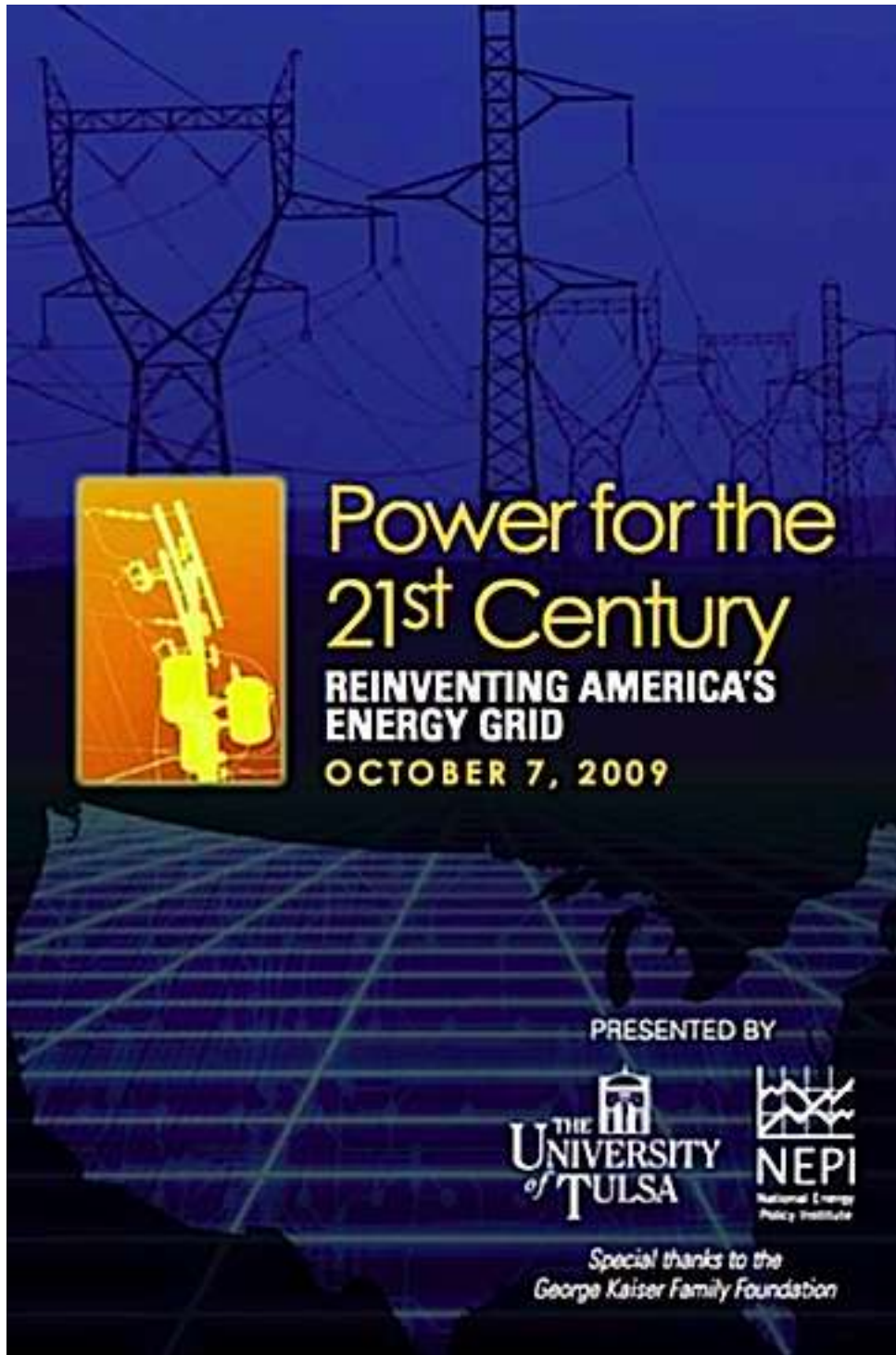


SUMMARY OVERVIEW



Power for the 21st Century

REINVENTING AMERICA'S ENERGY GRID

October 7, 2009

SUMMARY OVERVIEW

The National Energy Policy Institute (NEPI) joined forces with the University of Tulsa (TU) to present "Power for the 21st Century: Reinventing America's Energy Grid" which took place at TU's Allen Chapman Activity Center on October 7, 2009. The conference, designed to discuss the nation's energy problems, featured an elite roster of panelists and speakers that included regulators, legislators, academicians, consumers and industry representatives from Oklahoma, our region and across the country. NEPI is a nonprofit organization funded by the George Kaiser Family Foundation. Its purpose is to provide a rational analysis of energy policy to enable decision makers to improve our national security by reducing our dependence on imported oil and reducing our emissions of greenhouse gas.

President of NEPI, Tony Knowles, opened the event by saying "Our goal in presenting this conference is to stimulate productive discussion in several key areas that are critical to how America meets electric power demands in the 21st century: Supply options, Demand management, Regulatory challenges and Transmission. The format of this conference creates the opportunity to discuss a variety of perspectives on each issue. We hope this conference will provide food for thought, and make a meaningful contribution to the discussion of these critical issues."



Tony Knowles - NEPI President

President Knowles is a former two-term governor of Alaska. While serving as governor, he chaired the Western Governors Association and the Interstate Oil and Gas Conservation Commission. Knowles was born and raised in Tulsa. He graduated from Yale University with a bachelor's degree in economics.

Presentation Summary

Knowles stated, "America is now poised to make fundamental changes in how we power this country and how the world is powered." The change must be boldly innovative, at the lowest cost, fair and at the cutting edge of technology. He described the University of Tulsa as a school of national excellence in the study of oil and gas energy issues. It is now prepared to lead the way to a new 21st Century American Energy Center. Dean Janet Levit of the TU College of Law, recently accepted a \$2.5 million endowment from the George Kaiser Family Foundation for the Fred Dorwart Energy Law Chair. NEPI is also joining with TU to facilitate technology transfers to establish new business and job growth. Knowles discussed NEPI's involvement with the Washington, D.C., based research group, Resources for the Future, in a comprehensive energy strategy project. They're using the best available national experts to score and rank each strategy on the marginal costs of reducing each barrel of oil and ton of greenhouse gas. The study will be released in January. The goal is to use this information to advance a rational national energy policy that reflects more of the sum of our best wisdom rather than our best lobbyists. It is our belief that this conference will help broaden the public knowledge base and help initiate thoughtful policy ideas in one of our country's most important challenges.

STATE POLICIES - A Bridge or Barrier to Renewable Energy?



Gary Allison, Vice Dean, TU College of Law

Professor Allison earned his J.D. in 1972 from The University of Tulsa and his LL.M. in 1976 in the area of economic regulation from Columbia University. He teaches constitutional law, water law, and regulated industries. Professor Allison is a fellow of the Sustainable Energy & Resources Law Program of the College of Law. His scholarship includes a casebook on regulated industries and numerous articles on constitutional law and energy policy. As special counsel to the Oklahoma Corporation Commission, he helped organize and write a study of issues the OCC encountered in deciding whether to adopt various public utility standards proposed in the landmark Public Utilities Policies Act of 1978. Professor Allison has been lead counsel on five State Supreme Court challenges to initiative petitions concerning state government reorganization, abortion rights, education reform, and congressional term limits. He has been a Democratic nominee for Congress.

Presentation Summary

Allison discussed the potentials and constraints of renewables, and how our current market structures may affect key supply and demand choices. He pointed out that currently coal is by far the most utilized resource and combined with natural gas, nuclear power and hydroelectric it accounts for 95% of what is being used. All other renewables amount to only about 2.6%. That includes wind, solar, wood, geothermal, and other biomass. Wind is the leader of this group. Fuel cells could possibly be the game changer of the future.

The Constraints:

- **Cost:** With some renewables the cost is all upfront. Currently coal is the least costly and solar the most expensive. Geothermal, natural gas, nuclear, biopower and wind fall in between in that order.
- **Transmission:** It is a big issue for wind, solar and geothermal because you must build where the resources are and sometimes they are very remote.
- **Intermittency:** Some resources cannot produce at a steady level and can't be stored well.
- **Environmental:** Each renewable carries an environmental impact and many create the 'not in my back yard' response. For example, using water resources raises the issue of reducing the number of dams or not building more dams. Biopower materials are at odds with things like the use of corn for food or power generation. Thermo electric production is the highest consumer of water in the country.

Renewables depend upon subsidization if we are going to meet the timetables of 2010 or 2020. Some states are creating renewable energy credits as a way of subsidizing production. If we can get enough renewables in use, technology will advance with a critical mass at some point. Scientists, engineers, and economics take over and build a better mousetrap.

Net metering can spread the cost. It is a business arrangement between an individual power generator and a power distributor where you generate electricity for your own use and sell the excess back to the grid.

Voluntary purchase, a 'green' marketing plan, asks if you would be willing to contribute to a fund to buy renewable energy.

Feed In Tariff is a form of Renewable Portfolio Standard whereby all users on the grid pay the same amount for energy from a specified renewable technology.

'Not in my back yard' plays a huge role in picking sites for transmission. Some states have gone to a one-stop shop for transmission siting, while some states have not, especially for renewables. Answers are not yet clear.

Climate change is going to dramatically impact the water supply. Demand will exceed supply and the solutions are not being fully addressed.

We need subsidies, feed in tariffs and dramatic carbon policy and radical R&D on the Manhattan Project scale. We must face the fact that you can force ratepayers to pay. It's hard for elected commissioners to abide by this and retain their jobs, but we need to make radical changes to what we're doing now. We need to research renewables. We need to explore things like fuel cells and batteries. Batteries could possibly lead to the option that we won't need transmission grids. Battery technology is the new Saudi Arabia. China has 4 research projects on renewables, India has 3 and we have 2.

The very things needed to solve climate change, may be the things that will save the economy for our children.

SUPPLY: SHIFT TO ALTERNATIVE FUELS AND RENEWABLES - WHAT'S IN IT FOR ME?

Energy supply is the foundation of the American economy. This panel discussed current and future supply opportunities and challenges, including the ever-increasing shift toward renewable energy and changing supply priorities.



MODERATOR - MICHAEL C. MOFFET, Commissioner, Kansas Corporation Commission

Michael C. Moffet was appointed to the Kansas Corporation Commission by Governor Kathleen Sebelius on June 25, 2004. Moffet has served in regulatory and public service capacities at the state and federal levels. His governmental roles included serving as counsel to the U.S. Senate Committee on Commerce, Science & Transportation, Aviation Subcommittee, and as a legislative assistant to former Sen. Nancy Landon Kassebaum. In that capacity, he handled legislation on energy, transportation, banking and foreign affairs. Moffet's previous regulatory experience included service as assistant administrator for policy, planning and international aviation for the Federal Aviation Administration (FAA). He was also a special assistant to the administrator of the FAA. Moffet has been employed by Public Strategies, a Texas public affairs consulting company that provided advice to the president of SBC, Kansas, on legislative and regulatory affairs. He has been named to the National Association of Regulatory Utility Commissioners (NARUC) Committee on Telecommunications. A native of Norton, Kansas, Moffet graduated from the University of Kansas, earning a bachelor of science degree with distinction, from the William Allen White School of Journalism in 1972. He obtained his juris doctorate from the University of Kansas School of Law in 1975.

PANELISTS



MATT BAKER, Commissioner, Colorado Public Utilities Commission

Matt Baker was appointed as a commissioner of the Colorado Public Utilities Commission on January 15, 2008 by Gov. Bill Ritter, Jr. and was confirmed January 28, 2008. Before joining the commission, Baker served as the executive director of Environment Colorado, where he was the architect of Colorado's Renewable Energy ballot initiative, Amendment 37. Matt was a leader in efforts to double Colorado's renewable energy goals, implement policies to greatly expand utility energy efficiency programs and promote state goals to reduce carbon dioxide emissions. In addition, he was a leader on state transportation policy initiatives, including the successful build out of the Denver metro-area's light rail system. Before joining the Commission, Baker served as the vice chair of the Transit Alliance. He was appointed by then-Governor Bill Owens to the Colorado Pollution Prevention Partnership, and was vice chair of the Interwest Energy Alliance. Baker has a bachelor's degree from Penn State University.

Presentation Summary

The Colorado new energy story.....!

In 2001, about 90% of energy generated in Colorado was from coal and 9% was from gas. Today it is about 70% coal, 20% gas and 10% from renewables. Renewables are up from less than 1% in 2004 to 10%. By 2013 we'll reach 18 to 22% from renewables. Most will be from wind. We use solar, but water is a very big issue with that. Colorado is not a leader, but we are moving faster than virtually any other state, which has produced a lot of job growth. The new energy cluster is creating more jobs than any other sector during the economic downturn and in a few years it will be on a par with natural gas in terms of state employment. Colorado has the world's largest turbine manufacturer, Vestas, who employs about 4,000 people. Two wind tower manufacturers have located in Colorado. The world's lowest cost (\$100/watt) manufacturer of thin film solar started a production line in Colorado and Siemens/Conoco Phillips has set up R&D facilities.

There are four elements to Colorado's renewable energy policy: 1) We have an enormously engaged utility in Xcel Energy. 2) State policies are well synced to promote our goals. 3) Our resource base for renewables, although not the best in any category is pretty good in most categories. 4) There has been a large effort to develop intellectual capital in Colorado.

The utilities, on their own, worked to increase renewable penetration in Colorado and to create a smart grid experiment in the city of Boulder. They've made a commitment to move forward in their next resource plan with 800 MW of wind, 200 MW of central solar and an enormous amount of distributed generation.

State Policy: The governor is committed to moving from 10% to 20% renewable energy. We passed transmission legislation that created incentives to build transmission facilities. We passed a bill that would identify all the renewable resources in the state, map the transmission needs and create state blueprints with the ultimate goal of creating an export economy. Regulators have been appointed who share the governor's vision and who have the consumer's interests at heart.

Intellectual capital is thriving in Colorado with the National Renewable Energy Laboratory (NREL). At the state level we've developed what we call the collabortory...a partnership between NREL, the Research Institute of the School of Mines and state universities to take technology from the laboratory to businesses.

Finally, we are developing renewable energy with a mix of resources that will allow us to reach our penetration levels of 15 to 20% at reasonable costs while helping grow our economy.



ELIZABETH SALERNO, Director of Industry Data and Analysis, American Wind Energy Association

Elizabeth Salerno is the manager of policy analysis for the American Wind Energy Association (AWEA). She manages AWEA's analytical agenda including wind market economics, energy subsidies, economic development statistics including green jobs, and effect of policy options on wind industry market growth. She provides analytical support across AWEA's legislative agenda including the Production Tax Credit, Renewable Portfolio Standards, Climate Change Regulations and Research & Development Budget. Salerno holds a master's degree in environmental public policy from George Washington University and graduated with honors from Boston University with a bachelor of arts degree in economics.

Presentation Summary

Last year U.S. investments totaled \$17 billion in wind projects, which includes jobs and economic development, even exceeding longtime leader Germany. We installed 8,500 MW of wind in the U.S. using 5,000 turbines with a total of 250,000 MW in the ground. It was the largest year ever for wind for any country worldwide.

What is the generating capacity added in a given year? How much of that is wind and how much is renewable? In 2008, 42% of that capacity was wind; natural gas was about 48%. In 2009, we've done about 4,000 MW in the first three quarters and another 1,500 MW are under construction for wind, putting us in the 6,500 MW range, lower than 2008, but as expected given the economic downturn. Looking at the total wind supply potential in the US, we have 8 thousand gigawatts or 8 million MWs potential on land plus another 4 to 6,000 gigawatts offshore.

To reach 20% wind generation in this country by the year 2030 we need 300,000 MWs of wind capacity. Salerno called this goal "a heavy lift and not business as usual and really on the side of a paradigm shift to do this." Salerno cites that 16,000 megawatts a year would have to be added to reach that goal of 20% by 2030. There will be a 2% incremental cost to build for that much wind in the US. The nature of wind makes it a capital-intensive product with all costs being up front.

The offsets are the reduced costs in carbon emissions and water uses. There were 55 new or announced manufacturing facilities in 2008 solely for the purpose of the manufacture of wind components. Those 55 facilities represent 16,000 manufacturing jobs in one year, which can help build a new manufacturing base in this country. Under the 20% scenario, there would be about 500,000 jobs in the year 2030.

To integrate wind into the system the cheapest way is to put a market in place that will use demand side management. Next, we change how we use our units on the margin. Energy storage is going to be an important piece of the system going forward. We can use pumped hydro as a stored power and keeping gas in the pipeline is also an option for storage. Regarding transmission, the wind corridor is there, but we need some regulatory changes to put it to use.

Salerno pointed out that construction of wind farms and high-voltage transmission lines would cost billions of dollars, but the 20-percent scenario would save money in reduced carbon emissions and water savings otherwise used to cool thermal power plants



ROBERT WEGENER, Oklahoma Secretary of Energy

Robert “Bobby” Wegener currently serves the state of Oklahoma as secretary of energy. Wegener served as deputy secretary of energy under David Fleischaker from 2005 through 2008. In 2005, Wegener represented Oklahoma in Azerbaijan to help initiate economic and educational partnerships between Oklahoma and this former Soviet Republic. A graduate of Texas A&M University and the University of Oklahoma College of Law, Wegener came to state service from the Oklahoma City law firm, Clark, Stakem, Wood & Patten. Wegener’s general litigation practice included work on oil and gas, public utilities, and education law. He published regular articles in *Better Schools*, the newspaper for the Cooperative Council for Oklahoma School Administrators. Before practicing law, Wegener conducted domestic and international business transactions for a corporation in Houston, Texas. Wegener has a bachelor’s degree in accounting, with an emphasis on international business from Texas A&M. While at Texas A&M, Wegener was recognized as a College of Business Fellow. Wegener is a member of the Oklahoma and Oklahoma County Bar Associations as well as the William J. Holloway American Inn of Court.

Presentation Summary

Wegener said, “What Oklahomans should do is think long term about our power supply. Natural gas and wind are the two dominant forms of energy in Oklahoma.” He feels we should focus on a partnership between natural gas, renewables and demand management.

All energy will require subsidies to be competitive. The incentives for nuclear are competitively robust. We can no longer say that coal is cheap because it is not cheap anymore and we don’t know what the cost will be.

Natural gas is clean, domestic and abundant. In 2008, \$2 billion of Oklahoma’s \$7 billion budget came from energy revenues. The largest end use for natural gas has become electric power generation. We have more natural gas in the US than there is oil in Saudi Arabia. Burning natural gas to generate electricity creates 50% less CO₂ emissions than coal. Also, natural gas is best suited to back up our intermittent renewables like wind and solar

In Oklahoma we have to have a balanced energy portfolio and we shouldn’t rely only on natural gas. With a policy battle going on in Washington right now regarding natural gas, some believe that natural gas is scarce. From a natural gas perspective it is important that we agree that carbon emissions need to be reduced and it’s critical to support alternative energy development.

With 1,000 MW of wind in Oklahoma, we can see \$1.2 billion of positive economic impact according to the National Renewable Energy Lab.

Wegener pointed out the increased availability of an ample state resource, natural gas, noting that shale formations and directional drilling make natural gas a cleaner, more cost-effective option than other fossil fuels.

“Demand side management, or curtailing how much energy consumers use at the residential level, also can play a tremendous role,” Wegener said. Utility companies AEP-PSO and OG&E are currently taking their demand-side plans before the Oklahoma Corporation Commission.

Renewable Portfolio Standards - 29 states and Washington, DC have RPS and there are six states that have established goals. The manufacturing part of economic development as it relates to wind is directly connected to state development in renewable portfolio standards. If we develop policy that supports natural gas and integrate that capacity with the renewable portfolio, we'd have a real opportunity for a balanced electric generation portfolio that makes sense.

EPA is now telling us that geothermal heat pumps are possibly the cleanest space heating and cooling technology.

This is not a free market it is a regulated market and we have to make policy changes to help people manage demand.



ANDY WEISSMAN, Senior Energy Advisor, FTI Consulting, Inc.

Andy Weissman is a nationally recognized expert on the oil and gas markets and editor-in chief and publisher of Energy Business Watch, one of the most highly regarded market advisory services in the industry. He has over 30 years experience as a senior-level energy industry advisor on cutting-edge issues, generally at the CEO level and is the senior energy advisor to FTI Consulting, Inc., a major New York Stock Exchange-listed consulting firm with more than 3,600 employees globally (NYSE:FCN). He is one of the most sought-after speakers in the country on energy issues. In addition to publishing his market advisory service, Weissman writes a monthly column on energy markets for American Oil & Gas Reporter, which the publisher indicates is the most popular column American Oil & Gas has ever run. Beginning in early 2002, when he began publishing his analyses of the U.S. natural gas market, and prices were at \$2.25/MMBTU, Weissman has been more accurate than any other forecaster in predicting major price trends in the natural gas market. During the past five years, he has correctly called every significant price movement, often before any other market expert saw it coming. His analyses of price trends in the oil market also have been among the most accurate published by any forecaster. With this track record, Weissman's analyses of the oil, gas, coal and electricity markets are widely sought out by energy producers, major energy traders, hedge funds, senior executives of major energy companies, large energy users and senior government officials.

Presentation Summary

We have a need for integrated realistic planning that can develop strategies, which can solve the problems created by climate change. There are many proponents for individual pieces, but we need a plan to weave them all together.

There's an urgent need to have a viable energy supply. Although we need to talk about the long term, we really must focus on the immediate future - the next 3 to 10 years. We can't afford more of the kind of dislocations we've recently experienced in the energy sector.

In 2007, oil prices never reached \$80 a barrel and we couldn't predict that prices would exceed \$100 a barrel one year later. Natural gas prices increased 70% to 80% and since the summer of 2008 have fallen by two thirds. It created far-reaching implications for our ability to sustain investments and predict the growth and demand for energy. We had no idea of the radical

change in natural gas prices that was about to occur. What we now know with certainty is that the world in five years is probably going to be different than the world we see now. It is important that we deal with what we understand in the near future as in the long term things are less predictable and likely to radically change.

For example, regarding the issue of carbon capture and storage, we have to realize there is a range of possible outcomes and recognize that what we might actually accomplish may fall short of our aspirations.

The answer seems to be in technology. Shale development, which is a huge and quite low cost energy source, has recently impacted the energy discussion. There are a host of ways that technology may reveal answers that may become avenues we don't yet know.

Q&A

Q. To what extent did the DOE study that you cited take into account when it's talking about the 2% incremental cost of additional generation that you need to take care of the intermittency issues, construction of additional gas and that sort of thing?

A. Salerno: The study showed the variability of wind and that you have to build out additional marginal Combined Cycle Gas Turbines (CT) to help integrate 200,000 MW of wind. Additional marginal remits may be required to increase the regulation reserves and non-spinning reserves. About 30 to 40 MW of additional CT units were built. The report concludes a 2% incremental cost without energy storage.

Q. What was the capacity factor?

A. Today the US capacity factor is 35% and by 2030 it would be around 42%.

Q. Bob Anthony noted that the map showing the Southwest Power Pool transmission lines was now obsolete because the "765 line" from Woodward to Guymon just got dropped off.

A. Wegener: The Southwest Power Pool has a package of priority projects that includes the "765 Construction Project." Some think it costs too much money, but you need that line for the additional wind transmission.

A. Salerno: Although there are bumps in the road and the process seems slow, what Southwest Power Pool is doing is still light years ahead of what other parts of the country are doing, particularly by including other states in their systems to export power.

Q. Can the stimulus bill create a forum with the Eastern Interconnection Planning Collaborative that will make a difference or will it be a food fight?

A. Wegener: This is the very beginning of the process that creates a consensus that drives parties to agree. Based on getting the data right we can provide a group of legislators with facts so that they can defend them to their constituencies. The EIPC includes 40 states with 2 votes from each making this no small task.

- It was noted that the discussion would be less about where the lines go and more about who pays for them. Another complication that we must consider is that there are additional demands that will be put on consumers that weigh in on the debate.

DEMAND: CONSERVATION, EFFICIENCY, DEMAND-SIDE MANAGEMENT – CAN LESS ENERGY REALLY COST LESS?

It's often said that the cheapest kilowatt is the kilowatt not needed, but how much of America's increasing demand for energy can be met with conservation, efficiency and demand-side management? This panel focused on recent successes and ideas for the future.



MODERATOR - MATT BAKER, Commissioner, Colorado Public Utilities Commission

PANELISTS



RICHARD SEDANO, Director, Regulatory Assistance Project

Richard Sedano is a director of the Regulatory Assistance Project (RAP). He is the facilitator of the Mid-Atlantic Distributed Resource Initiative, the Midwest Demand Resources Initiative, and the Pacific Northwest Demand Response Project. Recently, he has worked with a collaborative in Arkansas and Oklahoma to launch energy efficiency programs, with members and stakeholders of the Ozone Transport Commission to develop utility policies to address regional ozone policy, and the stakeholders developing the National Action Plan for Energy Efficiency. Prior to joining RAP in 2001, Sedano served as commissioner of the Vermont Department of Public Service (VDPS) for nine years, and in staff positions for seven more. The VDPS represents utility consumers in all regulatory matters, and is the state's energy office and consumer advocate. Sedano served as chair of the National Association of State Energy Officials from 1998–2000. He is currently a member of the Board of Directors of Northeast Energy Efficiency Partnerships, the ISO-New England Environmental Advisory Group, the investment committee of the Vermont Clean Energy Development Fund, EVERmont (an alternative transportation vehicle consortium), and the Energy Team for the City of Montpelier. He was a member of the Task Force on Reliability to the U.S. Secretary of Energy's Advisory Committee from 1997–1998, and a member of the Advisory Committee to the ISO-New England Board of Directors from 1999–2003. Sedano received his Sc.B. degree in engineering from Brown University, and his M.S. degree in engineering management from Drexel University.

Presentation Summary

Demand Resources: Conservation and demand side management can make a great difference without the costs of new capital.

Attributes of Distributed Resources: Energy Efficiency (EE) is consistently delivered at a cost that no new supply can match.

People are increasingly used to energy efficiency and expect help through cooperation with a "utility". The recession has actually provided an opportunity for utilities to recognize this themselves.

Limitations on EE: Utilities can profit by committing to cost today to avoid large expensive assets in the future. Measuring the absence of sales requires some supply-oriented conversation about workforces, and codes and standards.

Aids for Efficiency: Some RTOs are using energy efficiency for reliable capacity. The local development of efficiency methods, the need for efficiency for national security, and for global environmental reasons all ease the way for EE.

Demand response addresses the most expensive hours, those when reliability is most threatened, or whenever curtailment is better than more usage. Customers learn to appreciate the value of their consumption. They can be operational resources, just like a peak or load following generator. It is cost effective now and smart grid will make the interface better.

There are curtailment service providers, although they are not allowed in some areas. Customers can voluntarily get involved in curtailing their use. Customers can get interruptible rates and can balance those with the potential of disconnection. The sign up is voluntary, but the control is up to the utility.

Distributed generation (DG): Government policy is critical in allowing this sort of demand resource to proceed. It includes stand by rates and feed in tariffs to flow energy back into the grid. One distributed generation is called combined heat and power (cogeneration). It can be used in supermarkets, etc. Energy efficiency block grants, including the use of biomass, can move the efforts forward. Further nudging from government through tax policy, recognition and project funding can build a marketplace to make distributed generation economical.

DG Varieties are as Diverse as Buildings: They include combined Heat and Power for industry, supermarkets and homes, using biomass fuel, sustainable practices, agricultural methane, wind, rooftop solar photovoltaic. They create additional enterprises such as a growth in fuel pellet production and other manufacturing, transportation and installation companies.

Barriers: Combined Heat & Power or Capturing Wasted Energy (or Cogeneration) face potential obstructions. The required return on investment of the host facility is often higher than that of a utility. Limited capital and competing investment opportunities often constrain the host facility's ability to develop cogeneration. Energy savings benefits to the host facility may not be worth the hassle of installing and operating a cogeneration plant. Unless participating as an equity partner, the utility sees no return plus possible loss of load. Difficulty in establishing a guaranteed fuel supply for wood residue plants. Uncertainties regarding the long-term economic viability of the host facility. The locational value of cogeneration is often not reflected in electricity buy-back prices. The complexity of obtaining permits and meeting environmental compliance for small plants.

Innovations: Buildings can become small power generators! Smart grids can optimize on-site generation. Storage may relocate at the substation. Solar Thermal for space and water heating. Flatbed-based turbines used as temporary solutions.

All forecasts show distributed resources making a difference: The Regulatory Assistance Project is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.

Others think the reservoir of energy efficiency savings is deeper. The Pacific Northwest: 6th Plan says 90% of growth could be met by energy efficiency. Northeast Energy Efficiency Partnerships: projects that energy efficiency can turn the electricity load trend negative.

Big Wins in 6th Plan include water heating, building shell, HVAC (Residential, Commercial) commercial lighting, process energy, electronics, irrigation, food industries. The pace of retrofits is a big uncertainty, with big potential.

Demand Resources are quite valuable, plentiful, reliable and technology will help. They are economical, yet the power sector has a long way to go to make effective use of this potential.



PETER DELANEY, Chairman, President and CEO, OGE Energy Corporation

Pete Delaney is chairman, president and chief executive officer of Oklahoma City-based OGE Energy Corp., the parent company of OG&E, a regulated electric utility, and Enogex, a midstream natural gas pipeline business. He also serves as CEO of Enogex. Delaney joined the company in April 2002 as Enogex CEO and OGE Energy executive vice president, corporate planning and strategy. In 2003, he took on added responsibility for corporate finance and accounting; and In 2004, he was named OGE Energy chief operating officer. On Jan. 17, 2007, the OGE Energy Board of Directors named Delaney president and COO, and elected him to the board. He was named chairman, president and CEO on Sept. 23, 2007. Prior to joining OGE Energy, Delaney completed a 15-year investment banking career on Wall Street. His last position was managing director at UBS, a leading global investment banking and securities firm. He specialized in corporate finance and other advisory services to electric and natural gas utilities and other energy companies in the United States, Europe and South America. Delaney is actively involved as a member of several community and industry boards of directors including Allied Arts, Oklahoma City Chamber of Commerce, Oklahoma State Chamber of Commerce, Oklahoma City Museum of Art, United Way of Central Oklahoma, Oklahoma City Boathouse Foundation, Oklahoma State Fair Board, Association of Edison Illuminating Companies and Edison Electric Institute. Delaney holds a bachelor's degree in economics from the University of Virginia and a master's degree in business administration from Tulane University.

Presentation Summary

Peter Delaney, the second panelist speaking on the Demand topic said, "When I talk about Demand Side Management I'm talking about energy efficiency and demand response." His DSM goals are to minimize costs while planning to meet customer's needs over the next 20 or 30 years. He listed three things as factors in demand side reasoning. First, the forecasts indicate that the cost of electricity in the future will have significant increases. Secondly, the decarbonization of generating resources will have a profound effect on costs. Thirdly, the smart grid technology will be a great enabler for reaching cost-effective goals.

Delaney suggests that if we do our planning right, the marginal costs of incremental energy efficient demand response is going to be about equal to the marginal cost of generating power. Analysis shows that costs associated with energy efficiency programs are about \$28 per MWH, which is well below the cost of new gas fired or coal capacity. The big cost driver regarding customers on the demand side is the current big policy issue, CO2. Energy efficiency is a really important part of the equation faced with the CO2 reductions. Demand side management also requires that we reduce our load's carbon footprint with renewables such as wind and nuclear power. Wind is by far the most economical renewable at the present time.

In 2008, OGE announced the 2020 plan, which meant not putting ourselves in the position to need any additional fossil fuel generation until the year 2020. We are faced with technology in the U.S. that is behind other countries. We haven't made inroads in terms of improving safety or in cost effectiveness in dealing with the long-term storage issue involved with nuclear produced energy. We end up limiting our options. Delaney was emphatic about the importance of pursuing demand side management and keeping all options on the table.

In order to explore controlling demand, OGE piloted a program in 2008 with about thirty customers in Oklahoma City. 'Smart meters' were given to about 660 customers and put in about 30 home area networks. The home area networks allowed rate changes for time of use and in

which customers could see within fifteen-minute intervals what they were consuming and what it was costing. During the summer, air conditioning requires the largest consumption and customers within this pilot knocked 10 to 11% off their usage. Behavioral changes, like turning down thermostats, were what Delaney was looking for. If you send the right price signals and make it painful enough to move people off the peak they will move off the peak Delaney stated. Our next step is to deploy 45,000 smart meters in Norman, OK, with 2 to 3,000 home area networks, which will determine how much energy efficiency these type of price signals will drive and also how much load shifting can result from the investments. Delaney thinks it will be substantial. We're now in the schools talking to 5th graders about making a change. Just as with seat belts or smoking, it will take a while.



DANIEL ELLIS, President, ClimateMaster, Inc.

Daniel L. Ellis is president of ClimateMaster, Inc. in Oklahoma City, Oklahoma. He has been active with geothermal heat pump technology since 1978, beginning in contracting and wholesale distribution, where he was one of the technology pioneers in northern climates. In 1983, Ellis cofounded WaterFurnace International, and served as its president and CEO before joining ClimateMaster in 1995. His technical contributions to the geothermal heat pump industry include the development of residential energy analysis and system design software, design procedures for commercial systems, and the development of advanced technology heat pumps. Ellis is chairman of subcommittee TC86/SC6 within the International Standards Organization (ISO), which is responsible for air-conditioner and heat pumps standards. He is also convener of ISO working group WG3 within TC86/SC6 that has established two international standards for water-source and geothermal heat pumps. Ellis is chairman of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Water- Source Heat Pump Sub-Section and is also a member of the Executive Committee of the AHRI Board. AHRI awarded Ellis the Richard C. Schulze Distinguished Service Award in 2005. Ellis is a member of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and a member of the U.S. National Team for the International Energy Agency (IEA) Heat Pump Centre. Ellis is a member of the Advisory Council to the International Ground Source Heat Pump Association (IGSHPA). He is past chairman and has twice received the IGSHPA Leadership Award. Ellis also serves as a director on the board of the Geothermal Heat Pump Consortium (GHPC), and received its Leadership Award in 2007. Ellis majored in physics at Purdue University.

Presentation Summary

Ellis spoke about specific solutions with geothermal units using onsite renewable thermal energy to displace thermal loads. He said buildings are the largest consumers of energy in the nation. They consume 39% of our primary energy, 70% of our electricity and 53% of our gas. The thermal loads, heating, cooling and water heating, account for 17% of all US energy consumption. These are the loads that a geothermal heat pump addresses.

Looking at the potential for carbon mitigation measures put together in a study by the International Energy Agency (IEA), they concluded that geothermal technology is the most effective for conditioning buildings with 65% of reduction coming from energy efficiency.

Geothermal is a form of a solar system. It creates a constant temperature anywhere in the nation from below the earth. Geothermal heat pumps tap into that energy and bring it into the building to provide heat in the winter. It sends heat in the natural direction of flow, which is hot to cold, using heat pump technology. It is part of the net zero energy solution, which is a combination of

technologies. Geothermal has a 55 to 80% reduction rate of energy use. This technology is now available in our Habitat for Humanity project in Oklahoma City (220 homes) as well as to all consumers in that area. It produces a high rate of carbon reduction as well.

Geothermal can reduce the watts per square foot on monthly bills by 35% and is a technology that actually helps to unload the grid by getting rid of the energy at the end of the line. There are five to six million people a year buying new systems. Last year one out of 38 homes installed geothermal heat pumps, even at a time when housing growth fell. Geothermal heat pumps use existing ductwork in homes. As energy costs have risen, our industry more than doubled in sales in a two-year period.

Q&A

Q. Do we need decoupling to get to where we need to go?

A. Utilities are faced with a lot of uncertainty so when we looked at the throughput incentive we found we needed to provide a different way for revenue recovery for utilities thru fixed cost recovery. Decoupling accomplishes that on an enterprise basis without a post adjustment for weather normalization and a post adjustment for economic normalization focusing on energy efficiency programs. That doesn't just account for the energy efficiency program, it allows the utility enterprise to not worry about how many kilowatt hours it actually sells. Utility executives go into summer saying "boy we need a really hot summer to boost those revenues". This is not helpful! This is why we promote decoupling.

A. If you have the proper rate design and you allocate proper fixed costs or variable costs, is decoupling really necessary? I think decoupling is difficult. Who actually grows the energy efficiency reductions? Have all those adjustments been made to be paired to the right payers? Those are things that need to be looked at on a case by case basis. And how long does decoupling go on? We need to look at our business and see where we are and where we need to go.

A. There no question that decoupling will have to change. You will use what resources you have and use new technology, but you can't get away from the fact that if you're regulated, the only way to recover your costs is through the regulation process. From a commission standpoint we have to consider what the new business models are. It's a complex issue.

Q. When you look at the demand side, what do you think the workforce is going to look like coming from colleges and universities?

A. A top issue is the Smart Grid, which is comprised of communications technology. The fact that customers will be reading meters, the skills associated with managing a system will be required. There are a lot of IT applications and you have to sell energy efficiency. There will be a lot of retirement in the next 5 years that will demand a lot of changing out. We are working with community colleges, OU and OSU to fill these needs.

Keynote Presentation by William Hogan

Dr. Steadman Upham, Tulsa University President

The energy model for the 21st Century has to include key elements: reduced emissions, diversified sources of energy and of course efficient transmission. If we are to succeed both our technologies and our markets have to support these priorities. This is a big challenge, which may require re-ordering our priorities.

William W. Hogan, Electricity Market Design: Smarter Pricing for Smart Grids

The move to a lower carbon future and the introduction of greater emphasis on efficiency and renewables calls for better pricing models to support a planned smart grid. Toward that goal, Professor Hogan discussed how organized wholesale electricity markets provide a foundation for open, nondiscriminatory transmission access. He also addressed how

those operating and investment decisions depend on the price signals from that market. Professor William W. Hogan is research director of the Harvard Electricity Policy Group (HEPG), which is exploring the issues involved in the transition to a more competitive electricity market.



WILLIAM W. HOGAN, Research Director, Harvard Electricity Policy Group

Professor William W. Hogan is research director of the Harvard Electricity Policy Group (HEPG), which is exploring the issues involved in the transition to a more competitive electricity market. Professor Hogan has been actively engaged in the design and improvement of competitive electricity markets in many regions of the United States, as well as around the world, from England to Australia. His activities include designing the market structures and market rules by which regional transmission organizations, in various forms, coordinate bid-based markets for energy, ancillary services, and financial transmission rights. This research is also part of the larger activities on the future of energy and energy policy research at Harvard University through the Environment and Natural Resources Policy Program, Environmental Economics Program, Harvard University Center for the Environment, and the Mossavar-Rahmani Center for Business and Government.

Presentation Summary

Harvard Professor William Hogan discussed how to approach the greening of the energy system. He pointed out past mistakes in the alternative energy endeavor as a warning that choices must be well thought out or they can produce unexpected, unwanted results. "I'm concerned about all the fads that have gone before us that had bad outcomes, such as coal-to-liquids technology and the Energy Independence and Security Act. It imposed stricter fuel standards for cars but it simply drove people to buy more trucks. We didn't think through the unintended consequences."

He asserted that our energy system is going to go through fundamental and sometimes dramatic changes with the greater use of renewable technology, the improvement of energy efficiency, the testing and deployment of carbon capture and storage technology, and the electrification of the transportation system. Changes in our electricity system will be particularly important. Electricity is important because of its scale, but it also has the importance of being a target for what has to be done and what has to be developed.

Hogan noted an op-ed piece in the October 6th, 2009, New York Times by David Brooks, called 'Bentham vs Hume' referring to the 18th and 19th century philosophers and how they would attack these energy problems. Bentham would likely advocate that the government proceed with confidence using the smartest people around to tackle all of the issues. Hume on the other hand would say, I don't know how to generate the most efficient energy and I don't know how technology will advance in the next 20 years, thus I suggest we just raise the price of carbon and let everyone else figure out the solution. Hogan felt this article captured today's debate and that the Hume approach is the better answer.

Hogan said the current problems are tied to climate change and are of a long duration. Actions cannot just be marginal solutions. We will have to turn to new technologies such as wind and solar, which are expensive. We might have more breakthroughs if we do enough research and development. We have already had surprises such as the development of turbines in the electricity sector out of the aircraft industry. Shale and natural gas has also become a new development.

Hogan doesn't feel that the low carbon electricity system falls into the Hume-like framework of a distributed system. It is his opinion that the solution to the carbon problem is going to be a collection of things, some currently unknown. He said that we should focus on learning the characteristics of a large scale, long term solution and match it with subsidies and research and development. However, the first order is putting a price on carbon. How we do it is secondary, it's that we do it that it is important.

It was noted that renewable portfolio standards are fundamentally inconsistent with the policy under cap and trade. He said that it could result in making expensive investments to make the cap. He proposed that the carbon cap might provide enough incentive alone.

Hogan said that he thinks it is critical to deal with the institutional designs of electricity markets. He said we now have the Southwest Power Pool and that it is a system that actually works. It is the kind of system needed for a world with global warming, low carbon, the wind and other renewables we want. The smart grid technology is enabling end users have the information flow so that they can make sensible decisions and tradeoffs.

"Scarcity pricing requires incentives rather than invent another regulatory problem," Hogan said. "I believe it is not politically impossible, it is something to fix." Tight conditions during peak hours is a first order problem which could be addressed by better scarcity pricing. Energy prices have to be realistic and reflect what is happening in the system. Transmission expansion is also a pricing issue. It is a matter of cost allocation, but we don't really know what kind of expansion we should do. We need to change some of the rules about how we decide about transmission expansion and change the rules about cost allocation. There must be an adherence to a beneficiary pay system. In New York they package private and public investment choices in such a way so you can support both without causing the rest of the system to unravel. Hogan feels we need the incentives now.

In his final statement Hogan said, "Go to the RTOs, take that model with all the things that are being done, fix the scarcity pricing, do a better job of dealing with the uplift, modify the transmission expansion protocols so that you can support a beneficiary pay system."

Q&A

Q. How can we identify who the beneficiaries of transmission are and how can we address the problem of hold up?

A. The way the NY system works is by super majority, which means you have to get a super majority of the beneficiaries to vote in favor of going forward. The votes of beneficiaries and cost allocations are in proportion to their benefits. I think it's a quite workable compromise.

Q. Why don't we have the transmission system treated like the highway system by putting it under the national security umbrella?

A. Two concerns are that first it's dishonest. Secondly, I don't think you can have the government building the infrastructure and not doing all the other things that come along with it. I don't think a centrally planned, government system promotes competition and innovation that can solve problems and it is not sustainable over a long period of time.

Q. Is there a role for resource planners in a market-based system?

A. We would be much better off letting people make their own judgments about what's going to work well and what's profitable. I'm working very hard to get the pricing done right because I think the demand side will have a huge impact. I'm very nervous that some plan a mandate by using the force of government to compel people to do something they don't want to do.

Q. Is there a better bill that that's got cap and trade that can get through?

A. The essential thing we have to get done is to get a price on carbon. We have to make it credible; it has to be a system that people can anticipate will get tighter and tighter. We've got to get started.

Q. How do you deal with transmission deals that cross state boundaries, such as is being done in Oklahoma and Kansas?

A. I think that crossing state boundaries is a serious problem and it's going to have to be dealt with on a national level by FERC using regulations and legislation. I don't think our political system is going to sustain a process where we constantly socialize only transmission while keeping them out of technology decisions for everything else. We must offer incentives or we will miss a lot of opportunities.

REGULATION: REGULATORY HURDLES – A NEW OLYMPIC SPORT?

Regulation and a changing regulatory environment are an ever-present reality for America's electricity sector. This panel focused on the role of regulation in implementing public policy, and how it can help or hinder the broadening of America's energy options.



MODERATOR - JEFF CLOUD, Commissioner, Oklahoma Corporation Commission

Jeff Cloud was elected statewide to a six-year term on the Oklahoma Corporation Commission on November 5, 2002, and assumed the chairmanship of the commission in June of 2005. Cloud, who is a member of the Electricity Committee for the National Association of Regulatory Utility Commissioners (NARUC) and Federal Energy Regulatory Commission (FERC) Joint Boards on Security Constrained Economic Dispatch, sits on the advisory boards for the Center for Public Utilities at New Mexico State University and Oklahoma Water Resources Institute-Water Research. Cloud is also a member of the Legal and Regulatory Committee of the Interstate Oil and Gas Compact Commission (IOGCC) and serves on Oklahoma Employees Retirement System Board of Trustees. The Aspen Institute recently honored Cloud as one of the top young elected officials by naming him as a fellow for the Aspen Institute-Rodel Fellowship, which brings together "the nation's emerging leaders" to discuss broad issues of democratic governance and effective public service. Born in Tulsa and raised in Oklahoma City, Cloud earned a degree in petroleum and management from the University of Oklahoma and a juris doctorate from the Oklahoma City University School of Law.

PANELISTS



JASON MARKS, Commissioner, New Mexico Public Regulation Commission

Prior to being elected to the New Mexico Public Regulation Commission, Jason Marks had an extensive career in healthcare finance and rate setting. After serving as hospital programs manager for Oregon Medicaid, he joined Myers and Stauffer LC, a mid-sized accounting firm, where he became a principal and led a national consulting practice extending to 20 states and the

federal government. Marks was first elected to the PRC by the voters in his Albuquerque-area district in November 2004. He was reelected by a large margin in 2008. Marks served as PRC vice chair for 2005 through 2007, and as Commission chair for 2008. Marks was the drafter and sponsor for Qwest's AFOR II regulatory order, which includes a three-year rate freeze and elimination of "trouble isolation charges." He was a strong advocate for ensuring that Qwest was held accountable for its AFOR I investment shortfall, and insisted that customer credits (ultimately totaling over \$30 per line) were part of the resolution of the AFOR I enforcement case. In 2008, Marks voted against the PNM emergency fuel adjustment clause because he believed it was inappropriate to transfer 100% of fuel and purchased power risk from the company to its customers. Although a Commission majority approved the fuel clause, Marks was successful in offering amendments to the surcharge that reduced the customer impact by over \$10 million. During the 2009 Legislative Session, Marks successfully fought to bring competition to title insurance rates and against Qwest's deregulation bill. Marks believes that the PRC has an important role to play in the transition from fossil-fuel dependency to energy supplies that are environmentally and financially sustainable. In 2007, he sponsored and passed renewable energy rules at the Commission that create diversity targets for solar energy and distributed generation. In 2006, he brought an order to the Commission that requires utilities to use standardized prices for carbon dioxide emissions in their long-range resource planning, and he joined with Com. Lujan in initiating a rulemaking that resulted in the highest net metering limit in the nation, and in sponsoring the PRC's entry into the Western PUC Commissioner's Joint Action Framework to Address Climate Change. Marks has a bachelor's degree from Reed College and a law degree from the University of New Mexico. He is a member of the New Mexico bar and serves on the governing board for the Western Renewable Energy Generation Information System, the Steering Committee for the Western Renewable Energy Zones Project, and the Advisory Committee for New Mexico State University's Center for Public Utilities

Presentation Summary

Jason Marks noted that wind energy leads the renewables. Independent producers began the use of wind, but now utilities are increasing ownership. A utility buys power through a power purchase agreement and that gets passed on to the customer at cost. A utility makes money on capital investments and a return on its shareholder's capital.

Regulations have facilitated wind energy. Currently, 29 states have an RPS requirement, meaning that the states set a requirement that all utilities have to meet.

New Mexico's renewable plan now has a goal of 20% by 2030. We want to push this, but we don't want it to become so expensive that we lose public support. We are currently at 7%.

Wind has great advantages with great economics, but it is intermittent. We have an abundant solar resource that we are beginning to utilize. Our utilities have responded with customer incentive programs. We have put in incentives to make it feasible if you want to invest in your own PV system. We have 500 grid tied PV systems and we have a solar plant contracted in southern New Mexico that's producing 90 MWs. New Mexico is a 3,000 MW state, which is big for us.

But for the fact that we did a command and control type approach, we wouldn't be seeing anywhere near the penetration of renewables that we have today.

We ask our utilities to deliver 1% reduction of demand a year through efficiency measures. As renewables and efficiencies move into the mainstream we need to assure our customers that we're only doing things that are cost effective.

Fixed cost issues are a concern because it is contrary to the nature of New Mexico. We want to put the private sector and the markets to work doing what we need to do socially. We're looking at decoupling, although it isn't popular.

We want to assure customers that we're only doing things that are cost effective and we should get all the savings we can by getting our efficiency incentives right.

Just because it's 'green' we shouldn't say thumbs up all the time.



JOSH SVATY, Kansas Acting Secretary of Agriculture

Joshua Svaty is acting secretary of agriculture for the state of Kansas. He was named by Governor Mark Parkinson in July of 2009 and is awaiting Senate confirmation in January. Prior to his service at the Department of Agriculture, Svaty served seven years in the Kansas Legislature. He was first elected at the age of 22 in 2002, and was successfully reelected three times. During his tenure in the Legislature, Svaty served on the House Energy and Utilities Committee and was the ranking member on the House Agriculture and Natural Resources Committee. Svaty was also a gubernatorial appointee on the Kansas Energy Council, a public/private group of citizens charged with developing long-term energy policy for the state of Kansas.

Presentation Summary

Josh Svaty spent 7 years in the Kansas legislature. He said, "We were dealing with the same issues at the end of my time there as at the beginning." The most significant issue was about Sunflower Cooperative building a coal fired plant. Previously air permits had been granted pretty easily by the Department of Health and Environment. However, the Secretary of the Kansas Department of Health and Environment denied the permit. It showed how much authority we have at the administrative level.

There is great energy potential, but it requires a cautious approach to tap into it. You need a strong relationship with the Governor and the staff. The pace of progress depends upon how well you work with them.

Energy has become a greater part of the conversation at the state and federal levels. In Kansas there is a lot of discussion regarding wind policy and transmission lines. Many groups are now involved, such as environmental groups like Wildlife and Parks who care about the prairie chicken when it comes to transmission line paths.

Svaty concluded, "The regulatory environment is very exciting. It's where decisions move your particular interest forward. It's an exciting time to be in Energy, but to be successful. I cannot stress enough the importance of long term relationships and open lines of communication with regulatory agencies, legislators and all levels of administration."



CHERYL VAUGHT, Attorney, Vaught & Conner

Cheryl Vaught is an attorney with and manager of Vaught & Conner, located in Oklahoma City, Oklahoma. Primarily, Vaught concentrates her practice on energy and public utility law. In addition, she has represented clients in both state and federal courts. Her practice also includes broad-ranging services for nonprofit organizations and human resources law. Representing clients in all stages of the permitting, regulatory and litigation process, Vaught has represented a variety of energy clients, including independent power producers, wind developers, cogeneration facilities, and independent transmission companies. She has extensive experience with transactions with utilities, including rate cases, power purchase agreements, contract negotiations, settlement proceedings, resource planning, and interconnection agreements. Vaught, a graduate of the University of Oklahoma College of Law, has served her community through the Oklahoma City National Memorial and the National Memorial Institute for Prevention of Terrorism, the Oklahoma City Community Foundation, the OKC Public Schools Foundation, Public Private Partnership for Juvenile Justice, and Literacy Coalition of Oklahoma County. Currently Vaught serves on the board of directors of the Federation of State Medical Boards, The State of Oklahoma Board of Osteopathic Examiners, Leadership Oklahoma City, Arts Council of Oklahoma City, MAP International (as well as serving as the External Relations Committee chairman), and is a founding board member and vice president of development of the Oklahoma Humane Society. Her special interests are related to animal welfare, community leadership development, arts and relief work. Vaught resides in Oklahoma City.

Presentation Summary

Cheryl Vaught was positive about the progress made since efforts to use renewables began and optimistic about the future of energy in Oklahoma. She pointed out that back in the days of ERPA (Emissions Reduction Purchase Agreement) things were really difficult and many felt that they would not be around for the long term. The process was burdensome on the Corporation Commissions and cost hundreds of millions of dollars in litigation within this state and nationwide.

Recently, Oklahoma issued competitive bidding rules, meaning that both electric utilities in Oklahoma had to purchase power at the lowest reasonable cost. It had to be viable and deliverable. This was a huge change for Oklahoma. Some states make it difficult to compete for bids with things like very stringent credit requirements.

ITC Great Plains made the first request to the Oklahoma Corporation Commission. They were awarded independent transmission utility status, which means that when utilities need to push the resources and assets on the generation side, ITC Great Plains, or someone like them can step in.

We have a lot more work to do and we have to do it in tandem for the long term. How do we make the landscape more competitive? What's the next step on competitive bidding? How do we get renewable power inserted into every logical place?

We must balance the market forces and motivate the utilities. Bottom line, if we don't think about our customers we won't get anywhere.



RICHARD SMEAD, Director, Navigant Consulting

Richard Smead is a director in Navigant Consultant's Energy practice, specializing in upstream and midstream natural gas issues. He has been responsible for multiple engagements involving potential acquisitions, policy analysis, litigation support, and strategic advice with respect to gas pipelines, potential supplies, and market initiatives. A significant concentration of his practice has involved the downstream market and infrastructure issues affecting liquefied natural gas (LNG) projects. Smead has more than 33 years of experience in the natural gas business, with a proven track record as a senior executive for several major natural gas pipeline companies and a leader across multiple industry sectors. He is known for a combination of hands-on, industry-recognized expertise in technical issues, effective management of both internal and external processes, and industry leadership on policy issues. Smead recently coauthored the comprehensive study, North American Natural Gas Supply Assessment, which indicates the United States has 2,247 trillion cubic feet (Tcf) of natural gas reserves, which is enough to last more than 100 years.

Presentation Summary

The 2006 Potential Gas Committee Report estimated US gas reserves of 1,530 Tcf, including 137 Tcf of shale gas. Based on the 2006 U.S. Production Rate, that reflects 82 years of gas supply.

In 2008, Navigant Consulting performed the North American Natural Gas Supply Assessment for the American Clean Skies Foundation. This study concentrated on shale gas evaluated according to producer reports. The resulting total supply estimate was 2,247 Tcf, including 842 Tcf of shale gas. This amounted to 118 years of production at 2007 levels.

By June 2008, the lower 48 state onshore production had reached the pre-Katrina level.

Gas shale production has experienced tremendous growth in recent years with Barnett Shale leading the way and signs of early followers.

- Barnett has grown from 94 MMcf/day production levels in 1998 to 3,014 MMcf/day in 2007; an increase of more than 3,000%.
- Fayetteville, Haynesville and Woodford are all showing similar signs of ramping up production. Marcellus will be next.
- Technology has allowed access to and economic production of a vastly greater resource base. Improved hydraulic fracturing techniques and greatly improved horizontal drilling have allowed tight, geographically diffuse reserves to be developed in large volumes.
- Producer estimates placed the "Big 6" plus Marcellus at 27 to 39 Bcfd upon full development.

The development of natural gas supplies does not take stimulus money. Unlike oil, it does not take expanded land or offshore access. All it takes is demand at a stable price, probably \$6-\$7 and a positive political environment.

The industry must quiet concerns about high-pressure fracturing that are causing legal and legislative uncertainty at both Federal and state levels. It requires a combination of effective communication and embracing the best practices.

Failure to recognize the abundance of supply is reflected in Secretary Chu's reaction to CNG vehicles. The Secretary expressed concern over deliverability, intangible drilling cost and over-

production, endangering future national security. EPA Administrator Jackson recently stated that expanding gas use would forego future feedstock use. These views are simply wrong and the industry must make that clear.

Q&A

Q. I'd like to know about the cost issue for shale and the LNG trade?

A. In terms of total costs it's about the same as LNG. The marginal production cost for LNG is very low; it's all in the infrastructure. There's nothing wrong with LNG, but we shouldn't be dependent on it.

Q. Regarding decoupling, how should we accurately measure fixed costs and variable costs and assure only those things that vary by consumption are being billed that way? I don't see decoupling discussed in those terms now.

A. Today they call that straight fixed variable, and the rule is that we don't want to do that on small commercial and residential. There are policy reasons to put part of the fixed costs into the volumetric charges. It encourages conservation and increases the price signal. The average cost of electricity is less than the marginal cost. There is a concern that a high fixed charge will make it difficult for the low income folks to bear, so this is a way to address those concerns without having a discriminatory subsidy.

A. In Oklahoma with our Request For Proposals procedure for competitive bidding, we have people submit what the costs are going to be. Originally there was uncertainty about who would bear what costs. Now the RFPs have gotten very simple. You ask a bidder to tell you what their total cost is going to be, period. The bidder must be accurate with what they're willing to be paid or they're at risk.

Q. Mr. Anthony and the National Association of Regulatory Utility Commissioners have led an effort to talk about hydraulic fracturing. I'd like to know if other states are doing as well as Oklahoma?

A. The natural gas industry is doing better than say in NY. You have competing dynamics with the state of the economic benefit releases, employment and all the stuff that goes with it. They are concerned with water, and an operation that they're not familiar with. Tensions resolve themselves differently state by state. The good cutting edge companies are out in front of the issue. They know they don't always have the high ground. It's evolving.

Q. The National Energy Modeling System doesn't seem to have as components the supply provisions and elasticity that you see with natural gas. When demand grows its modeling says the price goes up, which discourages its use, or the price will drop even though it may be below the lifting price of the gas. Is there an inherent problem with the NEMS system with a bias against natural gas and if so how do you fix it?

A. NEMS is an enormous model. It basically tries to model the activity of all fuels and all economic behavior and it takes a long time to load it. It's static and it's always wrong. The NEMS modeling system is too big and too slow and is not interactive enough.

TRANSMISSION: ENERGY WITHOUT BORDERS – WHO SHOULD PAY FOR IT?

America's transmission system is undergoing historic challenges and is widely considered the largest obstacle to the continued growth of reliable, renewable energy sources in the U.S. This panel addressed ideas about how the nation's future transmission system should be developed, and who should pay for it.



MODERATOR - COMMISSIONER JEFF DAVIS, Missouri Public Service Commission

Jeff Davis was appointed to the Missouri Public Service Commission on April 30, 2004 and was named chairman of the Public Service Commission by Governor Blunt on January 10, 2005. Davis was reappointed to a full six-year term in April 2006. He served as chairman until January 13, 2009. Davis serves as a member of the Homeland Security Advisory Council, the Missouri Universal Service Board, the Financial Research Institute Advisory Board, the Missouri Oil and Gas Council, the National Association of Regulatory Utility Commissioners (NARUC, where he serves on the electric committee), the Advisory Board for the University of Missouri Delta Center for Agricultural Development in Southeast Missouri, vice president of the Mid-America Association of Regulatory Commissioners (MARC), member of the Regional State Committee for Southwest Power Pool and a member of the Board of Directors for the Organization of MISO States (OMS). Davis has served as chair of the Missouri Energy Task Force, chairman of the FRI Advisory Board at the University of Missouri, a member of the FERC Joint Oversight Board for Economic Dispatch for the MISO-PJM region and a member of the NARUC gas committee. Prior to his appointment to the Public Service Commission, Davis served as general counsel and chief of staff for Missouri Senate President Pro Tem Peter Kinder. While in that capacity, Davis provided legal counsel to the Committee on Gubernatorial Appointments and the Senate Administration Committee; managed the President Pro Tem's office; and supervised the President Pro Tem's legislative agenda, which included drafting and helping pass several pieces of legislation including the Senior Care and Protection Act of 2003; the Dram Shop Act of 2002; the Religious Freedom Restoration Act; and legislation authorizing Missouri's first sales tax holiday. From July 1998 until December 2000, Davis was chief of staff and general counsel to Senate Minority Floor Leader Steve Ehlmann. Before that, he was a law clerk for the Honorable Paul J. Simon, Missouri Court of Appeals, E.D. and was a legal intern in Missouri Attorney General Jay Nixon's Labor Division. Davis graduated cum laude with a bachelor of science degree in political science from Southeast Missouri State University in 1994 and received his juris doctorate degree from Washington University in 1997. Admitted to the Missouri Bar in October 1997, he is a member of the Missouri Bar Association and Midwest Energy Bar Association.

PANELISTS



LES DILLAHUNTY, SR VP of Engineering and Regulatory Policy, Southwest Power Pool

Les Dillahunty is the vice president of regulatory policy for Southwest Power Pool (SPP). In this position, Dillahunty is responsible for managing the Regional Transmission Organization's regulatory, engineering and contract services functions. These roles involve the communication and coordination of both technical and policy information to internal and external audiences. Before joining SPP, Dillahunty held positions within Southwestern Electric Power Company (SPP's parent company), Central and South West Corporation and its merger partner, American Electric Power Company. Dillahunty later provided independent consulting services before joining SPP in September 2003 as the director of regulatory affairs and transmission policy. He

holds mechanical engineering degrees from Louisiana Tech University and is a registered professional engineer in Louisiana and Texas.

Presentation Summary

Southwest Power Pool (SPP) is a regional transmission organization, which is FERC regulated. We work with members, stakeholders and regulators to plan a transmission grid for a nine state region. We consider reliability and economics to plan the transmission grid for the future.

With wind, the first step is to find how much wind is out there. Today we have about 3,100 MW of wind in service and about 6,000 MW that have approved generator interconnection agreements. Based upon studies we know there is about 100,000 MW of potential in the SPP footprint, which is often referred to as the Saudi Arabia of wind.

All wind isn't equal. If we choose the best wind we can get by with 50% less turbines that if we choose the next best wind. That impacts transmission as well.

At SPP we think we can absorb 20 to 30% of our peak load from wind because of the intermittency. It is likely that SPP will be exporting wind on a national standard, but today it is a state standard. Cost and benefits are being studied now. They show it does make sense to fund expensive transmission and high voltage. The benefit to cost ratio is one or greater for the recommended projects. We have 7 projects and 700 million dollars recommended in the Balanced Portfolio.

If we don't build transmission we will be more dependent on generation and cost from local utilities. Building transmission will give us access to a greater number of resources, at the lowest costs. Our job is to convince regulators, stockholders and members that going ahead with this project is the appropriate thing to do.

We should not believe that we don't need both traditional and renewable generation to meet our needs. As we deal with these markets we are trying to do it at the lowest costs. SPP prices are down 47%, primarily because of gas price decreases, but we've also seen a 4.5% decrease in energy consumption because of the economic downturn.

Regulators and legislators are key. We should all get involved in the process. I encourage you to write our State Senators. They are the ones who are controlling the purse strings and the future of the transmission grid.



JULIE PARSLEY, Energy Consultant, Former Commissioner, Public Utilities Commission of Texas

Julie Parsley, an Austin, Texas-based attorney and former commissioner with the Public Utility Commission of Texas (PUCT), specializes in energy-related consulting and legal services focused on wholesale markets and transmission issues in the Electric Reliability Council of Texas and the Southwest Power Pool. Parsley served with the PUCT from November 2002 through September 2008 upon appointment by Governor Rick Perry and subsequent confirmation by the Texas Senate. Prior to her appointment to the PUCT, Parsley served as deputy solicitor general and then solicitor general of Texas. She is licensed to practice law in Texas and before the Supreme Court of the United States, as well as the U.S. Court of Appeals for the Fifth Circuit, and the U.S. District Courts for the Western, Eastern, and Northern Districts of Texas. Parsley has

served on Southwest Power Pool's Regional State Committee as president, vice president, and secretary-treasurer, as well as the Texas Energy Planning Council as Infrastructure Committee co chair and the National Association of Regulatory Utility Commissioners as a member of the Broadband over Power Lines Taskforce and Electricity Committees. Parsley received a B.S. degree in industrial distribution from Texas A&M University and earned her law degree from the Texas Tech University School of Law, where she served on the Board of Editors for the school's law review.

Presentation Summary

In 1968, SPP joined 12 other entities to form what became the North American Electric Reliability Corporation (NERC). SPP incorporated as an Arkansas non-profit organization in January 1994. The Federal Energy Regulatory Commission (FERC) approved SPP as a Regional Transmission Organization in 2004 and a Regional Entity in 2007.

In 2004, we had participant funding and there was less than \$500 million in the 10 year Southwest Power Pool expansion plan. It was pretty bare bones.

With the 2009 Step Plan, the FCC approved \$3 billion worth of transmission planning. In five years we have six times the projects on the books since we began. What happened was that we had two FERC approved tariffs that had rolled in rates.

When the Electric Liability Council of Texas energizes the lines with competitive energy zones in 2012 or 2015 they're going to have more than \$10 billion worth of transmission projects on the books.

The one reason I believe this actually happened is that we came together with Southwest Power Pool, we came up with two great tariffs, and everyone understood that this could actually work.

Now we're introducing a region wide tariff that's going to be a highway, byway tariff. And the question is not will it have a postage stamp component, but rather how much is going to be postage stamped.



**RICHARD LORDAN, Technical Director of Power Delivery and Markets,
Electric Power Research Institute**

Richard Lordan is technology director in the Power Delivery and Utilization Sector. His current research activities focus on grid operations and planning and renewable integration. Lordan joined EPRI in 1993 as a project manager in transmission and magnetic field management. Before joining EPRI, he worked at Florida Power and Light. Lordan worked in various capacities including Engineering Service Center Operation, Service Planning, and Marketing. In his engineering capacity, Lordan designed overhead and underground distribution and transmission systems. Lordan holds a BS degree in mechanical engineering from Pennsylvania State University and a master of science degree in electrical engineering from Florida Atlantic University. He is a professional engineer in the state of Florida.

Presentation Summary

The Electric Power Research Institute, Inc. (EPRI) conducts research and development relating to the generation, delivery and use of electricity for the public. 411 billion KWHs a year is

required.

Renewables are going to need a lot of transmission to achieve the 20% federal goal. Hydro renewable cannot do it and a lot of AC and DC transmission from wind is needed.

We'll need three times the amount of renewables we have now by the year 2030. Most good hydro spots are already taken, so the growth potential is in biomass, wind and solar.

Wind doesn't blow all the time. Sometimes the wind blows everywhere and sometimes the wind doesn't blow anywhere. Solar also is intermittent. The sun doesn't always shine, when it does there's moisture and dirt in the air. Concentrated solar thermals are not perfectly flat even on a sunny day.

Yet an operator has to balance generation and load exactly every instant. Today the grid doesn't crash because the big rotors in the nuclear and coal plants are spinning to create electricity all the time. PV (Photovoltaic) does not have those rotors, that's why operators get so concerned about solar and wind. Therefore we need access to the controllable elements. We need demand response, we need energy storage and we need transmission. Compressed-air energy storage will be a big technology, along with batteries. Biocars with plug in hybrid electric vehicles will be more widespread. The first 200,000 PH-EV vehicles will be charged just like my computer, so they will be limited. Around 2012, smart charge technology will make a big difference and by 2018 we will have smart charging, discharging, which will really be nice.

Operators need capacity. We need to develop an integration connection requirement that will bring the whole package to the grid. And we need transmission overlay.



CARL HUSLIG, President, ITC Great Plains, Independent Transmission Company

Carl Huslig, a native Kansan, holds responsibility for establishing and implementing the vision to rebuild the electricity transmission infrastructure in Kansas and the Great Plains region in order to improve reliability, reduce congestion and lower the overall cost of delivered energy. Huslig has more than 15 years experience in the utility industry. His career began at Aquila, Inc. in 1991 when he held positions of increasing responsibility primarily within the transmission function. Most recently, Huslig served as vice president of Aquila's Transmission Operations where he was responsible for day-to-day activities such as planning, system operations, capital and maintenance budgets, as well as working with regulatory and legislative affairs on transmission-related matters. Huslig holds a bachelor of science degree in electrical engineering from Kansas State University.

Presentation Summary

ITC Great Plains is in the business of transmitting energy from generating plants to where it is needed. We are the newest utility in the state of Oklahoma and we just celebrated our one year anniversary last month. ITC is the nation's first and largest independent transmission company.

Our objective is to reduce the cost of delivered energy, by investing in transmission infrastructure to provide a reliable system. Being independent allows ITC to focus on improving transmission, while insuring non-discriminatory access to the transmission grid. We have invested over \$1.2 billion in transmission systems upgrades to make sure we have the lowest cost energy delivered

to the end use customer.

A rational national energy policy is one that includes federal renewable portfolio standards and the federal regulation of green house gas emissions. Now we are trying to tackle a 21st century energy challenge with a transmission grid more than 30 years old and operating under an outdated regulatory system. We urgently need to reform how we plan, locate and pay for new transmission.

The current grid has an aging infrastructure with reliability concerns. In 1970 we transmitted electricity at a 5% cost factor, in 2005 that was increased to almost 10%. A lack of capacity has created large interconnection queues. We need a regional transmission grid. Transmission is the facilitator, whether talking about demand response, efficiency, renewable technology, or load. It's going to require transmission.

Huslig said "The national energy policy should cover three things, (1) an independent planning authority that reports to FERC, (2) cost allocation should be harmonized for a highly connected transmission grid and (3) federal siting with FERC having a more significant role and states approving transmission routes."

Transmission is the key to achieving our national energy vision. We should move forward with a regional transmission grid, good for forty years, that provides reliability and provides the choices customers want. Our unlimited renewable resources need to be connected to homes and businesses that want it.



**LISA BARTON, VP of Transmission Strategy and Business Development,
American Electric Power**

Lisa M. Barton is vice president of Transmission Strategy and Business Development for American Electric Power (AEP). She has 20 years of experience in the energy field, holding various positions in engineering, rates and regulatory affairs, marketing, legal and energy consulting. In her current position, Barton is responsible for business planning and analysis, EHV development, business development, and oversight of AEP's interface with its corporate partners. She also serves as president of Electric Transmission America (ETA), a joint venture between AEP and MidAmerican Energy Holding Company. Prior to her current position, she was managing director of Transmission and director of Transmission Planning for AEP. As director of Transmission Planning, Barton managed activities related to assessing and maintaining the adequacy of AEP's 11-state transmission network, which serves more than 5 million people. With transmission assets in three regional reliability regions, her team worked closely with regional transmission organizations and other engineering departments to develop plans to construct new transmission facilities. Barton joined AEP from Northeast Utilities in Berlin, Connecticut, where she was manager of Transmission Regulations and Compliance. Barton earned a bachelor's degree in electric engineering in 1987 from Worcester Polytechnic Institute in Worcester, Massachusetts; a juris doctorate degree in 1993 from Suffolk University Law School in Boston, Massachusetts; and is a graduate of The Executive Program - Darden School of Business at the University of Virginia. Barton is a member of the New Hampshire and Massachusetts state bar associations. She also serves on the board of managers for Prairie Wind Transmission and Tallgrass Transmission, both joint ventures with ETA and local utilities. In addition, she is on the board of directors for Amethyst, Inc. Barton resides in Westerville, Ohio.

Presentation Summary

Barton began by saying "We have 22 times the land mass of Germany, 7 times the energy consumption and 5 to 6 times the energy potential. In this part of the country that potential is primarily in wind."

Our generation profile is going to shift dramatically over the next 10 to 20 years. We have the challenges associated with interconnecting large renewable resources, while meeting the environmental requirements. Plans to use wind resources need to include a robust regional and interregional approach.

She pointed out that it is important to reflect on the past and on the cost of failure. During the 2003 blackout in Ohio, 50 million people were left in the dark. RTOs need to ensure their systems are robust, efficient and capable of meeting their long term energy needs.

Barton said she feels beneficiary based models with a line by line cost benefit analysis for EHV are not in keeping with today's needs. If this approach is followed, it will result in a narrow approach to transmission planning and development; delay EHV development; increase congestion; adversely affect system reliability and unduly increase Right of Way (ROW) consumption.

Siting transmission projects is not likely to get any easier in the future. We need to minimize our footprint while maximizing the benefits to the system. Efficient use of ROW's is needed.

A robust grid is critical to ensuring a system that is flexible and adaptable to changes in our generation fleet and consumption. Recognizing the value of transmission is essential. The cost of insufficient transmission can have a devastating impact on the economy.

Q&A

Following the Transmission panel discussion, the questions and answers were about the high cost of transmission and the benefits and beneficiaries of the system. There were skeptical comments from the questioners about the high cost and the inability to identify beneficiaries. Panel members defended the necessity and value of building a transmission system and stated that since the system would be in use over 30 years the beneficiaries would change over time.

Q. If we're going to really talk about spending all this money, I suggest we proceed with caution. What's this going to do to ratepayer's bills? If you're going to commit to spend \$3 billion dollars, get involved, hire consultants, hold proceedings because this will impact the customers.

A. We spent a lot of time looking at these transition projects and for every \$1 of transmission we got \$1.86 of benefits. I encourage everyone to get involved as well. The transmission needs to be built.

A. Cost allocation burden is assigned to SPP regional state committee. That's their responsibility and we support them in that area. The committee has been meeting at least quarterly since 2004 and people on the regulatory staff are meeting monthly. It's been a very open process and we've come a long way together since 2004.

A. We're so focused on the cost of transmission that the NRC refused to restart the Murphy's nuclear facility because the lack of transmission in that state caused tremendous stress on the transmission lines. When that was coupled with the open market the cost of electricity in Connecticut went through the roof.

A. If you're looking at moving low cost around the footprint, you have to have transmission. You can't just look that the transmission is expensive.

A.. I am a commissioner on a regional state committee and I am deeply concerned about the cost.

Q. The discussion near the end about calculating the cost lacked an identification of who benefits and who loses in that process. I don't understand the simultaneous statement that says we can't identify the beneficiary, but we are very good at calculating the benefits. How can that be true?

A. I think what you're asking is a line by line approach. Regardless of the modeling and how detailed the modeling it is never really going to be exact, but rather an essence of predictions.

She cites the 765 and 500 groups in New England that basically have socialized transmission.

A. The network and beneficiaries are going to change over time, as these systems will be up for over 30 years. A. You can calculate the benefits, but the beneficiaries will change over time.



JIM ROTH, NEPI Consultant and Attorney, Phillips Murrah

Convening Host of the NEPI conference, Jim Roth, is an attorney in the Transactional Department at Phillips Murrah Law Firm in Oklahoma City. Roth is a member of the Energy & Natural Resources practice group and Chair of the Alternative "Green" Energy practice group. He represents individuals and both publicly-owned and private companies in a wide range of business, energy and environmental matters. Hand-selected by Governor Brad Henry to serve as Corporation Commissioner on June 1, 2007, Jim held the office through January 2009. He was first elected county commissioner in 2002 and, in 2006, was the first re-elected county commissioner in over a decade. Prior to serving as County Commissioner, Jim served eight years as a chief deputy and attorney to the Oklahoma County Clerk and a previous administration for District One of the County Commission. Jim is licensed to practice law in Oklahoma, Kansas and respective Federal Courts.

The work of the National Policy Energy Institute will continue...

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