Senate Select Committee on Energy and the Environment

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Select Committee on Energy and the Environment Report

Committee Charge

The Senate Select Committee on Energy and the Environment was convened pursuant to Senate Rule 22(c), which allows the Senate President to create a committee to review a single specified subject matter area or issue during a regular legislative session. Pursuant to the Senate Rule, the President appointed five members to the committee.

According to the Senate President's December 6, 2016, letter, the purpose of the Select Committee on Energy and the Environment (select committee) was to hold hearings on a wide range of energy and environmental issues facing Colorado. Topics included supporting energy jobs and revenues while protecting natural resources in the state; the changing regulatory landscape; and pursuing an all-of-the-above approach to energy development in Colorado. The committee met five times in during the 2017 legislative session.

The committee did not recommend any legislation.

Committee Activities

During the 2017 legislative session, the committee met five times. The committee heard presentations from energy researchers, private entities, energy producers, equipment manufacturers, and local government officials. The committee received briefings on:

- the Resource Rich Colorado 2016 Report;
- Corporate Average Fuel Economy (CAFE) standards;
- trends in energy technology and markets;
- nuclear energy;
- energy production and its effect on water and other natural resources;
- coal methane production;
- utility energy efficiency programs;
- the cost of energy production and new technology;
- the role of fossil fuels; and
- the management of health risks associated with oil and gas development.

The committee heard from representatives of the Colorado Energy Coalition, Alliance of Automobile Manufacturers, the Automobile Dealers Association, the Idaho International Laboratory, the National Renewable Energy Laboratory, Colorado State University, Vessels Coal and Gas, Inc., and the Southwest Energy Efficiency Project. Presentations were focused on energy issues in the state of Colorado, but also provided the committee with data regarding energy trends around the nation and the world.

Resource Rich Colorado 2016 Report

A representative of the Resource Rich Colorado Committee (RRCC), a part of the Colorado Energy Coalition, provided a briefing on the eighth edition of the Resource Rich Colorado Report (published in December 2016). Resource Rich Colorado (RRC) analyzes Colorado's competitive position in the global energy economy. The representative from RRCC provided background on the report and discussed the methodology used in its creation. He also provided the committee with various results of the report, specifically focusing on Colorado. The eighth edition of the report includes data from a variety of public and private sources, such as the Energy Information Administration, International Energy Agency, BP Statistical Review of World Energy, the National Renewable Energy Laboratory, and the U.S. Green Building Council. The report also includes data from the Metro Denver Economic Development Corporation's (Metro Denver EDC) annual Energy Industry Cluster Study, which provides Colorado-specific employment and industry growth statistics.

RRC uses data to evaluate Colorado's competitive position in the areas of oil; natural gas; coal; renewable power generation; environment and sustainability; policies and programs; and employment and industry. States are evaluated in each category in order to determine their competitiveness and overall ranking. The report also evaluates the United States' competitive position in the global energy economy. Countries are compared in terms of production, imports, exports, reserves, installed renewable generation capacity, emissions, and pricing. According to the results of the report, Colorado is a strong performer in the production of oil, coal, natural gas, wind, and solar and is above the curve in the adoption of alternative fuel vehicles and improving energy efficiency.

According to the report, Colorado is ranked number seven in the country in oil production and in the top ten in wind and solar production. The report also reflects a steady decline of coal production in the state. Staff from RRCC discussed total energy storage, noting that the report shows that energy storage is becoming more important over time. According to the report, Colorado currently has a gasoline tax that is below the national average. The report also reflects that agriculture is the primary use of water resources in the state, with energy development and hydraulic fracturing using significantly less. Colorado's water utilization consists of the following: Agriculture at 86.5 percent; municipal use at 5.8 percent; recreation and fisheries at 4.9 percent; and other categories at 2.7 percent. Along with minimum stream flow, large industry, thermoelectric power generation, wildlife, and snowmaking, hydraulic fracturing falls within the "other" category and utilizes 0.09 percent of the state's water resources.

The report addresses carbon dioxide emission rates, noting that the United States is the world's second-largest carbon dioxide emitter per capita behind Saudi Arabia. However, annual United States emission totals are declining, and that trend will likely continue, according to the report. The full report can be found at:

https://leg.colorado.gov/sites/default/files/17ag_resource-rich-colorado-8th-edition.pdf.

Corporate Average Fuel Economy Standards

Background. The Corporate Average Fuel Economy (CAFE) standards are federal regulations enacted to improve the average fuel economy of cars, light trucks, vans, and sport utility vehicles, produced for use in the United States. Congress first established CAFE

standards in 1975. The standards set the average new vehicle fuel economy, as weighted by sales, that a manufacturer's fleet must achieve. The federal Department of Transportation's National Highway Traffic and Safety Administration (NHTSA) sets and enforces the CAFE standards under the federal Energy Policy and Conservation Act of 1975, as amended by the federal Energy Independence and Security Act of 2007. The Environmental Protection Agency (EPA) calculates average fuel economy levels for manufacturers and sets related greenhouse gas emission standards under authority of the Clean Air Act. Additionally, the California Air Resources Board (CARB), under the authority of the Clean Air Act, sets vehicle standards that are more stringent than the federal levels set by the EPA. California enacted legislation in 2002 directing CARB to develop global warming pollution standards for light-duty vehicles. Under the Clean Air Act, states are able to adopt the standards set by CARB in lieu of the federal standards. States that choose this option are required to adopt identical standards to those established by CARB, ensuring that there are two alternatives — a baseline federal requirement and a stricter state requirement, rather than multiple standards. NHTSA and the EPA have issued joint rules for CAFE standards and greenhouse gas emissions regulations for passenger cars and light trucks built in model years 2017 and beyond.

Impact on automotive industry. A representative from the Alliance of Automobile Manufacturers (alliance), an association of 12 vehicle manufacturers, discussed the CAFE standards and the impact the automotive industry has in the state. He stated that the alliance supports reducing greenhouse gas emissions associated with the operation of passenger cars and light trucks in accordance with market demands.

Zero emission vehicles. The representative from the alliance provided the committee background on zero emission vehicles (ZEVs) and discussed the impact of ZEVs on CAFE standards and the trends of ZEV ownership in the state. ZEVs include plug-in hybrid electric vehicles, battery electric vehicles, and fuel cell vehicles. According to the alliance, automakers currently offer 27 ZEVs and more models are being developed. Many advanced technology and alternative fuel vehicles do not qualify as ZEVs. These vehicles include hybrids that do not require an electric outlet, flex-fuel vehicles, natural gas vehicles, clean diesels, and vehicles that use advanced fuel-saving technologies.

The representative discussed California's ZEV rule, which was promulgated in accordance with the Clean Air Act by CARB. The original rule required that 2 percent of the vehicles produced by large manufacturers in California must be ZEVs by 1998, increasing to 5 percent in 2001 and 10 percent in 2003. In 2012, California adopted its most recent ZEV regulations, requiring that 15 percent of new vehicle sales in the state be ZEVs by 2025. In order to meet the climate change goals created by CARB, all new passenger vehicles sold in California must be zero emission by 2050. The representative from the alliance discussed the current market share of ZEVs and discussed several possible barriers to compliance with the ZEV regulation developed by CARB, such as uncertainty of available rebate funding and a lack of charging stations available for ZEVs.

Energy Development

Nuclear energy. A representative from the Idaho National Laboratory (INL), a government-owned, contractor-operated institution, provided a briefing to the committee regarding the development of nuclear energy. INL began as a testing facility for nuclear reactors and has since developed its activities into advancing nuclear energy, securing and modernizing infrastructure, and enabling clean energy development. Staff from INL discussed INL's development of methods to integrate nuclear energy with fossil fuel energy and renewable energy resources in order to help reduce the impact of energy created by fossil fuels. He discussed INL's work focused on renewable energy and the Center for Advanced Energy Studies, a public research center specializing in environmental and resource sustainability, nuclear and science engineering, geological systems applications, and fossil carbon conversion. INL is currently working to address science and technology challenges associated with the development, delivery, use, and security of nuclear energy. Staff from INL also discussed the launch of the Western Initiative for Nuclear, a broad, multi-state collaboration, in order to study the demonstration and deployment of a multi-module nuclear plan in the western United States. He also described ways in which INL has engaged with Colorado, including the laboratory-directed research and development at Colorado State University (CSU), the Nuclear Energy Program at the Colorado School of Mines, and a partnership with the National Renewable Energy Laboratory.

Coal mine methane. Methane is produced through natural processes, but is also emitted from sources such as coal mines. A representative of Vessels Coal and Gas, Inc. briefed the committee on coal mine methane production in the state. Senate Bill 13-252 expanded the definition of eligible energy resources that may be used to comply with Colorado's renewable energy standard to include coal mine methane, creating a demand for coal mine methane as an energy source. Vessels Coal and Gas, Inc. is a company dedicated to the capture of venting methane from coal mines and has developed and operates three mine methane capture projects that have generated and sold energy credits and electricity. The representative discussed the Elk Creek Mine electric generation project, which is the first coal mine methane emission electrical generation facility in the state. Methane gas that is vented through Elk Creek coal mine is pumped through a thermal oxidizer, burning the methane before it reaches the atmosphere. According to the representative, this not only produces a profitable form of energy, but helps to reduce greenhouse gas emissions. The energy produced from the extraction of coal mine methane at Elk Creek Coal Mine is currently being used as Aspen Skiing's main source of electricity.

Trends in energy technologies and markets. An official from the National Renewable Energy Laboratory (NREL) briefed the committee on electricity generation costs in the state. He also briefed the committee on power system trends throughout the country. According to NREL, natural gas has surpassed coal production in the United States, and renewable energy has seen a sharp production increase. The committee also heard a presentation from CSU regarding water consumption for electricity generation in the state. The representative from CSU stated that in Colorado, approximately 55,000 acre feet are consumed by energy production per year.

Fossil fuel production. The committee received a briefing from a representative from Mercator Energy regarding oil and natural gas production and oil consumption in the United States and across the world. The committee heard testimony regarding the evolution of the oil and gas extraction industry, focusing on the practice of hydraulic fracturing. Hydraulic fracturing produces fractures in a rock formation that stimulate the flow of natural gas or oil, increasing the

volumes that can be recovered. Wells may be drilled vertically to thousands of feet below the land surface and may include horizontal or directional sections extending thousands of feet. Fractures are created by pumping large quantities of fluids, consisting of water, proppant, and chemical additives, at a high pressure down the wellbore and into a rock formation. The proppants contained in the liquid, typically sand, ceramic pellets, or other small incompressible particles, hold open the newly created fractures. Once the injection process is complete, the internal pressure of the rock formation causes fluid to return to the surface through the wellbore. This fluid is known as both "flowback" and "produced water" and is typically stored on the well site in tanks or pits before treatment, disposal, or recycling. The representative from Mercator Energy discussed ways that oil and gas producers take precautions in regard to hydraulic fracturing, including using well casings to prevent leaks and continual testing of surrounding surface water.

The committee was also briefed on the importance of shale reserves in the United States. According to Mercator Energy, the production of oil and gas in the United States has steadily increased since 2005, mainly as a result of horizontal drilling and hydraulic fracturing techniques, notably in shale, sandstone, carbonate, and other tight geologic formations. Shale is a fine-grained sedimentary rock that forms from the compaction of silt and clay-size mineral particles. It is easily broken into thin, parallel layers. Black shale contains organic material that can generate and trap oil and natural gas. Mercator Energy discussed the Barnett Shale in Texas and the Marcellus Shale in the eastern United States. The United States has access to significant shale natural gas resources, and the U.S. Energy Information Administration estimates that the United States has approximately 200 trillion cubic feet of proven shale gas resources.

Health Risks Associated With Energy Production

Managing health risks associated with oil and gas development. The committee received a briefing from staff of Quality Environmental Professional Associates, an environmental health risk communication firm. Staff referenced a report from the American Petroleum Institute entitled "Managing Health Risks Associated with Oil and Gas Development Activities in Colorado." The report seeks to understand health risks associated with oil and gas development using a number of studies and approaches, such as risk assessments, exposure surveys, hazard evaluations, and exposure assessments. Testimony focused on risk assessments, which are used to characterize health risks to humans from stressors that may be present in the environment. Risk assessments use a framework established by the EPA involving four major steps:

- identifying what health problems are caused by the pollutant (hazard identification);
- identifying what the health problems are at different levels of exposure (dose-response assessment);
- quantifying how much of the pollutant people are exposed to during a specific time period (exposure assessment); and
- identifying the extra risk associated with health problems identified in the exposed area (risk characterization).

The panel discussed an assessment recently conducted by the Colorado Department of Public Health and Environment (CDPHE), which used available studies and data to evaluate the potential health risks from substances emitted from oil and gas operations. CDPHE used an approach that integrated different sources of information to determine whether substances

emitted into the air from oil and gas operations result in exposures to Coloradans living near oil and gas operations at levels that may be harmful to their health. According to the panel, the assessment conducted by the CDPHE predicts that adverse health consequences from exposures to chemicals emitted by oil and gas operations to humans living less than 500 feet from those operations are unlikely.

Public Testimony

The committee heard public testimony from local elected officials, energy researchers, private citizens, private corporations, and other advocacy groups. Public testimony focused on the impacts of climate change, new technology to reduce the impact of air pollution, the effect of air quality on human health, renewable energy sources, and potential projects in the state focused on renewable energy.

Impacts of climate change. A representative from the United Church of Christ discussed global climate change and described climate change as a moral issue for the Christian community and the general population. He also discussed Pope Francis' 2015 encyclical letter on climate change, entitled "*Laudato Si*." The representative stated that moral perspectives should be a part of the public debate concerning climate change and that good science and morality should help to drive that debate.

A professor from the atmospheric science program at Colorado State University (CSU) provided testimony on carbon dioxide emissions and how those emissions relate to climate change. He stated that over the past century, scientists have found that an increase in carbon dioxide emission into the atmosphere causes a rise in the earth's temperature. The professor mentioned that there are seven recent studies that measure the impacts of burning carbon dioxide in the earth's atmosphere, and those studies found that approximately 90 percent of scientists agree that carbon dioxide emissions increase earth temperatures. He discussed the importance of the spring snow pack to the state's water system, and how that water supply impacts agricultural and municipal water supplies. He discussed how an increase in Colorado's temperature would impact the water supply in the state. He discussed the cost of clean energy as opposed to oil and natural gas production, asserting that more Americans are employed in the clean energy sector than in the oil and gas industry.

A representative from Protect our Winters, a local nonprofit founded to engage and mobilize the snow sports industry to combat climate change, testified before the committee. The representative discussed the ways in which climate change impacts the ski industry and mountain communities in the state. She discussed the negative impacts of a decrease in snowfall as a result of climate change to winter tourism, emphasizing the importance of winter tourism to the state's economy.

Representatives from the American Lung Association and the city of Lafayette and private citizens also discussed the impacts of climate change, including public health concerns and the importance of developing clean energy.

Clean energy jobs. A representative from the Environmental Entrepreneurs (E2) testified before the committee. E2 is a national, nonpartisan group of business leaders, investors, and professionals from different sectors of the state's economy advocating for policies that improve the state's economy as well as the environment. The representative discussed a report

published by E2, entitled “Clean Jobs Colorado.” The report examines clean energy jobs in the state. According to the report, Colorado’s clean energy industry employs more than 62,000 people statewide in industries such as energy efficiency firms, renewable energy development, and other clean energy businesses. The representative from E2 stated that the employers in these industries expect the clean energy sector to grow by 2 percent over the next year. The representative also discussed the U.S. Department of Defense’s increased use of microgrids on military bases as main source of energy. A microgrid is a local energy grid with control capability that can operate separately from an area’s main power grid. The representative stated that by switching military bases from diesel backup generators to efficient microgrids, the Department of Defense can enhance security against the threat of grid outages or cyberattacks while becoming increasingly energy efficient. He also stated that installing microgrids on military bases creates employment opportunities in the clean energy sector.

Opportunities in renewable energy development. A representative from Western Resource Advocates testified on expanding opportunities in renewable energy throughout the state. The representative discussed several projects in the state that are focused on creating renewable energy, specifically, the Comanche Solar Project in Pueblo, which was developed with collaboration with Xcel Energy; the Peak View Wind Project in Las Animas County, which partnered with Black Hills Energy; and Xcel Energy’s Rush Creek Wind Farm. The representative stated that all three of these projects were developed at a low cost while bringing savings to Colorado energy consumers. For example, the Rush Creek Wind Farm is projected to save customers $443 million over the next 20 years and cost $28 per megawatt hour to develop. She also stated that prices for renewable energy production continue to fall, creating more opportunities for renewable energy development. She discussed the economic costs of not investing in renewable energy production, including impacts on the economy, forest health, and watershed health.

A representative from Panasonic testified to the committee regarding Panasonic’s new operation center located at Pena Station Next. Pena Station Next is a mixed-use development currently being developed near Denver International Airport by Panasonic. According to the representative, it is a self-sufficient community that will produce and store energy using a microgrid. He stated that the objectives of the center are to maximize property values in the area, create a compelling “live, work, play” environment, improve community operations, and deploy new and developing technology throughout the state. He also discussed Panasonic’s new focus on lithium ion battery manufacturing and stated that Panasonic is the leading provider of lithium ion batteries for Tesla vehicles.

Renewable energy developments in transportation. A representative from Proterra, a bus manufacturer, testified before the committee on Proterra’s development of battery-powered busses for public transit use. He stated that Proterra has over 100 electric battery-powered busses deployed throughout the country. Proterra is seeking to expand their presence by deploying fleets in Greeley, Boulder, and several mountain ski towns in the state.

Representatives from the Southwest Energy Efficiency Project (SWEEP), the city of Aurora, and Gunnison County Electric Association provided information to the committee regarding electric vehicle programs in their respective areas. They also emphasized the need for new developments in energy efficiency and improved electric grid systems in order to support electric vehicles.

Resource Materials

Meeting summaries are prepared for each meeting of the committee and contain all handouts provided to the committee. The summaries of meetings and attachments are available at the Division of Archives, 1313 Sherman Street, Denver (303-866-2055). The listing below contains the dates of committee meetings and the topics discussed at those meetings. Meeting summaries are also available on our website at:

https://www.colorado.gov/pacific/cga-legislativecouncil/interim-committees

Meeting Dates and Topics Discussed

January 19, 2017

- Presentation of the Resource Rich Colorado Report (*Brian Payer, Co-Chair, Resource Rich Colorado Committee*)
- Public testimony

February 16, 2017

- Briefing on Corporate Average Economy Fuel Standards (*Chris Nevers, Vice President, Alliance of Automobile Manufacturers, and Tim Jackson, Colorado Automobile Dealers Association*)
- Public testimony

March 9, 2017

- Presentation on nuclear energy development (*Michael Hagood, Idaho National Laboratory*)
- Trends in energy technologies and markets (*David Mooney, National Renewable Energy Laboratory*)
- Energy, water, and our future (*Brad Udall, Colorado State University*)

April 6, 2017

- Presentation on coal mine methane production (*Thomas Vessels, Vessels Coal and Gas, Inc.*)
- Utility energy efficiency programs (*Dr. Howard Geller, Executive Director, Southwest Energy Efficiency Project*)
- Energy solutions overview (*Matthew Crosby, Utility Solutions Program Manager, Panasonic*)

April 20, 2017

- Fossil fuels and the role they play in an energized world (*John Harpool, Mercator Energy*)
- Health risks associated with energy production (*Dollis Wright, Quality Environmental Professional Associates*)