Executive Summary

Up in Smoke:
An Analysis of Future Costs Associated with Electricity from the Turk Coal-Fired Power Plant and Other Types of Generation

The proposed coal-fired generating facility at Hempstead County, Arkansas has raised a number of concerns regarding the environmental effects and the cost of containment measures that SWEPCO, the operating company, will face in the future. These concerns led Audubon Arkansas to contract with HISTECON Associates, Inc., for additional research into the potential long-run economic implications for this plant.

Among the many experts in the energy field, little dispute remains about the need to control or limit the environmentally harmful by-products of coal-fired plants that generate electricity. Where most experts disagree, however, is when and where these types of limits will be placed on the major concern that remains: carbon dioxide.

Coal Becomes More Expensive: When one looks at the hearings that led to the state PSC decision, by a two-to-one vote, to grant approval of the Turk plant, one critical factor that was downplayed by most utility representatives is a historical perspective regarding the limitation of today's major air pollutants. Because no current legislation requires carbon limitation, for example, the SWEPCO and AEP representatives did not factor future costs of controlling emissions into their initial cost projections. Even so, the utility's own experts and their consultants found that a coal-fired plant would be more expensive than the alternatives, **even without the addition of elevated costs in the future for carbon-emissions reductions that may be required**.

In 2008 the leaders of both political parties and both presidential candidates spoke publicly about the need for a reduction in carbon emissions. A recent review of proposed federal legislation and regulatory proposals shows a range of possible outcomes, from a return of carbon levels to year 2000 readings to actual reductions in the current levels of carbon emissions by 2020 or 2050, and originate from federal agencies, congressional proposals, and other state regulatory agencies.

Projections of future costs for carbon emissions have created a broad range, from basically no cost – the status quo – to rates in excess of $60 per ton. Most studies have concluded that carbon costs in the range of $15 to $45 per ton are a reasonable assumption during the next 20 years. For the Turk plant, we calculated the amount of CO2 that will be generated annually based on the estimate that 120 rail cars of coal will be needed daily to fuel the plant. That quantity of coal will generate about 3.6 million tons of CO2 each year of operation – some estimates are as high as 5.28 million tons – and is expected to provide customers with electricity at a cost of about $.09 per kWh.

Carbon Penalties Not in Cost Estimates: The report answers the question of how much it will cost consumers to pay for future reductions in carbon emissions from coal-fired power plants. **The short answer is: A LOT.** If we consider the range of possibilities, projections are about $5 per ton at the low end and almost $100 per ton from the EPA analysis of Senate Bill 2191. One national firm has been tracking the various legislative and environmental agency proposals for several years. In 2008, these reference numbers have risen dramatically and the projected cost is now from $15 to $45 per ton. So including these more reasonable carbon costs as part of the future costs of electricity means that SWEPCO cannot possibly provide electricity at a cost of about $.09 per kWh, once the effect of new greenhouse-gas legislation is incorporated.

One way to summarize the added cost is to consider the mid-points of the various projections. If one considers the most recent numbers from July 2008, the mid-range estimate means that costs would **increase by about one-fourth** (26.4 percent) and the upper range estimate places the **increased costs more than one-third above** the company's projection. If one considers the alternative projections that place carbon emissions from this size of plant at 5.28 million tons annually, this generates a range of costs from about $20 to about $70 per ton. Here, the mid-range estimate means that costs would **increase by more than one-third** (36.7 percent) and the upper range estimate places the **increased costs more than one-half above** (55.1 percent) the company's projection for this plant. Again, the obvious result of this scale of large cost increases is that the cost of electricity provided to SWEPCO's customers must increase dramatically. Based on the company's estimated gross revenue of $408 million per year from selling power at an average price of $0.09 per kWh, these carbon-cost increases could translate to prices of $0.127 to $0.145 per kWh.

Another way of looking at these cost data is the comparison of the utility's selected "best alternative" source for the power project. The company's own expert during the APSC hearings admitted that the Turk plant will be more expensive than a generic natural gas plant. Using the lower numbers for carbon generation, the average projected cost of carbon emissions from the 20 sources is $117.5 million for each year of operation. At a 5 percent discount rate for 40 years, the present value of these additional costs to the utility's customers is **$2.0 billion**. The higher level of carbon emissions would make the future penalties larger; the average projected cost is $172.3 million for each year of operation. The present value of these additional costs to the utility's customers is **more than $3.0 billion**, compared to the "savings" on a gas plant of $130-300 million.

Construction Costs Up: Recent figures on construction costs show the trend lines for all generating plants and for the non-nuclear sites, and although the latter increases are slightly lower they are still forcing utilities and other energy producers to reevaluate their construction budgets every six months. While the economic slowdown of 2008 may reduce some of the steam in these overheated markets, a long-term trend of even seven-

percent price increases means that last year's power plant supposedly costing $1.6 billion could have an eventual price tag of $2 billion or more by the time of its 2013 completion.

Increased Cost of Coal Not Included: Although cost increases of mined coal itself pale in comparison to the large dollar increases that the company faces in both carbon emissions and rising construction expenses, it is clear to many experts that rising coal costs are a "third shoe" dropping on the economic prospects for coal-fired power plants. The SWEPCO testimony indicated that delivered coal prices would climb to about $1.40 per million Btu – about $23 per ton – by 2013. However, based on increased worldwide demand and accompanying price rises, one analyst has predicted that delivered coal prices would reach $33-35 per ton, or about $2.00-2.10 per million Btu, by 2013. That represents **a difference of 50 percent above the projections** that the company used in its testimony before the PSC.

The Way Forward – Energy Efficiency and Renewables: Many other studies have examined the potential contribution of more energy efficiency in the U.S. economy, and have generally found very positive results for energy savings in the 20-percent range, including electricity use. While this approach was presented to the APSC during the SWEPCO public hearings, it did not appear to have a major impact on its deliberations.

Demand Side Management (DSM) is the electric-resource strategy with which many U.S. utilities control growing electric demand and energy consumption by means of targeted improvements in customer end-use efficiency or equipment operation. In utility DSM programs, energy resources are procured by means of shifting customer peak loads and by promoting the installation of high-efficiency customer equipment such as lighting, air-conditioning, motors, pumps, insulation, industrial process equipment and household appliances. In contrast to traditional generation or "supply side" utility activities, demand side resources originate on the customer or "demand" side of the electric meter.

For example, the U.S. added more windpower capacity during 2007 alone than all of the coal-fired capacity added from 2003-2007, and Texas was the largest single state for wind additions. With generation prices in the $0.035 to $0.05 per kWh during the 2000 decade, windpower continues to be highly competitive with all forms of traditional electricity sources. Yet Arkansas seems unable or unwilling to make the change to this level of commitment. A recent study of national efforts in DSM indicates that states like Florida, Massachusetts, and Texas are leaders in the amount of money spent on energy efficiency and conservation, providing from $83 to $250 million in funding in 2007.

Consider the recent comparison of electricity costs per kWh that was prepared by the California Public Utility Commission for a 2008 energy plan. For the purposes of the present study, two findings from the accompanying table are particularly striking:

1. The California study confirms that, even at historically high natural-gas prices of early 2008, combined-cycle gas-fired power plants **have a clear cost advantage**

over any of the coal-fired technologies; and

2. If a reasonable projection is used for the cost of carbon capture or an equivalent carbon tax, **"clean coal" costs would far exceed solar, wind, and even geothermal** (available in the West) alternatives that are currently producing electricity.

Misleading Job Creation Numbers: In addition, the employment and income projections that have been used by SWEPCO overstate the effect of the new plant for two reasons: first, the multiplier used was too large for this type of facility, and second, not all of the construction and operations positions can be filled by local Arkansans and their communities will not benefit fully from the economic growth. Using the inputs provided by SWEPCO we found that 151 fewer temporary jobs will be created. That is **13 percent less than the company's estimate**. Also, our numbers show that there will be 80 fewer permanent jobs created. That is **28 percent less** than the coal plant's findings.

The second reason for the overestimation is that many of the skills required by the construction and operation of the power plant are not well-represented in southwest Arkansas. To the extent that workers are not available here, the positions will be filled by workers from Louisiana and Texas who "in-migrate" for the job opportunities. This is especially true for the temporary construction jobs. This region is not a heavily industrialized area, and thus does not have a large population of skilled laborers for this type of construction. Therefore, our findings show that even if every qualified employee in Southwest Arkansas were to work on the construction of the coal plant, recent skill patterns show a shortage of over 400 workers. Unfortunately, because of the coal plant's proximity to Texas and Louisiana borders, the promised economic benefits would therefore return to those states and not to Arkansas.

Finally, one of the new realities that is often overlooked by the advocates of large power-plant developments and their eye-catching payrolls is that very encouraging employment opportunities exist in other parts of the energy industry. Some recent research has pointed out how important these types of alternative energy jobs can be to the Arkansas economy. Large power plants are capital-intensive endeavors that provide relatively few jobs on a permanent basis. At a cost of $1.6 billion, the Turk plant will employ about 110 workers during its operations phase. That equates to about **$15 million of investment per position**, and is not a very efficient job-creation process because the "labor-intensity" is not very high.

However, employment in the areas of renewable energy and energy efficiency are much more labor-oriented and create a wide swath of jobs in factories and construction that supports such projects as energy conservation, housing rehabilitation, wind farms, etc. Some of these are new types of industry, such as wind blades and turbines, and many others are simply new applications of older technologies such as fabrication and tool and die work. These jobs would be spread throughout the economy.