Denver – Energy Listening Session Summary

The sixth listening session was held in Denver on Wednesday, August 14, 2013. The session was attended by 41 industry participants and 6 staff from partner agencies. The attendees are listed in the table below. Please note that this summary does not reflect the opinion of the State of Colorado, but rather provides a summary of comments from attendees that were with businesses and other non-state agency organizations.

State and Regional Profile

- There is an interest in having more information on the mining industry added to the Colorado Energy Office website and to insure that the mining sector is part of the key industry network process. Colorado mining produces important minerals that are inputs for the energy industry.

Energy Efficiency Trends – Discussion Points

- Consumer education is important for energy efficiency. California has some "gold standard" programs for energy efficiency education to explore. The California Energy Commission can provide effective education program models.
- Several parts of the state are looking at strengthening building codes for the purpose of protecting homes and buildings against wildfires. These efforts to strengthen building codes should be leveraged to look at energy efficiency code updates at the same time.
- Demand side management (DSM) program expansion is important to advance the energy efficiency sector throughout the state. Rural Electric Associations (REAs) and municipal utilities may not have DSM programs. Additionally, DSM programs should consider propane fuel as qualifying resource.
- Additional financing mechanisms for energy efficiency could be developed at the state level to advance energy efficiency. Additional funding sources and mechanisms to explore include a carbon tax, public benefit funds, revolving loan funds, public private partnerships, and other private capital sources.
- In the real estate market it is important to provide Home Energy Rating System (HERS) score in the Metro Listing Service (MLS) system to support energy efficiency efforts. Currently, MLS listings are currently showing HERS scores if homebuilders choose to have their homes assessed. It is also important for appraisers to understand the value of the HERS scores.
- There is a need for consumers and business to have access to aggregated data from utilities. This information would provide valuable information on the impact of energy efficiency improvements. This data could include consumer data that is aggregated by neighborhood or at the block level.
- Appraisers are currently unable to capture the value of energy efficiency upgrades in a home. There needs to be methodologies or standards that allow for the valuing of energy efficiency features that are more sophisticated than using comparable home sale prices. The current situation for the real estate market would be similar to buying a car without knowing its fuel efficiency.
- A commercial Property Assessed Clean Energy (PACE) financing bill recently passed in Colorado. The rulemaking still needs to take place before it applied to energy efficiency improvements. This bill creates a need to educate the industrial sector on what energy efficiency improvements are available and which ones are worth the investment.

- Incentives may be more effective in advancing energy efficiency than a mandate approach. Mandates may drive costs and not efficiencies.
- There is an interest in supporting energy efficiency by examining how energy systems could decouple profits from energy sales. Decoupling also refers to rate structures that separate energy sales from the recovery of fixed costs. The fixed cost charge to a customer would include the cost of meters, transformers, and other equipment that would be paid for separately from the energy itself. For REA customers the fixed cost may be about $30/month before the energy consumption cost is added to the bill. Customers that use little energy will likely be dissatisfied with this rate structure because it will increase their monthly bill.
- There are three distinct types of electric utilities in the state (REAs, investor owned utilities, and municipal utilities), each with a different structure. REAs exist to optimize systems and stay efficient and cost effective. REAs are not geared toward being profitable. Each REA selects the programs they want to put in place and how they invest in programs.
- A test or demonstration facility is needed for new energy efficiency technologies to be developed in the state. Currently, CH2MHILL and MWH vet and approve technologies. The state could act as a convener between technology companies and the test facility.
- There is a need for using a life-cycle cost approach to energy efficiency projects. A more advanced approach would focus not just on return on investment, but look at externalities, economic impact, and environmental impact.
- Capitol Solar and the Colorado Solar Energy Industry Association indicated that solar thermal systems for heating should fall into the category of energy efficiency, and not be considered energy generating systems. This lack of distinction as an energy efficiency technology has resulted in solar thermal being overlooked in many energy initiatives at the state level. Geothermal heat pumps should also be considered energy efficiency technologies according to the Colorado Geo Energy and Heat Pump Association.
- Energy efficiency improvements for energy generation facilities and transmission systems are important projects to consider. It would be useful to developers if utilities could provide more information about the opportunity for new energy generation sources to be integrated into a system. A significant amount of energy can be saved when improving infrastructure on a utility system.

Advancements in Energy Production – Discussion Points

- Air permits can be an obstacle for natural gas production and mining. Typically, air permitting involves regulations at the state level. State agencies are using part time employees for processing air permitting and there is currently a national-level problem with permitting delays. There has been a decline in funding to support air permitting activities in the U.S. The Colorado Department of Public Health and Environment (CDPHE) does not have sufficient staff for air permitting, but may have more staff than necessary focused on other regulation activities. Additionally, water quality permits for mining are difficult to gain approval through the system.
- For the stone, sand, and gravel mining industry, there are negative impacts from state staff leaving CDPHE to go to the private sector for more lucrative salaries and benefits. The departures have

resulted in reduced capacity within the air permitting staff to handle permit applications. There are companies that have waited 18 to 24 months for permit approval, based solely on delays in the agency's review processes.

- There is a need for timely super-load permits. Transportation infrastructure should be on the list of things the state is looking at for economic development.
- Coal generation, a bedrock source of energy production for REAs, continues to get vilified. Coal has issues, but it is still required at this point to provide electricity to the state. Other energy sources should be considered, but coal generation shouldn't be thrown to the side in the conversation dealing with advances in energy production.
- It should be understood that there is clean coal in Colorado and upgrades have been made to systems for better efficiency. There is a need to look at impacts from legislation that may affect coal production, as well as the impact on consumers. There needs to be an analysis prior to regulations being implemented and legislation being passed. Senate Bill 73, which allows for cost-benefit analysis, could help with the implementation of rulemaking across the board.
- There are opportunities and interest to have different sectors of the energy industry working together. Examples include the use of energy efficiency and renewable energy technologies in the traditional fuel sectors; direct energy efficiency and renewable energy that supports traditional energy production; the use of solar on natural gas well pads.
- There is currently a large untapped opportunity for the use of renewable energy, such as solar, in the state. There is a huge amount of solar potential in the state, but it currently only provides less than one percent of the state's generation. Colorado could be viewed as the epicenter for solar energy development. There is no need to find the solar energy resource - it is everywhere and it is free. The solar coaster has been dealt with in recent years – the unpredictability of the solar incentives available. Permitting is also a challenge for solar installations. Net metering policy is important and the state could be more supportive of net metering policy. Solar systems may have provided utility system benefits by reducing rolling brown outs and instability in the grid.
- Solar thermal project for electricity, allow for energy storage, and can provide base load. The state needs to value these attributes and use it to its advantage. Each utility has the need for dispatchable loads that can be provided by solar thermal to electricity projects. Solar thermal technologies are currently working on finding a more flat rate for dispatching energy to the grid.
- Black Hills Energy commented that solar and wind energy are important to customers, but that it is also important to understand the costs of advancing these energy resources. Such policies as feed in tariffs, rebates, and net metering have costs associated with them. These programs should be developed with an understanding of the net system costs before the policies are implemented. Customers who are not able to take advantage of these technologies may end up subsidizing those who utilize the programs.
- In utility resource planning in Colorado, each type of technology is examined through models and the models point to the least cost solutions. Many technologies have promise, but when you line them up side by side, the models indicate the least costly solutions. In Colorado, it is not the utilities unilateral decision on what to invest in. The cost issues make it difficult for some technologies to be chosen as long term energy providers.

- There is an interest in examining the resource planning models and modifying them to capture additional costs and benefits. For example, energy efficiency saves money by not having to build a new power plant and that savings could be included in a model. The models may need more research to identify accurately what the cost of different technologies would actually be. Most existing models may have been designed to model fossil fuel generation and miss the reduced costs or benefits from other technologies that may reduce health costs or other external costs.
- There was concern expressed that externalities are arbitrary and cannot be baselined to provide effective models for resource planning. The state could work on developing a baseline approach to the energy cost models.
- There is an interest in developing an export corridor in Colorado. An opportunity may exist to transform the Four Corner coal hub into a renewable energy and natural gas hub. Colorado could be the leader in the development of the export corridor in this region. There are concerns that there may not be enough energy to run energy production in the west because the Four Corners hub is in decline.
- Transmission siting is an important issue in Colorado. The state could provide leadership to work with local governments on 1041 authority to find a better balance on siting issues. Various agencies and organizations have been down that path many times on transmission siting. There has been an impasse involving local governments, state, and utility stakeholders. Transmission siting is a multi-pronged issue from 1041 authority to landowners can make a transmission line a 10 to 12 year project.
- From the federal perspective, energy generators and marketers are distinct from transmission providers. They are separate entities that follow different regulations. Storage providers are also an important part of the system. Storage is a great enabler for renewable energy and balancing the grid. California has a long list of storage projects.
- Dairies have heating and cooling needs that could be served cost effectively by geothermal heat pumps. It is difficult to find investors that will finance these projects on dairies. There is a need for financing models for different industries. There is currently a lack of financing options for energy projects of this size.

Federal and State Regulations – Discussion Points

- Solar PV projects could benefit from the implementation of a more standard state-wide permitting process. Jurisdictions across the state currently have their own permitting process that can vary significantly. The variety of permitting processes acts as a barrier for solar PV installers operating in multiple jurisdictions. These same permitting issues exist for solar thermal installers as well. A license is required to operate in each jurisdiction which can become expensive for a business to obtain and maintain if they are seeking multiple licenses.
- The federal Endangered Species Act has presented challenges for projects in the state. The Act is currently creates uncertainty for which animals will be listed as endangered in the future. The process for listing species can take 5 or more years which create uncertainty for development during that entire period.

Infrastructure Stability and Modernization – Discussion Points

- Independent power producers go through a transmission process to identify the best location to tap into the grid with additional transmission. It would be interesting to develop a process that goes in the other direction, shifting the business model to have system operators provide information on available capacity so that projects are sized to the current infrastructure.
- Black Hills has implemented Advanced Metering Infrastructure (AMI) on 100% of its customers. They are now using the data to support more effective management of their system. The utility has an application for customers to access usage data. In the future additional applications will provide much more thorough load research. The AMI infrastructure creates the possibility for expanded distributed generation and improved outage response. Additionally, there is an opportunity for external vendors to create the web platform for data applications. The opportunities from smart grid, AMI, and DSM have yet to be fully achieved, but the infrastructure is in place to move in a positive direction.

Alternative Fuel Vehicles – Discussion Points

- National Car Charging stated that electric vehicles (EVs) have grown 300 percent in recent years, with 80-90 percent of charging occurring at home.
- Utilities are generally happy to handle EV charging on customer homes, but there is an interest knowing where charging stations are being installed for planning purposes – allows a utility to identify areas for system upgrades.
- The two primary opportunities for creating public EV charging infrastructure are work places and multi-family housing properties. There is interest in tax incentives to encourage expansion of charging stations in these markets. In California, they built the infrastructure first and consumers than bought the EVs.
- With the increase use of EVs there are future challenges to consider for maintaining tax revenue from gasoline sales that fund road maintenance.
- There are concerns that EV charging costs that are based on time are not equitable because different EV types charge at different rates. A more equitable approach is by kWh consumed for charging.
- The Compressed Natural Gas (CNG) vehicle market would likely grow with refueling stations installed in building parking garages. There is also a need for increased education on CNG vehicles - consumers don't understand how they work .
- The Western Governors Association hosted a meeting on CNG financing and infrastructure. The report that was produced as an outcome of the meeting should be incorporated into this Energy Key Industry Network effort. CNG is a complex issue for deployment; however, there are other countries that have more CNG vehicles in use than the United States.
- The state, in developing policies and regulation, should not focus on defining AFV technologies as they are now (e.g. EV, CNG, E85), because the distinction between AFVs is a moving target that is now moving fast in a direction where multiple technologies may be part of one vehicle. The future of vehicle incentives could be based on performance measures, and not on the type of technology. A

performance based model for incentives might allow for greater innovation and the advancement of new technologies.

- EV consumers are interested in whether they are recharging their vehicle from a "clean grid." That information is not readily available in most cases - knowing the source of the electricity can be hard to determine. This is an issue that could be addressed in the future.
- Media outlets seem to be providing misinformation on EVs.
- Fuel cell vehicles should be a particular area of focus for advancing AFVs along with other technologies. In looking at the AFV technologies it is important to understand two key areas of information: how they compete with other vehicle technologies, and how they can collaborate with other vehicle technologies. For example, fuel cells may not be ready for the market today, but the technology currently in EVs can be used with fuel cells when they are commercially available. Another, example includes hydrogen powered vehicles. Hydrogen is derived from natural gas. The models for examining AFV need to evolve and we need to be better at comparing them. The types of AFV technologies will have appropriate uses (e.g. EVs may be better for driving in the city).
- It is important to consider energy efficiency for vehicles in terms of control systems, e.g., smart vehicle technology that could allow for more efficient operation of a vehicle than humans. The implementation of advanced control systems and "smart" navigation technologies could make transportation more efficient.
- Utilities are interested in developing time-of-use rates for EV owners that would encourage charging of vehicles at night when rates are lowest and could benefits utilities with greater consumption of excess power on the system. However, cost leakage may become an issue with these programs.

Connecting Business to Research – Discussion Points

- When dealing with academic institutions and national labs, a primarey issue is intellectual property (IP) rights involving ownership of the end product. This may be viewed as a barrier if companies hesitate to use research services because of concerns about IP ownership rights.
- The most successful research projects have rational expectations and are realistic between the parties involved. The more that is understood beforehand, regarding who will pay for what, and who will own what, the better the collaboration will be.
- The duration of research programs can be an issue. A long period for research may not be viable for an industrial company to make it cost effective. On the academic institution side, a research program can be dependent on how long the students will be there to work on the project.
- Developing the workforce of the future and growing employees is important. There should be educators involved in this Energy Key Industry Network. Curricula are changing fast and the state could lead an effort to be inclusive skills to support current markets and industries. Renewable energy of the future is dependent on the minds of the future, our kids.

- There have been efforts to develop future employees for companies through student research projects at universities. The state should consider an incentive for companies to hire students that conduct research for the industry at the state's universities.
- There is currently robust research and development taking place in the utility sector that extends beyond the borders of Colorado. Colorado is in a large, global competition in this space of utility energy research. This global competition is forcing utilities to look beyond Colorado and the west to support research opportunities and future development. There are many opportunities outside of our local region to consider for research. These global resources need to be considered in order to stay competitive with other states and regions.
- Workforce development for solar thermal development is not just about research, but about other parts of the value chain: technicians have constant turnover; training and hiring is difficult; there is a need to have the tools to prepare the technicians; and, design engineers that can work with complex systems are hard to find. Design engineers are typically based outside of the state or out and can't be retained because of work visa issues.
- Vestas has developed strong partnerships with local community colleges. Work visas are an issue with many students who are educated at the local colleges – the students are not able to remain in the state after they obtain valuable skills for the industry. Additionally, Vestas has encountered challenges in getting in-house professionals to train employees. Sometimes employees are sent overseas for training because it is easier – challenges with the visas are the cause of this issue as well.
- In the oil and gas industry, there is a need for good technical minds that are familiar with the industry. In the next four to five years, there could be as many as 50% of the oil and gas industry's employees retiring. Efforts are being made to partner with universities to look at technical programs for training.

Wrap-Up – Discussion Points

- There is a need for a plan that helps us respectfully transition to new energy sources in a manner that is non-preferential to specific resources in the process.
- Legislation currently demands certain energy sources produce a certain amount which creates winners and losers. There is an important need to look at long term benefits, not just what will benefit us today in the short term.
- Utilities should be consulted before legislation is proposed. Utilities want to be involved and they need to be engaged in the process.
- Renewable energy should be viewed as a priority for the Blueprint.
- Denver International Airport (DIA) is the second largest airport in the world by land mass and has the potential to be a demonstration hub for a wide range of energy technologies. The information from these sessions should be pulled together and made available for projects to be demonstrated at DIA.

- The Energy Key Industry Network should be more about the process than a report. The final report should not be a final report; it should be a living document that is updated periodically, or as necessary.
- Whatever the energy sources are, it should be noted that the state's consumers will want affordable, reliable, responsibly produced energy. Affordable and reliable energy is key for the economy. The cost of power matters for attracting and recruiting companies to the state.