Summary of Testimony of Larry Dickerman, Director - Distribution Engineering Services, American Electric Power before the House Science and Technology Committee on October 3, 2007.

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 more than 38,000 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 (Virginia, West Virginia), AEP Appalachian Power (Tennessee), Indiana Michigan Power, Kentucky Power, Public Service Company of Oklahoma and Southwestern Electric Power Company (Arkansas, Louisiana and east Texas). Combined, these utility units operate and maintain over 207,000 miles of distribution lines in service territory covering approximately 197,500 square miles.

AEP is the leader among US utilities for deployment of large-scale battery-based energy storage. Over the last 100 years, AEP has been an industry leader in developing, advancing and deploying new technologies and has always recognized the value of energy storage. In 1965, AEP's Smith Mountain, a 600MW pumped hydro energy storage facility in Virginia, came on line with the ability to provide peaking power within minutes and thereby better utilize the company's existing generation and transmission assets.

Over the last decade, AEP tested and evaluated the feasibility of new battery and supercapacitor technologies in its engineering laboratories. Based on those tests, AEP decided to use sodium sulfide (NAS) batteries for a distributed energy storage system to support its distribution grid. The major factors in selecting the NAS technology over the alternative storage technologies were its commercial operation experience, compact footprint, high efficiency, zero emissions and relocation ability.

Based on successful laboratory and demonstration projects, AEP worked with NGK Insulators and S&C Electric Company to deploy AEP's first commercial 1MW NAS battery in 2006 on a 12kV distribution feeder in Charleston, WV, and recently announced a new initiative to deploy more energy storage on its system including 6MW of additional NAS-based energy storage by the end of 2008; at least 25MW of NAS battery capacity in place by the end of this decade and adding another 1,000MW of advanced storage technology in the next decade.

Energy storage technologies, such as the NAS battery, offer many benefits to improve the reliability and performance of the distribution system. These benefits include reducing peak load, providing backup energy and offering shorter deployment. In addition, energy storage also complements the "modern grid" concept. Although this technology in most cases rests on the distribution side, other benefits of energy storage extend to all parts of the electric utility infrastructure, including helping to optimize generation.

The Department of Energy (DOE) played a critical role in helping deploy AEP's project in West Virginia by covering the non-repeat engineering costs that were needed for this first-of-a-kind installation in North America.

AEP supports the adoption of incentives for deployment of distributed stationary energy to improve security, reliability and performance of the United States electric grid infrastructure.

Testimony of

Larry Dickerman

Director - Distribution Engineering Services

American Electric Power

Before the House Science and Technology Committee

October 3rd, 2007

Good morning Mr. Chairman and distinguished members of the House Committee on Science and Technology. Thank you for inviting me here today. Also, 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 the significance of deploying energy storage for improvement in security, reliability and performance of America's electricity infrastructure.

My name is Larry Dickerman, and I am the Director of Distribution Engineering Services of American Electric Power (AEP). Headquartered in Columbus, Ohio, we are one of the nation's largest electricity generators -- with over 38,000 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. In addition, 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 US transmission systems combined. We also operate and maintain over 207,000 miles of distribution lines in a service territory covering approximately 197,500 square miles. But of particular importance for the Committee members here today, AEP is the leading utility in the US for deployment of large-

scale energy storage, which improves the security, reliability and performance of our distribution grid. Of particular note, AEP installed the first-ever, megawatt (MW)-scale NAS battery in the Western hemisphere in 2006.

Over the last 100 years, AEP has been an industry leader in developing, advancing and deploying new technologies and has always recognized the value of energy storage. In 1965, for example, AEP's Smith Mountain, a 600MW pumped hydro energy storage facility in Virginia, came on line with the ability to provide peaking power within minutes, thereby reducing peak demand and better utilizing the company's generation and transmission assets.

Grid Modernization and Energy Storage

In many respects, the distribution grid of 2007 is not much different than the grid of 1965. Consequently, many associated with the electric utility industry are talking about developing a "smart grid," "modern grid" or "the grid of the future." I first want to address what is meant by these terms and how energy storage fits into the concept of a "modern grid." One clear analogy is the progress that has been made with automobiles since 1965. In 1965, automobile builders compromised on components so cars could meet a variety of demands such as acceleration and steady state driving. In addition, the components could not communicate and had limited adaptability to meet different demands. An automobile built in 2007 is far different in that a communication system provides information to on-board computers and components have the ability to adapt how they operate based on input about varying conditions. Consequently, a modern car performs better, stops better, pollutes far less and gets better gas mileage. More recently, this dynamic optimization has been taken a step further with on board batteries in Hybrid Electric Vehicles. The on-board batteries provide further

opportunities to size the engine for steady state conditions, while the battery provides power for acceleration and other peak demands.

The utility grid in the United States is an enormously complex system that like automobiles can benefit from a modern communication infrastructure, interconnected computers, devices that can dynamically change and store energy. To achieve dynamic optimization similar to what has been achieved in the automotive industry, the "modern grid" will require:

- Inexpensive communication systems that work over large areas;
- Computer protocols determining how each connects/communicates with various pieces of equipment;
- Equipment from suppliers that can receive communication and dynamically adapt; and
- Electricity storage devices to optimize use of assets and improve reliability.

A "modern grid" using this technology would improve reliability, improve the utilization of existing assets, move demand off peak, help customers reduce usage, and help with the integration of distributed resources.

AEP Efforts to Deploy Energy Storage

A key component of the "modern grid" and of particular interest today is energy storage. Over the last decade, AEP tested and evaluated the feasibility of new battery and supercapacitor technologies in its engineering laboratories. Based on those tests, AEP decided to use sodium sulfide (NAS) batteries for a distributed energy storage system to support its distribution grid. The major factors in selecting the NAS technology over the alternative storage technologies were:

- 15 years of commercial operational experience in Japan at sizes over 1MW (1MW produces enough energy to power 600 homes).
- The ability to have high energy and power density in a compact footprint the size of a double-decker bus.
- High efficiency through the charge/discharge cycle.
- No emissions, vibrations or noise concerns
- Ability to economically relocate and recycle

AEP first tested a small 12.5kW module (enough power to feed seven homes) in our laboratories and installed a 100kW demonstration unit (enough power to feed 60 homes) for peak shaving and backup power to one of our office buildings in 2002. As a next step, AEP worked with NGK Insulators (manufacturer of NAS batteries) and S&C Electric Company (manufacturer of the system to connect DC battery to an AC power grid) to deploy its first commercial 1MW, 7.2MWh[1] NAS battery in 2006 on a 12kV distribution feeder in Charleston, WV. This site was chosen to alleviate overloading of an existing distribution transformer. By installing the battery, AEP was able to reduce its daily peak load and, therefore, defer substantial capital investment on a new distribution substation. The Department of Energy (DOE) played a critical role in this project by covering the non-repeat engineering costs that were needed for this first-of-a-kind deployment in North America and we deeply appreciate their assistance.

Following the successful operation of the NAS battery in West Virginia, AEP recently announced a new initiative to deploy more energy storage on its system including (see the attached press release):

[1] 7.2MWh can feed 1MW of electricity for 7.2 hours.

- An additional 6MW added of NAS-based energy storage by the end of 2008.
- At least 25MW of NAS battery capacity in place by the end of this decade.
- Adding another 1,000MW of advanced storage technology in the next decade.

AEP, NGK and S&C are now in the process of further developing NAS battery technology by implementing an "islanding" feature to improve distribution reliability. With "islanding," the battery can be deployed at the end of a long remote distribution line and provide power even when the normal feed is interrupted. AEP will demonstrate the "islanding" technology with four megawatts of the six megawatts planned for 2008. The islanding feature will also demonstrate the use of communication and control systems necessary for the deployment of a "modern grid."

The other two megawatts scheduled for 2008 will be deployed at a site near wind generation that will help AEP understand how electrical storage can enhance wind generation. NAS batteries can help by storing energy whenever the wind does blow and giving the energy back when needed most during times of peak demand. NAS batteries can be utilized with wind and all forms of generation today, but likely will become even more attractive as the price for NAS batteries decreases through greater volumes and the need increases due to a greater number of wind generators.

Electricity Storage Benefits

Energy storage technologies, such as the NAS battery, offer many benefits to improve the reliability and performance of the distribution system. Although this technology in most cases rests on the distribution side, other benefits of energy storage extend to all parts of the electric utility

infrastructure, including helping to optimize generation. A list of benefits of energy storage includes but is not limited to the following:.

- Improving service reliability and power quality by being a backup energy source ("islanding") during outages.
- Reducing peak load (or lead leveling) and hence reducing the need for other local capacity upgrades in distribution
- Complementing "smart grid" or "modern grid" benefits by taking advantage of the distribution grid's communication and control features.
- Much shorter deployment time than most conventional solutions to address many immediate grid problems.
- Enhancing the use of wind generation during periods of peak demand.

Most importantly, in a given application, many of these benefits can be achieved at the same time.

AEP Perspective on a Federal Energy Storage Research, Development and Deployment Program

In the past, the United States led the world in pure research on energy storage. For example, the concept of the NAS battery was pioneered in the United States in 1965 for electric vehicle applications. Others in the US and Europe continued to advance the technology. However, in the mid 1980s, the Tokyo Electric Power Company and NGK, with support from the Japanese government, launched a development and demonstration program that successfully commercialized the technology for utility-scale applications. Because of this, AEP would suggest and strongly support a federal energy storage research, development and deployment program that would join technology experts

with end-users of energy storage to actively develop, guide, and implement a government-supported storage program. To do this, federal funding needs to be balanced between research and "real world" applications to advance the technology. A few sample projects could include:

- Implementing large scale battery “islanding” capability to improve reliability in rural areas.
- Developing a “smart” or “modern grid” installation and integrate energy storage.
- Using energy storage to improve security to critical infrastructure that includes police, fire stations, water pumps and hospitals.
- Exploring greater benefits of the technology on the entire energy infrastructure, including distribution, transmission and generation.

Legislation to establish Federal financial support is needed to encourage end-users to overcome their respective entry costs to deploy large-scale energy storage systems. For example, an investment tax credit in the range of 30 percent of the initial investment in an energy storage facility would help accelerate deployment across the industry. (Note that in Japan, the government has subsidized early end-users of energy storage for grid support and currently covers one third of the cost of energy storage facilities that support the deployment of wind power systems.)

AEP Perspective on Renewable Resources

AEP strongly supports the increased use of renewable energy sources and believes that further technological advances and commercial deployment of energy storage technologies will significantly increase the use of renewable energy sources. Today, we have 467MW of wind generation under purchased power agreements, but we intend and fully expect to increase our renewable portfolio into

the future. That said, we oppose the federal Renewable Portfolio Standard (RPS) recently adopted by the House (and similar measures) as a costly and unnecessary government mandate.

The RPS adopted by the House, for example, will likely cost electricity consumers billions of dollars in higher electricity cost without the development of significant additional renewable generation or, more importantly, without any technological advances. Simply put, many retail electric suppliers will be unable to meet the RPS through their own generation and will purchase renewable energy credits. As a result, AEP anticipates a wealth transfer from electric consumers in states with little or no renewable resources to those states with abundant renewable resources (which would likely be developed without a federal mandate) and/or the federal government. In fact, we calculate that this proposal, if implemented, would cost our customers approximately between $6 - $8 billion dollars (with some purchases of credits) in total cumulative costs by 2020.

Rather than focusing on an RPS, the Congress should promote technologies to the degree where economic and environmental benefits are optimized. For example, combining energy storage and wind generation will in the long run increase the availability of this resource and may meet the definition of economic and environmental optimization. Unfortunately, this combination would not help AEP meet the RPS mandate adopted by the House beyond the original addition of the wind generation. In short, mandates may be well intentioned, but are not always the most effective way to proceed from both an economic and environmental perspective.

Conclusion

In conclusion, energy storage is an important technology for the transformation of the existing electricity grid in the United States. A strong and cooperative partnership of industry and government can and will promote research and development and, ultimately, commercial deployment. AEP is

committed to being a part of this important process, and helping you achieve the best outcome at the most reasonable cost as quickly as practicable. Thank you again for this opportunity to share these views with you.

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FOR IMMEDIATE RELEASE

AEP TO DEPLOY ADDITIONAL LARGE-SCALE BATTERIES ON DISTRIBUTION GRID

Installations will boost reliability, integrate wind generation, prepare for future; new batteries a step toward AEP's goal of 1,000 megawatts of advanced storage

COLUMBUS, Ohio, Sept. 11, 2007 – American Electric Power (NYSE: AEP), as part of the company's comprehensive effort to integrate new technologies for reliability, renewable energy and energy efficiency to meet customers' future needs, is expanding its use of large-scale battery technology on its electricity grid.

AEP, the only U.S. utility currently using advanced energy storage technology as part of its electricity infrastructure, will be adding stationary sodium sulfur (NAS®) battery technology in its West Virginia and Ohio service territories next year.

The company will also work with wind developers to identify a third location within AEP's 11-state service territory for NAS battery deployment next year, using the storage capability to help offset the intermittent nature of wind generation.

AEP has placed an order for the three new NAS batteries with NGK Insulators Ltd. of Japan, the manufacturer and co-developer, along with the Tokyo Electric Power Co., of the technology. AEP anticipates delivery in spring 2008.

The six megawatts added to AEP's system during this deployment is a step toward the company's goal of having 1,000 megawatts of advanced storage capacity on its system in the next decade.

"We are extremely impressed with both the performance and the potential of this technology after using it in real-world applications and from experience we've gained through our long

relationship with NGK," said Michael G. Morris, AEP's chairman, president and chief executive officer. "These new installations will move us a step closer to the full potential of advanced energy storage technologies in areas like reliability improvement, peak-load shaving and the use of stored energy from renewable sources like wind to supplement available generation resources.

“We’re first movers on advanced storage among U.S. utilities, a position we’ve held on a wide number of technologies in our century of existence,” Morris said. “Our near-term goal is to have at least 25 megawatts of NAS battery capacity in place by the end of this decade. But this is just a start. Our longer-term goal is to add another 1,000 megawatts of advanced storage technology to our system in the next decade. We will look at the full spectrum of technologies – flow batteries, pumped hydro, plug-in hybrid vehicles and various other technologies in early stages of development today – to determine their feasibility and potential for commercial application.

”In our view, advanced storage technologies, like NAS batteries, and other emerging technologies to increase customers' ability to benefit from energy efficiency will play equally important roles in delaying or avoiding costly future investments in new energy delivery or generation infrastructure," Morris said. “I believe other companies will begin deploying storage technologies in the coming years.”

AEP plans to add two megawatts of NAS battery capacity near Milton, W.Va., to enhance reliability and allow for continued load growth in that area. AEP will also add two megawatts of NAS battery capacity near Findlay, Ohio, to enhance reliability, provide support for weak sub-transmission systems and avoid equipment overload.

A specific site for the third NAS battery, which is expected to be integrated with wind generation, will be announced in the coming weeks.

The combined cost for the three installations, including associated site preparation, equipment and control systems, will be approximately $27 million.

AEP has identified other potential sites for future deployment of advanced storage technologies.

In 2006, AEP installed the first megawatt-class NAS battery system to be used on a U.S. distribution system. That installation, on a substation near Charleston, W.Va., operated by AEP utility unit Appalachian Power, delayed the need for upgrades to the substation. A similar, but much smaller, NAS-based system installed in 2002 at an AEP office park in Gahanna, Ohio, was the first U.S. demonstration of the NAS technology.

The agreement to purchase additional NAS batteries was reached during an August visit to NGK in Japan by Holly Koeppel, AEP’s chief financial officer.

“AEP and NGK have had a very close business relationship for more than five years,” Koeppel said. “Our meeting in August generated the agreement for our deployment of additional batteries, but it also provided an opportunity for us to arrange an upcoming meeting with NGK for other Ohio utilities and state officials. Advanced storage technologies like NAS batteries are important to our industry’s future. That’s why we continue to lead the public policy and technology integration efforts.”

The deployment of additional advanced storage capacity is part of a comprehensive AEP initiative focused on preparing the company’s 11-state distribution system to meet future needs of customers.

“We’re looking at where we need to be in the year 2020 and will be making changes to transition our system to the grid of the future,” Morris said. “We have teams of employees examining the current and likely future needs of customers as well as the variety of technologies under development that could meet those needs. We’re looking at ways to improve reliability and efficiency of our system as well as ways to reduce consumption, which delays or avoids the need for additional generation.

“Some elements, like additional large-scale storage systems to enhance reliability, advanced metering systems to provide customers with options for reducing energy use and further integration of renewable resources, are among the likely solutions customers will see in the near term,” Morris said. “We’re also testing distributed energy resources and ‘smart grid’ or ‘self-healing grid’ technologies designed to seamlessly separate sections of the distribution grid when problems develop elsewhere, with customers seeing no disruption in power supply or quality in situations where outages would be likely today. But implementation of these technologies is a bit further off.”

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 more than 38,000 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 transmission system directly or indirectly serves about 10 percent of the electricity demand in the Eastern Interconnection, the interconnected transmission system that covers 38 eastern and central U.S. states and eastern Canada, and approximately 11 percent of the electricity demand in ERCOT, the transmission system that covers much of Texas. 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.

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 in Ohio 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 sells 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.