complying nation.

In the best tradition of American free market cap-and-trade policies, this would equalize global trade with re-

### COMMENTARY

BY MICHAEL G. MORRIS  
AND EDWIN D. HILL

gard to climate change, and be a powerful incentive for nations to join a new global regime. Other major emitting nations would likely join rather than buy huge numbers of allowances, while deriving even greater benefits from cleaner development through treaty participation.

Similar trade provisions should form the basis for any legislation limiting domestic greenhouse emissions. This legislation would require a federal determination as to whether, by date certain, other major emitting nations have joined the global effort. If not, and in response, the legislation would automatically require that allowances accompany imports from such nations, or alternatively, an agency could suspend or reduce the stringency of the domestic program until those nations join.

Without such a legislative program, the U.S. would have little leverage to negotiate with rapidly developing nations. If Congress fails to include these provisions, it would abdicate its responsibility for dealing with climate change as a global problem because our own greenhouse gas emissions would be capped while other nations' emissions would rapidly increase and damage the environment.

Including such measures in any future treaty or domestic legislation would help break the impasse caused by Kyoto, which applied emissions caps only to industrialized nations. The Senate overwhelmingly rejected the Kyoto approach nine years ago. Our proposal addresses Kyoto's central flaw, and prevents non-participating nations' intransigence from holding the global environment hostage. It encourages major emitting countries to join us, while ensuring that we are not hurt by cheaper

exports from uncapped nations.

Ironically, even some Kyoto parties are now expressing similar concerns. Jacques Chirac, president of France, recently proposed that the next post-Kyoto climate treaty include a border tax on imports from nations lacking carbon controls. Peter Mandelson, the European Union Trade Commissioner, agrees that trade needs to be addressed, but believes that border taxes would be "highly problematic under current World Trade Organization rules and almost impossible to implement in practice."

Our proposal directly reduces greenhouse gases to diminish environmental harm. By contrast, border taxes don't do so. Because the use of allowances is required for both capped and uncapped nations, our proposal is more consistent with the WTO and superior to border taxes that apply only to uncapped exporters.

We welcome economic growth throughout the developing world. A more prosperous world benefits all humanity. However, we must also responsibly address the climate challenge posed by that growth. China's emissions will surpass America's in 2009. To unilaterally cap America's emissions, while ignoring other major emitting nations, is a fatally flawed approach, which would compromise our competitiveness, jeopardize American jobs, and harm the global environment.

Making the climate-trade linkage would empower the United States with the necessary carrots and sticks to lead a successful international solution. The old Kyoto approach failed. A new approach is long overdue.

—Michael G. Morris is Chairman, President, and Chief Executive Officer of American Electric Power; Edwin D. Hill is International President of the International Brotherhood of Electrical Workers.





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**FOR IMMEDIATE RELEASE**

**AEP TO INSTALL CARBON CAPTURE ON TWO EXISTING POWER PLANTS;  
COMPANY WILL BE FIRST TO MOVE TECHNOLOGY TO COMMERCIAL SCALE**

***As climate policy advances, 'it's time to advance technology for commercial use,' CEO says***

COLUMBUS, Ohio, March 15, 2007 – American Electric Power (NYSE:AEP) will install carbon capture on two coal-fired power plants, the first commercial use of technologies to significantly reduce carbon dioxide emissions from existing plants.

The first project is expected to complete its product validation phase in 2008 and begin commercial operation in 2011.

“AEP has been the company advancing technology for the electric utility industry for more than 100 years,” said Michael G. Morris, AEP chairman, president and chief executive officer. “This long heritage, the backbone of our company’s success, makes us very comfortable taking action on carbon emissions and accelerating advancement of the technology. Technology development needs are often cited as an excuse for inaction. We see these needs as an opportunity for action.

“With Congress expected to take action on greenhouse gas issues in climate legislation, it’s time to advance this technology for commercial use,” Morris said. “And we will continue working with Congress as it crafts climate policy. It is important that the U.S. climate policy be well thought out, establish reasonable targets and timetables, and include mechanisms to prevent trade imbalances that would damage the U.S. economy.”

Morris will discuss AEP’s plans for carbon capture during a presentation today at the Morgan Stanley Global Electricity & Energy Conference in New York. A live webcast of the presentation to an audience of investors will begin at 12:10 p.m. EDT and can be accessed through the Internet at



<http://www.aep.com/go/webcast>. The webcast will also be available after the event. Visuals used in the presentation will be available at <http://www.aep.com/investors/present>.

AEP has signed a memorandum of understanding (MOU) with Alstom, a worldwide leader in equipment and services for power generation and clean coal, for post-combustion carbon capture technology using Alstom's Chilled Ammonia Process. This technology, which is being piloted this summer by Alstom on a 5-megawatt (thermal) slipstream from a plant in Wisconsin, will first be installed on AEP's 1300-megawatt Mountaineer Plant in New Haven, W.Va., as a 30-megawatt (thermal) product validation in mid-2008 where up to 100,000 metric tons of carbon dioxide (CO<sub>2</sub>) will be captured per year. The captured CO<sub>2</sub> will be designated for geological storage in deep saline aquifers at the site. Battelle Memorial Institute will serve as consultants for AEP on geological storage.

Following the completion of product validation at Mountaineer, AEP will install Alstom's system on one of the 450-megawatt (electric) coal-fired units at its Northeastern Station in Oologah, Okla. Plans are for the commercial-scale system to be operational at Northeastern Station in late 2011. It is expected to capture about 1.5 million metric tons of CO<sub>2</sub> a year. The CO<sub>2</sub> captured at Northeastern Station will be used for enhanced oil recovery.

Alstom's system captures CO<sub>2</sub> by isolating the gas from the power plant's other flue gases and can significantly increase the efficiency of the CO<sub>2</sub> capture process. The system chills the flue gas, recovering large quantities of water for recycle, and then utilizes a CO<sub>2</sub> absorber in a similar way to absorbers used in systems that reduce sulfur dioxide emissions. The remaining low concentration of ammonia in the clean flue gas is captured by cold-water wash and returned to the absorber. The CO<sub>2</sub> is compressed to be sent to enhanced oil recovery or storage.

In laboratory testing sponsored by Alstom, EPRI and others, the process has demonstrated the potential to capture more than 90 percent of CO<sub>2</sub> at a cost that is far less expensive than other carbon capture technologies. It is applicable for use on new power plants as well as for the retrofit of existing coal-fired power plants.

AEP has signed an MOU with The Babcock & Wilcox Company (B&W), a world leader in steam generation and pollution control equipment design, supply and service since 1867, for a feasibility study of oxy-coal combustion technology. B&W, a subsidiary of McDermott International, Inc. (NYSE:MDR), will complete a pilot demonstration of the technology this summer at its 30-megawatt (thermal) Clean Environment Development Facility in Alliance, Ohio.

Following this demonstration, AEP and B&W will conduct a retrofit feasibility study that will include selection of an existing AEP plant site for commercial-scale installation of the technology and cost estimates to complete that work. Once the retrofit feasibility study is completed, detailed design engineering and construction estimates to retrofit an existing AEP plant for commercial-scale CO<sub>2</sub>

capture will begin. At the commercial scale, the captured CO<sub>2</sub> will likely be stored in deep geologic formations. The plant, with oxy-coal combustion technology, is expected to be in service in the 2012-2015 time frame.

B&W, in collaboration with American Air Liquide Inc., has been developing oxy-coal combustion, a technology that utilizes pure oxygen for the combustion of coal. Current generation technologies use air, which contains nitrogen that is not utilized in the combustion process and is emitted with the flue gas. By using pure oxygen, oxy-coal combustion excludes nitrogen and leaves a flue gas that is a relatively pure stream of carbon dioxide that is ready for capture and storage. B&W's and Air Liquide's collaborative work on oxy-coal combustion began in the late 1990s and included pilot-scale development at B&W's facilities with encouraging results, burning both bituminous and sub-bituminous coals.

The oxy-coal combustion process, as envisioned, uses a standard, cryogenic air separation unit to provide relatively pure oxygen to the combustion process. This oxygen is mixed with recycled flue gas in a proprietary mixing device to replicate air, which may then be used to operate a boiler designed for regular air firing. The exhaust gas, consisting primarily of carbon dioxide, is first cleaned of traditional pollutants, then compressed and purified before storage. B&W, working with Air Liquide, can supply the equipment, technology and control systems to construct this new value chain, either as a new application or as a retrofit to an existing unit.

The Alstom technology provides a post-combustion carbon capture system that is suitable for use in new plants as well as for retrofitting to existing plants. It requires significantly less energy to capture CO<sub>2</sub> than other technologies currently being tested.

The B&W technology provides a pre-combustion boiler conversion option for existing plants that promotes the creation of a pure CO<sub>2</sub> stream in the flue gas.

Both pre- and post-combustion technologies will be important for companies facing decisions on carbon reduction from the wide variety of coal-fired boiler designs currently in use.

AEP anticipates seeking funding from the U.S. Department of Energy to help offset some of the costs of advancing these technologies for commercial use. The company will also work with utility commissions, environmental regulators and other key constituencies in states that have jurisdiction over the plants selected for retrofit to determine appropriate cost recovery and the impact on customers.

"We recognize that these projects represent a significant commitment of resources for AEP, but they are projects that will pay important dividends in the future for our customers and shareholders," Morris said. "Coal is the fuel used to generate half of the nation's electricity; it fuels about 75 percent of AEP's generating fleet. By advancing carbon capture technologies into

commercial use, we are taking an important step to ensure the continued and long-term viability of our existing generation, just as we did when we were the first to begin a comprehensive, system-wide retrofit program for sulfur dioxide and nitrogen oxide emissions controls. We have completed the sulfur dioxide and nitrogen oxide retrofits on more than two-thirds of the capacity included in the program and we are on schedule to complete all retrofits by shortly after the end of the decade.

“By being the first to advance carbon capture technology, we will be well-positioned to quickly and efficiently retrofit additional plants in our fleet with carbon capture systems while avoiding a potentially significant learning curve.”

AEP has led the U.S. electric utility industry in taking action to reduce its greenhouse gas emissions. AEP was the first and largest U.S. utility to join the Chicago Climate Exchange (CCX), the world’s first and North America’s only voluntary, legally binding greenhouse gas emissions reduction and trading program. As a member of CCX, AEP committed to gradually reduce, avoid or offset its greenhouse gas emissions to 6 percent below the average of its 1998 to 2001 emission levels by 2010. Through this commitment, AEP will reduce or offset approximately 46 million metric tons of greenhouse gas emissions by the end of the decade.

AEP is achieving its greenhouse gas reductions through a broad portfolio of actions, including power plant efficiency improvements, renewable generation such as wind and biomass co-firing, off-system greenhouse gas reduction projects, reforestation projects and the potential purchase of emission credits through CCX.

American Electric Power is one of the largest electric utilities in the United States, delivering electricity to more than 5 million customers in 11 states. AEP ranks among the nation’s largest generators of electricity, owning nearly 36,000 megawatts of generating capacity in the U.S. AEP also owns the nation’s largest electricity transmission system, a nearly 39,000-mile network that includes more 765 kilovolt extra-high voltage transmission lines than all other U.S. transmission systems combined. AEP’s utility units operate as AEP Ohio, AEP Texas, Appalachian Power (in Virginia and West Virginia), AEP Appalachian Power (in Tennessee), Indiana Michigan Power, Kentucky Power, Public Service Company of Oklahoma, and Southwestern Electric Power Company (in Arkansas, Louisiana and east Texas). AEP’s headquarters are in Columbus, Ohio.

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This report made by AEP and its Registrant Subsidiaries contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934. Although AEP and each of its Registrant Subsidiaries believe that their expectations are based on reasonable assumptions, any such statements may be influenced by factors that could cause actual outcomes and results to be materially different from those projected. Among the factors that could cause actual results to differ materially from those in the forward-looking statements are: electric load and customer growth; weather conditions, including storms; available sources and costs of, and transportation for, fuels and the creditworthiness of fuel suppliers and transporters; availability of generating capacity and the performance of AEP’s generating plants; AEP’s ability to recover regulatory assets and stranded costs in connection with deregulation; AEP’s ability to recover increases in fuel and other energy costs through regulated or competitive electric rates; AEP’s ability to build or acquire generating capacity

when needed at acceptable prices and terms and to recover those costs through applicable rate cases or competitive rates; new legislation, litigation and government regulation including requirements for reduced emissions of sulfur, nitrogen, mercury, carbon, soot or particulate matter and other substances; timing and resolution of pending and future rate cases, negotiations and other regulatory decisions (including rate or other recovery for new investments, transmission service and environmental compliance); resolution of litigation (including pending Clean Air Act enforcement actions and disputes arising from the bankruptcy of Enron Corp. and related matters); AEP's ability to constrain operation and maintenance costs; the economic climate and growth in AEP's service territory and changes in market demand and demographic patterns; inflationary and interest rate trends; AEP's ability to develop and execute a strategy based on a view regarding prices of electricity, natural gas and other energy-related commodities; changes in the creditworthiness of the counterparties with whom AEP has contractual arrangements, including participants in the energy trading market; actions of rating agencies, including changes in the ratings of debt; volatility and changes in markets for electricity, natural gas and other energy-related commodities; changes in utility regulation, including the potential for new legislation or regulation in Ohio and/or Virginia and membership in and integration into regional transmission organizations; accounting pronouncements periodically issued by accounting standard-setting bodies; the performance of AEP's pension and other postretirement benefit plans; prices for power that AEP generates and sell at wholesale; changes in technology, particularly with respect to new, developing or alternative sources of generation; other risks and unforeseen events, including wars, the effects of terrorism (including increased security costs), embargoes and other catastrophic events.

## **BACKGROUND: American Electric Power's Actions to Address Climate Change**

### **GHG Reduction Commitment**

American Electric Power (AEP) was the first and largest U.S. utility to join the Chicago Climate Exchange (CCXSM) and make a legally binding commitment to gradually reduce or offset its greenhouse gas emissions to 6 percent below the average of 1998-2001 emission levels by 2010.

As a founding member of CCX, AEP committed in 2003 to reduce or offset its emissions gradually to 4 percent below the average of 1998-2001 emission levels by 2006 (1 percent reduction in 2003, 2 percent in 2004, 3 percent in 2005 and 4 percent in 2006). In August 2005, AEP expanded and extended its commitment to a 6 percent reduction below the same baseline by 2010 (4.25 percent in 2007, 4.5 percent in 2008, 5 percent in 2009 and 6 percent in 2010). Through this commitment, AEP expects to reduce or offset approximately 46 million metric tons of greenhouse gas emissions.

### **Operational Improvements**

AEP has been able to reduce its carbon dioxide (CO<sub>2</sub>) emissions by improving plant efficiency for its fossil-fueled plants through routine maintenance and investments like turbine blade enhancements (installing new turbine blades) and steam path replacements that improve the overall heat rate of a plant and, in turn, reduce CO<sub>2</sub> emissions. A one-percent improvement in AEP's overall fleet efficiency can reduce the company's greenhouse gas emissions by 2 million metric tons per year.

AEP has also reduced its CO<sub>2</sub> emissions by improving the performance and availability of its nuclear generation. AEP's D.C. Cook Nuclear Plant in Michigan set plant records for generation and capacity factor in 2005. The plant had a capacity factor (energy generated as compared to the maximum possible) of 96.8 percent in 2005 and generated 17,471 gigawatt-hours (GWH) of electricity. Additionally, AEP will invest \$45 million to replace turbine motors in one unit at D.C. Cook in 2006, which will increase that unit's output by 41 megawatts.

As a member of the US EPA's Sulfur Hexafluoride (SF<sub>6</sub>) Emissions Reduction Partnership for Electric Power Systems, AEP has significantly reduced emissions of SF<sub>6</sub>, an extremely potent greenhouse gas, from 1999 levels of 19,778 pounds (a leakage rate of 10 percent) to 2004 emissions of 1,962 pounds (a leakage rate of 0.5 percent).

### **Managing Forests and Agricultural Lands for Carbon Sequestration**

To reduce carbon dioxide (CO<sub>2</sub>) concentrations in the global atmosphere, AEP has invested more than \$27 million in terrestrial sequestration projects designed to conserve and reforest sensitive areas and offset more than 20 million metric tons of CO<sub>2</sub> over the next 40 years. These projects include protecting nearly 4 million acres of threatened rainforest in Bolivia, restoring and protecting 20,000 acres of degraded or deforested tropical Atlantic rainforest in Brazil, reforesting nearly 10,000 acres of the Mississippi River Valley in Louisiana with bottomland hardwoods, restoring and protecting forest areas in the Sierra Madres of Guatemala, and planting trees on 23,000 acres of company-owned land.

### Deploying Technology for Clean-Coal Generation

AEP is focused on developing and deploying new technology that will reduce the emissions, including greenhouse gas emissions, of future coal-based power generation. AEP announced in August 2004 its plans to build a commercial-scale Integrated Gasification Combined Cycle (IGCC) plants to demonstrate the viability of this technology for future use of coal in generating electricity. AEP has filed for regulatory approval in Ohio and West Virginia to build a 629-megawatt IGCC plant in each of these states. The plants are scheduled to be operational in the 2010 to 2011 timeframe and will be designed to accommodate retrofit of technology to capture and sequester CO<sub>2</sub> emissions.

### Developing Technology for CO<sub>2</sub> Capture and Storage

AEP's Mountaineer Plant in New Haven, W.Va., is the site of a \$4.2 million carbon sequestration research project funded by the U.S. Department of Energy, the Ohio Coal Development Office, and a consortium of public and private sector participants. Scientists from Battelle Memorial Institute lead this climate change mitigation research project, which is designed to obtain data required to better understand and test the capability of deep saline aquifers for storage of carbon dioxide emissions from power plants.

AEP is a member of the FutureGen Alliance, who, along with the Department of Energy, will build "FutureGen," a \$1 billion, near-zero emission plant to produce electricity and hydrogen from coal while capturing and disposing of carbon dioxide in geologic formations.

Additionally, AEP funds research coordinated by the Massachusetts Institute of Technology Energy Laboratory and the Electric Power Research Institute that is evaluating the environmental impacts, technological approaches, and economic issues associated with carbon sequestration. The MIT research specifically focuses on efforts to better understand and reduce the cost of carbon separation and sequestration.

### Renewable Energy and Clean Power

AEP strongly supports increased renewable energy sources to help meet our nation's energy needs. AEP is one of the larger generators and distributors of wind energy in the United States, operating 311 megawatts (MW) of wind generation in Texas. The company also purchases and distributes an additional 373.5 megawatts of wind generation from wind facilities in Oklahoma and Texas. Additionally, AEP operates 2,285 megawatts of nuclear generation and 884 megawatts of hydro and pumped storage generation.

More than 125 schools participate in AEP's "Learning From Light" and "Watts on Schools" programs. Through these programs, AEP partners with learning institutions to install 1 kW solar photovoltaic systems, and uses these systems to track energy use and demonstrate how solar energy is a part of the total energy mix. Similarly, AEP's "Learning From Wind" program installs small-scale wind turbines to provide wind power education and renewable energy research at educational institutions.

### Biomass Energy

Until the company sold the plants in 2004, AEP co-fired biomass in 4,000 MW of coal-based power generation in the United Kingdom (Fiddler's Ferry and Ferry Bridge). AEP has been evaluating and testing biomass co-firing for its smaller coal-fired power plants in the United States to evaluate potential reductions in CO<sub>2</sub> emission levels.

### Energy Conservation and Energy Efficiency

AEP is implementing "Energy Efficiency Plans" to offset 10 percent of the annual energy demand growth

**in its Texas service territory. In 2003 alone, AEP invested more than \$8 million to achieve over 47 million kilowatt-hours (kWH) of reductions from installation of energy efficiency measures in customers' homes and businesses. Total investments for the four-year program will exceed \$43 million, achieving more than 247 million kWH of energy efficiency gains.**

#### 2005 EPA Climate Protection Award

**In May 2005, the EPA selected AEP to receive a 2005 Climate Protection Award for demonstrating ingenuity, leadership and public purpose in its efforts to reduce greenhouse gases. EPA began the Climate Protection Awards program in 1998 to recognize outstanding efforts to protect the earth's climate.**