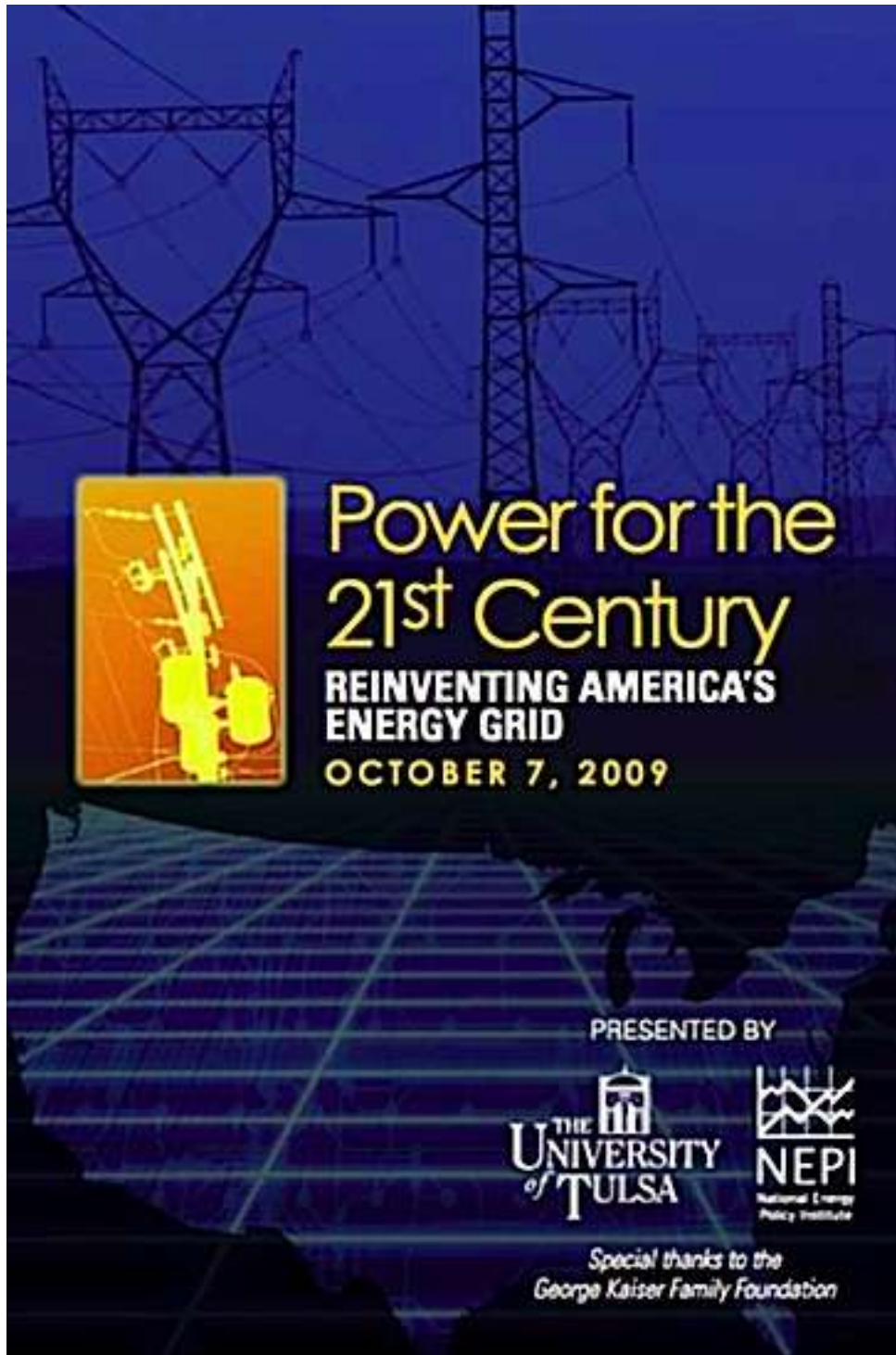


SUPPLY PANEL



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 county 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.