

A Colorado Perspective: The New Energy Economy

Jim Martin and Ginny Brannon***

I.	INTRODUCTION.....	269
II.	AGRICULTURAL SEQUESTRATION	270
III.	RENEWABLE ENERGY AND EFFICIENCY MEASURES	272
	A. <i>Renewable Energy</i>	273
	B. <i>Efficiency Measures</i>	274
IV.	FOSSIL FUEL ELECTRICITY GENERATION	275
	A. <i>Existing Coal Plants</i>	275
	B. <i>Clean Coal</i>	275
	C. <i>Natural Gas</i>	275
V.	SMART GRID.....	276
VI.	ECODRIVING	277
VII.	MANDATORY REPORTING.....	277
VIII.	COLORADO’S STATE GOVERNMENT: LEADING BY EXAMPLE	278
IX.	ADAPTATION.....	278
X.	CONCLUSION	280

I. INTRODUCTION

In his campaign for Governor, Bill Ritter promised to establish Colorado’s twenty-first century New Energy Economy by promoting alternative energy, encouraging cleaner ways of extracting and using fossil fuels, and rewarding efficiency and conservation. A plan was put in place to create jobs and develop businesses, boost rural economies, leverage unique energy assets, increase energy efficiency and conservation, lead by example, and promote the responsible development of fossil fuel re-

* Jim Martin is the Executive Director of the Colorado Department of Public Health and Environment.

** Ginny Brannon is the Climate Change Manager for the Colorado Department of Public Health and Environment.

sources. In the two years since the governor took office, major progress has been made on all of these fronts and the underlying tenants of the New Energy Economy—creating jobs and spurring fiscal growth while producing cleaner energy—remains a reality in Colorado, even in the midst of a national economic crisis.

At a time when concern about our economy is growing and American families are struggling with high energy costs, we have proposed policies that will take advantage of renewable energy resources like wind, solar and biofuels. In Colorado, we call this the New Energy Economy. By creating a twenty-first century energy policy, we are creating jobs, revitalizing the economy, protecting the environment and helping secure our nation's energy future.¹

One year after the election, Governor Ritter released the state's first Climate Action Plan (CAP), which included all of the elements of the New Energy Economy.²

In this first iteration, our CAP is an incentive-based plan. Guided by the scientific advice of the Intergovernmental Panel on Climate Change, the CAP set a goal of reducing emissions by 20 percent from 2005 levels by 2020, and by 80 percent by 2050. The CAP, including our accomplishments to date, is outlined below.

II.

AGRICULTURAL SEQUESTRATION

The Colorado CAP recognizes that the state and the nation will need transition strategies while we develop new technologies to produce energy without adding to the atmosphere's greenhouse gas load. In the United States and internationally, carbon sequestration in soils is an option to help mitigate increasing greenhouse gases in the atmosphere and it is recognized as an attractive low-cost activity that can be quickly implemented. Soil sequestration and management practices that reduce emissions of greenhouse gases could reduce more than 10 percent of Colorado's total greenhouse gas emissions. Incentives to producers to implement these management practices are established by creating a market in agricultural offset credits that farmers and ranchers can sell to those wishing to offset their emissions.

1. Governor Bill Ritter, Jr., National Radio Address, Dec. 1, 2007.

2. See GOVERNOR BILL RITTER, JR., COLORADO CLIMATE ACTION PLAN: A STRATEGY TO ADDRESS GLOBAL WARMING (2007), available at http://www.colorado.gov/energy/in/uploaded_pdf/coloradoclimateactionplan_001.pdf.

Examples of such management practices are reduced tilling, rotational grazing, converting cropland to permanent vegetative cover, adjusting the amount and timing of fertilizer use and improving the storage and management of livestock manure. These practices often have environmental and economic co-benefits as well. This results in a win-win-win proposition as we reduce the “low-hanging fruit” of greenhouse gas emissions; offer revenue streams for our farmers and ranchers; and improve the environment with management practices that conserve water, improve water quality, provide habitats for our wildlife, increase soil fertility, reduce soil erosion and increase resource efficiency.

In May 2007, Governor Ritter signed HB 1203, a bill that provides funding for a county-level appraisal of carbon stocks as well as carbon sequestration and greenhouse gas mitigation potential. This appraisal will be conducted by the Colorado State University’s (CSU) Natural Resource Ecology Laboratory. CSU scientists are also developing modeling to quantify the amount of greenhouse gases sequestered or reduced as a result of changing to a particular management practice. Farmers and ranchers can then use online support tools to estimate the amount of emissions reduced and carbon they could sequester by implementing an alternative management practice. The more greenhouse gases that are sequestered or reduced, the more credits producers can sell.

In addition to supporting this important research, we have developed a demonstration project that illustrates the efficacy of an agricultural offset program. This winter, the state facilitated the execution of contracts with owners of expired or expiring Conservation Reserve Program (CRP) lands in Baca County to ensure that the acres will continue to serve as carbon sequestering grasslands. Colorado has 700,000 acres of CRP lands due to expire this fall, at which time both the federal government and the farmers may choose not to renew the contracts. In that case, the acres may get plowed out unless incentives are provided to keep the acres in grass.

The demonstration project involves two farms, one where the acres recently came out of CRP and one where the acres are still in CRP, but are due to expire this year. In the first case, the farmer is selling offsets for emissions avoidance to keep the recently expired acres in grass and forego the opportunity to crop. In the second case, the farmer is implementing a rotational grazing plan that will stimulate vegetative growth and enhance se-

questration. This provides the farmer with a heightened incentive to renew the CRP contract since he is now getting both the revenue through the CRP program and money from the sale of the carbon credit. Part of the basis for the demonstration project was to explore this “layering” of incentives to find creative ways to offer farmers packages of incentives that will lead to the most sequestering possible. The demonstration project also offers the unique opportunity for CSU to do actual on-site soil sampling, which can then be compared to their modeling numbers. This will give us a better sense of the accuracy of CSU’s quantification methodology before the overall program launch.

Current climate change policy in the United States is based on voluntary reductions in greenhouse gas emissions, but a federal cap-and-trade program is likely just around the corner. Under a cap-and-trade program, industry subject to the cap will need to buy offsets from other sectors, such as agricultural producers, to meet their compliance obligations. The resulting heightened demand for carbon credits will increase their price and, together with more robust quantification tools, will significantly increase the potential of this revenue stream for Colorado’s agricultural producers.

III.

RENEWABLE ENERGY AND EFFICIENCY MEASURES

In April 2008, Governor Ritter issued an executive order to encourage investor owned utilities to work toward a goal of reducing greenhouse gas emissions by 20 percent by 2020 and to task the Governor’s Energy Office with developing comparable timelines and goals for public power entities.³ Xcel Energy, the state’s largest utility, responded to the Governor’s executive order by submitting plans to the Public Utilities Commission outlining how it would achieve a 10 percent reduction of greenhouse gas emissions by 2017. Xcel intends to submit a supplemental plan that shows how it will get to the 20 percent reduction by 2020. The Colorado CAP envisions that over 80 percent of these greenhouse gas reductions can be met through energy efficiency and renewable energy measures, many of which are already underway.

3. Exec. Order No. D 004 08, Climate Change Goals (Apr. 22, 2008), available at <http://www.colorado.gov/cs/Satellite?c=Page&cid=1233327301854&pagename=GovRitter%2FGOVRLLayout> (select Executive Order Number D 004 08 under “2008 ‘D’ Orders”).

A. *Renewable Energy*

A citizen initiative adopted in 2004 required Xcel and other investor owned utilities to get 10 percent of their energy from renewable energy resources by 2015. Xcel met that target eight years ahead of schedule. One of Governor Ritter's highest priorities in his first legislative session was to double that Renewable Portfolio Standard goal and to enlist public power entities in a similar effort. That legislation was adopted in the Governor's first 100 days and will significantly contribute to meeting the CAP greenhouse gas reduction goal, which envisions that renewable energy will comprise 33 percent of the energy supply mix from Colorado's utilities.

Beyond the partnerships that we have fostered with our utilities, we are forging stronger relationships with the National Renewable Energy Laboratory (NREL), located in Golden, Colorado. This partnership has led to the creation of the Colorado Renewable Energy Collaboratory, a research consortium that links NREL with three of the state's leading universities. The Collaboratory is drawing on the combined expertise at NREL and the brainpower at Colorado University, Colorado State University and the Colorado School of Mines to research and develop renewable energy projects and quickly bring them to the commercial market.

Both U.S. and international companies have responded by building and expanding operations in Colorado. One example is Denmark-based Vestas Blades, a leading producer of highly technological wind power solutions. Vestas Blades opened its first North American manufacturing plant in Colorado last year and has announced expansion plans for two more facilities, which will ultimately total 2,450 Colorado jobs.

We have also become home to Tendril Networks, Inc., a smart grid company based in Boulder. Among its contributions, Tendril makes in-home smart-grid software and devices, including a wireless thermostat and Internet gateway, which provide a method for automatically collecting information on home energy usage. Consumers can access this information in real time via their PC, iPhone or BlackBerry.

Other companies that are part of our New Energy Economy include:

- ConocoPhillips, which established its global alternative fuels research and development center in Louisville.

- Siemens Energy, which established its U.S. wind research and development center in Boulder.
- Renewable Energy Systems America, Inc., which designs, builds and operates wind farms, and relocated from Texas to Colorado.
- Texas-based Dragon Wind, which will open a plant to build wind towers in Lamar.
- Solix Biofuels, which will open the world's first commercial pilot facility outside of Durango to develop biofuel from algae.
- Five ethanol plants and more than 100 E85 or biodiesel fueling stations, selling more than 8 million gallons in 2008.

B. *Efficiency Measures*

The CAP envisions that 50 percent of the utilities' emission reduction goals will be met by increased energy efficiency. Last August, our Public Utilities Commission adopted the energy efficiency goals established in the CAP as part of a demand-side management plan that incorporates incentives for Xcel if it achieves or exceeds the goals established through the plan. Xcel will invest over \$140 million in the next two years in an effort to achieve these energy efficiency goals.

Colorado is also home to a number of industrial and residential efficiency programs that have proven to be highly effective. Colorado is home to the Energy Star New Homes Program, which supports the statewide construction and testing of new energy efficient single family homes built to Energy Star standards. Efficiency measures include insulation, duct systems and heating and cooling equipment to make these homes 20–30 percent more efficient than standard homes. The state has also employed the Insulate Colorado Program, which provides rebates for insulation measures in homes. The state's Residential Solar Rebate Program offers rebates for solar electric and solar hot water. The state provides Efficiency Code Training, which offers free technical training to building industry professionals through partnerships with cities throughout Colorado. The New Energy Economy Development Grant Program provides funding from the Clean Energy Fund for the advancement of energy efficiency and renewable energy throughout the state. Finally, the High Performance Schools Program requires the state to improve the energy efficiency in all Colorado schools through performance contracting. In just one example, at Soroco Middle School, the

Governor's Energy Office replaced a coal boiler with a biomass boiler running on pellets from trees killed by bark beetles.

IV.

FOSSIL FUEL ELECTRICITY GENERATION

A. *Existing Coal Plants*

Taking a significant step forward, Colorado partnered with Xcel in support of their electric resource plan. The plan called for the retirement of four inefficient coal-fired units at two plants in Colorado and replacement of that capacity with a mix of natural gas generation and renewable energy resources. Last August, the Public Utilities Commission approved that plan.

B. *Clean Coal*

Another promising opportunity for reducing greenhouse gas emissions is clean coal. While 16 gigawatts of coal-fired generation is under construction in the U.S. and 33 gigawatts in Europe, almost 300 gigawatts of coal-fired resources are slated to come online in China and India over the next five years. Clearly, coal will continue to be a part of our energy mix for decades to come. It is imperative that the U.S. develop new technologies that enable the capture and geologic sequestration of carbon dioxide, both for domestic use and to provide a path forward for developing nations. Colorado, Wyoming, and Utah are working together with industry to develop a framework for demonstrating pre- and post-combustion capture technologies and geologic sequestration using western coals at high altitude.

As we look to a future that includes clean coal, we face significant challenges. Major federal investments are needed, as is consensus on important regulatory and legal issues pertaining to sequestration, such as ownership of the pore space and long-term liability.

C. *Natural Gas*

Colorado and other Western states have abundant supplies of natural gas, and recent discoveries of shale gas reserves are rapidly expanding proven reserves. Natural gas will be an important bridge fuel as electric utilities make resource acquisitions in a carbon-constrained world. For example, natural gas generation is already being widely used to firm up intermittent renewable energy resources. In the coming years, demand for this resource

is likely to significantly expand. Also, the recent addition of natural gas reserves creates new opportunities for using natural gas as a transportation fuel, although there are significant infrastructure obstacles in the way of achieving these goals.

Of course, environmental preservation is among the challenges associated with natural gas extraction. It is important to carefully balance natural gas exploration and development with protection of other resources. Colorado's recent revision to its oil and gas regulatory program, implemented through HB 1341, illustrates how a thoughtful and careful balance can be achieved.

V.

SMART GRID

The Smart Grid offers one of the most exciting opportunities for clean and efficient energy, as well as job creation. We are supporting Xcel and the City and County of Boulder, which are working together to establish the first "Smart Grid City," consisting of fifty thousand homes equipped with smart meters and appliances. These homes are getting the latest in environmentally friendly and energy-saving technology, including solar panels, plug-in hybrid electric cars and—for some—a specialized heating, cooling and lighting system. All of these systems will be integrated into a monitoring system that reports the home's carbon footprint to the homeowner.

But, the Smart Grid City technology goes far beyond merely informing the homeowner of their carbon footprint. It will allow the homeowner to get on the computer and literally tell their house and car what to do. For example, the homeowner can instruct the computer to turn off certain appliances in a certain order if energy use goes above a specified threshold. Homeowners will be able to conserve even more energy, given the ability to store excess power in the solar panels. This power can charge the batteries in their car and supply them with a couple of days' worth of backup power. "Vehicle to grid" (V2G) technology, through which the plug-in hybrid vehicles can send electricity back to the grid, also allows the homeowner to make money and helps utilities during times of peak demand. The Smart Grid City offers a unique opportunity to incorporate smart grid technology in a controlled large-scale pilot environment. But challenges for the smart grid are great. Significant additional federal dollars are needed for expanded smart grid transmission and to dramatically increase the number of plug-ins being deployed.

VI.

ECODRIVING

Governor Ritter, together with Governor Arnold Schwarzenegger of California, the Environmental Defense Fund and the Auto Alliance, launched the EcoDrivingUSA program at a news conference in 2008. Governor Ritter serves as host of the website www.EcoDrivingUSA.com, which educates drivers about simple driving and car maintenance tips. Some examples are avoiding rapid starts and stops, keeping tire pressure at the manufacturer's recommended limit, removing excess weight from the vehicle and idling the vehicle to warm it up during cold weather.

Transportation is one of the most challenging sectors and more is needed, especially in regard to federal leadership and funding. We are hopeful that the President and Congress will explore harmonizing the new corporate average fuel economy standards and the California clean car standards to produce a national high-mileage, low-emitting vehicle standard.

VII.

MANDATORY REPORTING

Although the Air Quality Control Division at the Colorado Department of Public Health and Environment had draft regulations ready to bring before the Air Quality Control Commission in July 2009, staff will not pursue them at this time in light of EPA's draft rule requiring the mandatory reporting of greenhouse gas emissions. It has long been our view that initiatives, such as greenhouse gas reporting and cap-and-trade, should be initiated at the federal level to ensure consistency across the nation. While regional initiatives are critical in the absence of federal action, the cost to industry, and ultimately consumers, of complying with a variety of programs and protocols is less desirable than federal regimes in this context.

As for voluntary reporting, Colorado is on the Board of The Climate Registry (TCR) and was a founding member of TCR. Colorado is one of only two states to commit to statewide reporting of greenhouse gas emissions. Also, a number of the state's major emitters already report to TCR, including 90 percent of our utilities.

VIII.

COLORADO'S STATE GOVERNMENT:
LEADING BY EXAMPLE

Colorado has embraced the opportunity to lead by example, and we have a number of Greening Government initiatives in play. Pursuant to the governor's Greening of State Government Executive Order, the state will reduce overall energy use in all state facilities by 20 percent or more by 2012.⁴

The EO also set a goal of a 25 percent reduction in petroleum fuel use in the state fleet by 2012. We will meet this goal through a combination of biofuels and higher efficiency vehicles. To this end, we are maximizing hybrid purchases and use of alternative fuels in existing fleets, and increasing E-85 fueling stations state-wide. Finally, our Waste Task Force is establishing how we will meet a 75 percent waste diversion goal by 2020, at which time only 25 percent of the state's solid waste will go into landfills.

IX.

ADAPTATION

A collaborative research effort that included the National Oceanic and Atmospheric Administration's Earth Systems Research Laboratory and the University of Colorado culminated in a report on the effects of climate change in Colorado. Climate models show that Colorado will warm by four degrees Fahrenheit by 2050. There will be fewer extreme cold months and more extreme warm months, with more strings of consecutive warm winters. There will be a decline in lower-elevation snowpack, with runoff occurring earlier in the spring and resulting in reduced late-summer flows. Runoff overall is expected to decline, leaving farmers on the eastern plains without much-needed irrigation water. Further exacerbating the problem, higher temperatures will raise evapotranspiration by plants, lower moisture in soils, and alter growing seasons, all of which will increase water demand.

Other systems affected include habitat. Increasing temperature and soil moisture changes may shift mountain habitats to higher elevations. Water-stressed trees subject to warmer win-

4. Exec. Order No. D 012 07, Greening of State Government: Detailed Implementation (Apr. 16, 2007), available at <http://www.colorado.gov/cs/Satellite?c=Page&cid=1199121589584&pagename=GovRitter%2FGOVRLayout> (select Executive Order Number D 012 07 under "'D' Orders").

ters will be more vulnerable to pests, which is already apparent in Colorado's pine beetle epidemic. As stream temperatures warm, aquatic ecosystems will change, including the spread of nonnative and water-guzzling plant species in riparian areas. And, of course, much of this will ultimately affect our economy. Less snowpack and changes in stream flows affect tourism dollars that arise from skiing, rafting and fishing.

We are taking the opportunity now to adjust to the predicted consequences of climate change, as well as those already afoot. The state has completed phase one of the Colorado River Availability Study to assess climate change and other impacts on the Colorado River. The study will give us a better sense of how much water from the Colorado River Basin System is available to meet current and future water needs. This will depend not only on climate variability and drought conditions, but also on population, which is expected to increase by 5-7.5 million people by 2030.

Concerns about our future water supply extend throughout Colorado, but are most apparent among our metropolitan water providers on Colorado's Front Range. A group of Front Range water agencies are working together on a study intended to provide the education, tools, and methodology necessary to examine the effects of climate change scenarios on several common watersheds. This is a regional modeling effort through which projected stream flows are obtained by running adjusted sequences of temperature and precipitation through hydrologic models and comparing them to historic stream flows to estimate the sensitivity of water supplies to climate change. Our partners in this effort include state water agencies, water providers and the water utilities of Denver and Aurora.

We have also developed the Colorado Drought Mitigation and Response Plan to react to drought conditions when they arise. To this end, we assembled Colorado's water supply specialists, emergency management professionals, federal land managers, scientists and experts in climatology and weather forecasting to assess when the plan needs to be activated to mitigate drought conditions.

Finally, our Forest Health Advisory Council is addressing beetle infestations and wildfires. The pine beetle epidemic has decimated more than 2 million acres of mature lodgepole pines in Colorado over the past decade. The Colorado Forest Health Advisory Council brings together local, state, federal and private in-

terests to identify and implement short- and long-term forest health strategies.

X.

CONCLUSION

Along with other states, Colorado is taking the lead on initiatives that provide clean energy and offer opportunities for new markets and job creation. Many of the challenges confronting the state are monetary and regulatory. In most cases, federal leadership is the best solution to these obstacles. In the void of federal leadership that has colored the past decade, the states have paved the way, but more must be done as key areas, such as transportation and transmission, have languished. Colorado looks forward with great optimism to a new era of state and federal partnerships that will provide accelerated momentum toward full realization of the New Energy Economy.