

Pioneering Renewable Energy the Rocky Mountain Way

Colorado's Experience Generating Clean Energy Investment and Use

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Introduction

Progressive policies and abundant resources have secured Colorado's position in the West as a leader in clean energy investment, generation, and use. Colorado helped pioneer the transition of our regional economy to one powered rapidly and effectively by sustainable energy sources, acting upon Coloradans' demand that our state government be proactive, protect consumers, stimulate our economy, and preserve our natural resources. Our action on renewable energy over the past four years proves that good economic development practices go hand in hand with good sustainable energy practices.

Colorado has an abundance of renewable energy resources at its disposal. The Centennial State enjoys over 300 days of sunshine a year, ranking us fourth in the nation for solar potential. With an estimated 6 million acres of high-wind landscapes, especially along the Eastern Plains, Colorado ranks 11th for wind-energy potential. Finally, our geothermal and biomass supplies are among the best in the world, providing the state with a unique set of assets to diversify our energy portfolio. We have all we need in our own back yard.

And we have made excellent use of these renewable resources. Our efforts include setting clean energy standards for utility providers, facilitating transmission of renewable energy to market, funding technological development, providing renewable energy savings incentives to consumers and business, and limiting the effects of energy use on the environment through aggressive efficiency measures. With strong political will and abundant resources to tap, more bold legislation is on the docket for 2008, proving Colorado has no intention of slowing down. Too much is at stake to act any differently.

Understanding how Colorado got to where it is today in renewable energy, and what the state plans to do in the future, are both worthy of analysis. As you'll see in the pages that follow, Colorado is among the leaders in renewable energy policymaking at the macro- and micro-economic level in the Rocky Mountain West. And we are determined to remain so.

Pioneering Renewable Energy the Rocky Mountain Way

Renewable Energy: Successes and Goals

After inaction on renewable energy at the federal level, Colorado voters took matters into their own hands in 2004, passing Amendment 37, the first Renewable Portfolio Standard ever put on the ballot. The initiative required investor-owned utilities, which serve around 60 percent of the state's population, to get at least 10 percent of their electricity from renewable resources by 2015. In 2007, the utilities met this goal eight years ahead of schedule.

Based on the success of A37, in 2007 state lawmakers raised the bar to 20 percent by 2020. In addition, Renewable Portfolio Standards were set for rural electric cooperatives and municipal-owned utilities that were previously excluded from the RPS. These utilities are expected to get 10 percent of their power from clean energy by 2020, making all of Colorado's electricity-generating operations invested in a diversified energy portfolio.

Lawmakers and citizens are not the only ones to recognize the value of clean energy. Colorado's largest energy provider, Xcel Energy, was opposed to the original A37 standards—until last year, when the utility company did an about-face and lobbied for raising the Renewable Portfolio Standard to 20 percent. Xcel is now the No. 1 wind provider in the nation.

The new standards have attracted industry giants to Colorado. Vestas, the largest wind-turbine manufacturer in the world, decided to set up shop in Windsor. Over 500 jobs are on the way. Solar-panel manufacturer AVA Solar will bring over 400 jobs to the Fort Collins area. And SunEdison, North America's largest solar-energy provider, already completed an 8.22 megawatt solar power plant in Alamosa. Xcel has agreed to buy energy from the plant for the next 20 years.

Among the Rocky Mountain states, Colorado's Renewble Portfolio Standards are tough and demanding—and get results (see map on page 3 and table on page 7). In fact, Governor Bill Ritter recently testified before the U.S. Congress regarding the success of Colorado's renewable resources program as policymakers in Washington examine possible state programs as models for a national program.

State's Initiative to Expand Capacity

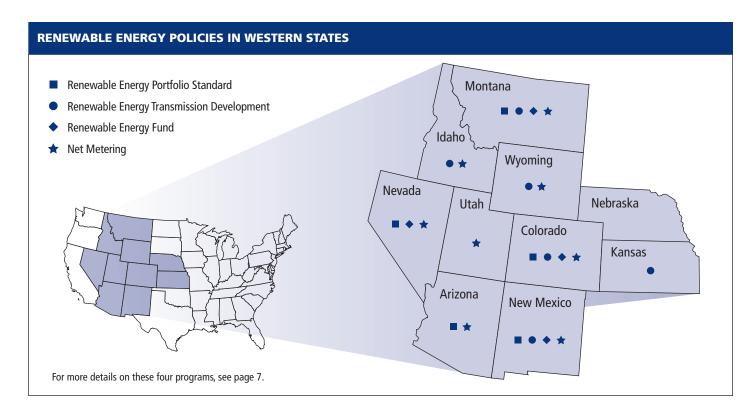
Although there is an abundance of renewable resources in Colorado, they are often located in rural areas far from the state's big energy markets. These constraints have prevented cost-effective solar and wind projects from being built, leaving consumers increasingly subject to high natural gas and coal prices for their electricity.

In 2007, Colorado took action, providing the means to identify and transport renewable energy to urban centers where consumer and business demand for electricity is the greatest. First, we created a way for utilities to speed up transmission projects while protecting consumers' pocketbooks. To qualify, utilities must identify so-called "Energy Resource Zones" that they feel are currently isolated from existing transmission infrastructure. If the state's Public Utilities Commission agrees, then the

utilities recover the cost of transmission as they build. This allows for the cost of building the new transmission lines to be absorbed by the utilities (and eventually their customers) over time rather than in one lump sum. Sudden spikes in utility bills are then avoided.

The utility companies are not the only ones looking to develop new energy plans. The state can, and should, help, too. That's why we created the Renewable Resource Generation Development Area Task Force to identify areas in Colorado that have the potential to support renewable energy projects. The diverse Task Force was made up of utility providers, clean energy suppliers, agriculturalists, and governmental officials. Its report, released in 2008, was eye-opening.

Cases in point: Colorado has 96 gigawatts of wind generation capacity, about eight times greater than the state's current peak electricity use; and Colorado's potential for solar-power generation is even greater, at



around 1,300 gigawatts, or enough to meet the needs of the entire Western region.

Finally, the Colorado Clean Energy Development Authority was formed in 2007 to provide government-backed, low-interest loans for projects that increase the production and consumption of clean energy. The Authority is authorized to finance wind-energy transmission projects of up to \$40 million and solar energy projects up to \$25 million. A bill is moving forward this year that will expand its already-existing financing options to help consumers afford the upfront costs of energy-efficiency measures.

Conservation Funding

Colorado's Clean Energy Development Fund is also empowered to advance energy-efficiency measures and renewable energy development across the state—yet another way in which the state is pioneering renewable energy in the Rocky Mountain West. Originally capitalized with \$9.5 million, it's scheduled to receive around \$7 million annually. These funds have been used to create dozens of initiatives and partnerships, such as the Insulate and Seal Program and the Residential Solar Program. The former aims to conserve energy by supporting the proper installation of insulation and air-sealing measures in Colorado homes. The latter is designed to support Colorado homeowners in the development of solar electric and hot-water-heater systems. By funding these programs, Colorado is making it financially feasible for individual citizens join the clean energy effort.

Clean energy solutions can be complex. State officials recognize that some of the best thinkers in this area can be found on our own college campuses and at the National Renewable Energy Laboratory, which is located just outside Golden. In an effort to utilize this great brain power, the state created the Collaboratory—a partnership among NREL, the University of Colorado, Colorado State University and Colorado School of Mines. The goal is to share resources, attract top talent to our state, and speed up the development of innovative renewable energy technologies.

In addition, we've provided grants to higher education institutions to help finance breakthroughs in the laboratory so that these new discoveries can make it to the marketplace. Colorado State University, which has emerged as a national leader in renewable energy curricula, is conducting a statewide carbon-sequestration analysis with state dollars. We need to give our farmers and ranchers the tools to stay on their land and reduce their carbon footprint through carbon sequestration. Once the analysis is complete, more Coloradans will be able to participate in emerging financial markets, such as the Chicago Climate Exchange.

Finally, we provided the backing to the University of Colorado to compose an energy profile of the state. Empirical evidence, with up-to-date information that is accessible to all Coloradans, will help guide us toward individual actions that can effect positive change.

Efficiency Incentives for Providers and Consumers

The easiest and most cost-effective way to cut pollution and utility costs is to use energy efficiently. From rebates and loans to rule changes and technical assistance, Colorado is providing consumers with the tools and incentives to go green. And we're targeting all sectors.

New building codes, for example, are taking effect to help us save water and energy. Tax benefits at the local and state level have been given the green light so that consumers can invest in renewable energy systems. Hybrid vehicles are now allowed to drive in HOV lanes. And we're trying to re-join land and water supplies to development so that property developers must identify the source of water and sewage for their projects before they can begin building.

Another idea we've been pushing the past few years is an expansion of our net metering laws, which allow Coloradans to generate their own power, via solar or wind, and still be connected to the electrical grid. If a customer generates more clean power than he or she uses, the utility will compensate the customer for the excess generation. Here's the goal: provide a way for consumers to trim their utility bills and help utilities cut down on demand across the grid. The less demand, the less need there is to build costly coal or natural gas plants to meet that demand.

Xcel, our largest utility, already has great net metering rules. The other utilities around the state, however, are not quite there yet. We believe we should give them the needed nudge. We didn't quite pass the bill in 2007, which would bring net metering to co-op utilities, but we've brought it back in 2008—and also included the municipal utilities. Consumers, regardless of their zip code, should have the right to choose clean energy over coal, and generate their own power.

State Efficiency Goals and Education

Colorado state officials realize that the best way to encourage energy efficiency and renewable energy development is to lead by example. In 2007, Gov. Ritter signed the "Greening of State Government" Executive Order. This directive requires state departments, agencies, and offices to reduce energy consumption by 20 percent in all state facilities by 2012. The legislature also adopted bills to require state-funded buildings to meet higher building standards. Few things make more sense and save taxpayers more money.

Consider schools. Their budgets are always tight, and trimming money on operating costs because their buildings are efficiently designed and constructed could enable them to hire another teacher or make much-needed repairs.

The state also now requires public entities to purchase environmental products when cost-effective. The state Capitol responded by replacing all of the incandescent light bulbs in the building with compact fluorescent lights. The simple change will go a long way; CFLs use up to 75 percent less energy than their standard incandescent counterparts.

Most importantly, in order to ensure a clean and prosperous future, Colorado is educating its citizens about the dangers of greenhouse emissions and the benefits of clean energy. Rather than just reading about it in a textbook, Colorado's children can look out of the classroom window and see renewable energy at work. The "Wind for Schools" grant program will help schools install wind turbines and develop clean energy curricula in the classroom. In 2007, John Mall High School, located in Walsenburg, became the first school in Colorado to generate its own energy from a small wind turbine.

Conclusion

ue to an increased awareness of global warming and the rising cost of carbon-based fuels, renewable energy has become an increasingly important issue for many state legislatures across the nation. In the Rocky Mountain West, Colorado is pioneering renewable energy generation and use alongside Arizona and New Mexico, and encouraging by example other states in the region to join the effort.

More progress is on tap for 2008. We'll make room for exciting new technologies, such as concentrating solar power so we have cheaper and cleaner options to meet the rising demand for energy. In terms of efficiency, we'll continue to target all sectors, from transportation to new construction. With an abundance of renewable energy sources, a dedicated government, and an increasingly educated citizenry, Colorado will continue to be a leader in renewable energy policy and innovation.

RENEWABLE ENERGY POLICIES IN WESTERN STATES

STATE

RENEWABLE ENERGY PORTFOLIO STANDARD

RENEWABLE ENERGY TRANSMISSION DEVELOPMENT

NET METERING

Colorado

- Investor-owned utilities are required to obtain 20 percent of their retail electricity sales in Colorado by 2020 from renewable energy or recycled energy. In 2007, these utilities must generate 3 percent of their retail electricity from renewable energy, at least 4 percent of which must be generated by solar-electric technologies.
- Electric cooperatives and municipal utilities serving more than 40,000 customers must obtain 10 percent of their retail electricity sales in Colorado by 2020.
 Starting in 2008, these utilities must obtain 1 percent of their retail electricity sales from renewable energy.
- Eligible energy resources include: solar; wind; geothermal; biomass; new hydroelectricity with a nameplate rating of up to 10 megawatts; hydroelectricity in existence on January 1, 2005, with a nameplate rating of up to 30 megawatts; fuel cells using hydrogen derived from an eligible energy resource; and recycled energy. Recycled energy is produced by a generation unit with a nameplate capacity of up to 15 megawatts that converts the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and that does not combust additional fossil fuel.
- Regulated electric utilities must undertake biennial reviews to designate areas of the state as "Energy Resource Zones" where transmission constraints hinder the delivery of electricity. These utilities are required to submit plans for the construction of additional transmission capacity in these zones to the Public Utilities Commission. PUC must grant or deny any necessary certificates within 180 days. Utilities are allowed to recover costs during construction

through a rate adjustment.

- The 16-member Renewable Resource Generation Development Area Task Force was created in 2007 to identify areas in Colorado that have the potential to support competition among developers for renewable energy projects. Members of the board include energy providers, renewable energy producers, agricultural interests, and government officials
- The Colorado Clean Energy Development Authority was created in 2007 to leverage bond proceeds and provide government-backed loan guarantees for transmission projects that increase the production and consumption of clean energy resources including biodiesel, biomass, ethanol, zero emission generation technology, renewable resources, and integrated gasification combined cycle generation (IGCC) facilities. The authority is governed by a nine-member board. It is prohibited from issuing bonds or other obligations that are to be paid from or secured by tax revenue. The authority is authorized to finance a wind energy transmission facility project of up to \$40 million and/or a solar energy project up to \$25 million. However, for any given fiscal year, the aggregate amount of scheduled payments of all outstanding bonds issued by the authority is limited to \$8 million.
- The Clean Energy Fund was created in 2007 and capitalized with \$9.5 million. The Governor's Energy Office may use these monies to advance energy efficiency and renewable energy throughout Colorado including attracting investment from the renewable energy industry; assisting transfers of technology into the marketplace; and providing incentives to purchase and distribute energy-efficient and renewable energy products. It may also use the money to implement energy-efficiency projects; aid governmental agencies in greening government initiatives; and remove regulatory barriers to implement renewable energy technology.

RENEWABLE ENERGY FUND

• Electric utilities serving at least 40,000 customers must provide net metering services to customer-generators if the customer pays any additional costs for the acquisition and installation of the necessary metering equipment. Renewable energy generation systems up to two megawatts in capacity are eligible for net metering. Electricity generated at a customer's site can be applied toward meeting a utility's renewable generation requirement under Colorado's renewable portfolio standard. Four percent of the renewables portfolio standard must be met with solar energy, half of which must come from solar electricity generated at customers' facilities.

STATE	RENEWABLE ENERGY PORTFOLIO STANDARD	RENEWABLE ENERGY TRANSMISSION DEVELOPMENT	RENEWABLE ENERGY FUND	NET METERING
Arizona	Investor-owned utilities are required to generate 15 percent of their total energy from renewable energy by 2025, with 30 percent of the renewable energy to be derived from distributed energy technologies. By 2012, at least 30 percent of the standard must be derived from distributed renewable energy resources. In 2007, these utilities must generate 1.5 percent of their retail electricity from renewable energy and at least 5 percent of the standard must be derived from distributed renewable energy. Eligible renewable energy resources include solar; water; heat,; solar space heat; solar thermal electric; solar thermal process heat; photovoltaics; landfill gas; wind; biomass; new hydroelectricity with a capacity of up to 10 megawatts; geothermal electric; geothermal heat pumps; combined heat and power cogeneration; solar pool heating (commercial only); daylighting (non-residential only); solar space cooling; solar heating ventilation and cooling; additional technologies upon approval; anaerobic digestion;	None	None	The Arizona Corporation Commission is currently developing net metering rules pursuant to the state's Renewable Energy Standard.
Idaho	and fuel cells using renewable fuels. None	The Idaho Energy Resources Authority was created in 2005 to promote transmission, generation, and renewable energy development in the state and region. The authority may own and finance transmission and generation projects, and use eminent domain. The authority does not receive a state appropriation and does not have the ability to finance projects that are not backed by utility ratepayers.	None	No statewide net metering standard is in place. However, each of the state's three investor-owned utilities have developed net metering tariffs that have been approved by the Idaho Public Utilities Commission. Each utility offers net metering to customers that generate electricity using solar, wind, hydropower, biomass or fuel cells and limit residential systems to 25 kilowatts. They also limit aggregate net metered capacity to 0.1 percent of the utility's retail peak generation in 2000 and restrict any single customer from generating more than 20 percent of the aggregate capacity of all net-metered systems.
Kansas	None. A bill to create a renewable energy portfolio standard failed in 2007.	The Kansas Energy Transmission Authority was created in 2005 to ensure reliable operation of the electrical transmission system, diversify and expand the Kansas economy, and facilitate consumption of Kansas energy through improvements in the state's electric transmission infrastructure. It is authorized to plan, finance, construct, acquire, own, and dispose of transmission facilities. It may also enter into contracts with the Kansas Development Finance Authority to issue bonds and provide financing for projects. The authority may exercise the power of eminent domain to construct or upgrade transmission facilities.	None	None

RENEWABLE ENERGY POLICIES IN WESTERN STATES RENEWABLE ENERGY RENEWABLE ENERGY RENEWABLE ENERGY FUND **NET METERING** STATE PORTFOLIO STANDARD TRANSMISSION DEVELOPMENT · Public utilities and competitive Montana does not have an authority • The Alternative Energy Revolving Loan Montana's net metering law allows Montana electricity suppliers are required to or other mechanism to help finance Program provides loans to individuals, customers of investor-owned utilities to obtain 15 percent of their retail transmission projects. However, state small businesses, local governments, net meter systems that generate elecelectricity sales from renewable law provides up to a 75 percent property the university system, and nonprofit tricity using solar, wind, or hydropower energy resources by 2015. Starting tax reduction for new lines that transmit organizations to install alternative systems up to 50 kilowatts. All customer in 2008, these utilities must obtain renewable energy to market. The law energy systems that generate energy for classes are eligible, and no limit on 5 percent of their retail electricity sales also provides landowners, whose land is their own use. The program is funded enrollment or statewide installed capacfrom renewable resources. crossed by transmission lines, a property by air quality penalties collected by the ity is specified. Net excess generation is tax abatement on property that is within Department of Environmental Quality. credited to the customer's next monthly Eligible renewable energy resources 650 feet of either side of the lines. bill. At the beginning of each calendar include wind, solar, geothermal, • The Universal System Benefits Program year, any remaining unused kilowattpays for energy conservation; lowhydroelectricity with a capacity of up to hour credit accumulated during the ten megawatts, landfill or farm-based income customer weatherization: previous year is granted to the utility. methane gas, wastewater gas, biomass, renewable energy projects; research and fuel cells using renewable fuels. and development programs related to energy conservation and renewable resources; market transformation designed to encourage competitive markets for public purpose programs; and low-income energy assistance. Since 1999, electric utilities and electric cooperatives must contribute annually 2.4 percent of their 1995 revenues to the program. A total of \$14.9 million is collected each year via a surcharge on customers' electricity use. This surcharge is determined by the Montana Public Service Commission and by individual electric cooperatives. Utilities may spend all or a portion of the funds on internal programs, or may opt to contract or fund eligible programs externally. Large-scale electricity users with a load exceeding one megawatt may choose to fund qualifying internal energy programs with monies that otherwise would be remitted to the Universal System Benefits Program. Nebraska New Mexico · Investor-owned utilities are required · In 2007, New Mexico created the • The Energy Innovation Fund was • Investor-owned utilities and electric to generate 20 percent of total Renewable Energy Transmission established in 2007 with a \$2 milcooperatives must offer net metering Authority to plan, finance, acquire, and retail sales from renewable energy for renewable energy systems and comlion appropriation to accelerate the resources by 2020. Starting in build power lines and energy storage development of innovation to enable bined heat and power systems up to 80 2011 these utilities must generate projects. The authority may designate faster commercial adaptation of clean megawatts in capacity. Customers are 10 percent of total retail sales from transmission corridors, negotiate with credited or paid for monthly net excess energy technologies in the state. To renewable resources. Starting in 2011, other entities on the establishment of receive funding, a project must relate generation at the utility's avoided-cost at least 20 percent of this standard interstate corridors, and use eminent to achieving New Mexico goals in rate. If a customer has net excess genmust be generated from solar power, domain. Eligible transmission projects eration less than \$50 during a monthly clean energy; be an innovative project; at least 20 percent from wind power, must transmit at least 30 percent of have the potential for a significant billing period, the excess is carried over and at least 10 percent from either their electricity from renewable sources impact on New Mexico; and include to the customer's next monthly bill. If biomass or geothermal energy. Addiwithin a year of commencing operations. partnerships between private and it exceeds \$50 during a monthly billing tionally 1.5 percent must come from public sectors, with at least one of the period, the utility will pay the customer distributed renewable resources by the following month for the excess. principals in the project being a New 2011, rising to 3 percent in 2015. Mexico entity. Applicants may request Customer-generators retain ownership funding in the amount of \$200,000 to of all renewable energy credits associ-• Electric cooperatives are required to \$2 million per project. ated with the generation of electricity. generate 10 percent of their retail electricity sales from renewable · State law authorizes the New Mexico resources by 2020. Starting in 2015, Finance Authority to issue up to \$20 these utilities must obtain 5 percent of million in bonds backed by the state's their retail electricity sales from renew-Gross Receipts Tax to make loans to state agencies, universities, and public able energy. schools to fund energy efficiency and Eligible renewable energy resources renewable energy renovations at existinclude solar, wind, geothermal, new ing facilities. Under the program 90 hydroelectric facilities, fuels cells that percent of the expected energy utility are not fossil fueled, biomass, and bill savings are "captured" from the landfill gas. participating agencies' budgets to pay debt service on the bond.

STATE	RENEWABLE ENERGY PORTFOLIO STANDARD	RENEWABLE ENERGY TRANSMISSION DEVELOPMENT	RENEWABLE ENERGY FUND	NET METERING
Nevada	Investor-owned utilities are required to generate 20 percent of total retail sales from renewable energy resources by 2015. In 2007, these utilities must generate 9 percent of their retail electricity from renewable energy. Utilities may meet the standard through renewable energy generation and energy savings from efficiency measures. At least 5 percent of the standard must be generated, acquired, or saved from solar energy systems. Eligible renewable energy resources include biomass, geothermal energy, solar lighting, solar heating, hydroelectric facilities up to 30 megawatts, and wind.	None. However, in 2007, the Governor created the Nevada Renewable Energy Transmission Access Advisory Committee to make recommendations on improving access to the grid system for renewable energy producers.	The Trust Fund for Renewable Energy and Energy Conservation provides money for public education and outreach, program incentives, grants, and the development of studies related to the use of renewable energy and energy conservation and energy efficiency.	Investor-owned utilities are required to allow net metering for up to one mega watt systems that generate electricity using solar, wind, geothermal, biomass and certain types of hydropower. Systems must be designed to offset part o all of a customer-generator's electricity requirements. Investor-owned utilities must offer net metering until the aggregate capacity of all net-metered systems in its service territory equals 1 percent of the utility's peak capacity.
Utah	None	None	None	Investor-owned electric utilities and cooperative utilities are required to offer net metering to their customers. Eligible generating systems include fuel cells, solar, wind, and hydropower systems with a maximum capacity of 25 kilowatts. Total participation in the program is limited to 0.1 percent of the cumulative generating capacity of each utility's peak demand in 2001. If a customer generates more electricity than the customer uses during a billing period, then the utility must credit the customer for the net excess generation at a rate equal to the utility's avoided cost or higher. This credit is carried over to the customer's next monthly bill until the end of each calendar year, at which point any remaining credit is granted to the utility.
Wyoming	None	The Wyoming Infrastructure Authority was created in 2004 to pay for the expansion of Wyoming's electrical transmission system. The authority is responsible for planning, financing, building, and operating interstate electric transmission and related facilities. It is authorized to issue revenue bonds to finance new transmission lines and advanced coal plants, and may extend up to \$1 billion in bond financing for projects owned by private parties. The authority may form partnerships with public or private entities to build and upgrade transmission lines and to develop advanced coal plants.	None	Investor-owned utilities and electric cooperatives are required to allow net metering for solar, wind, biomass, and hydropower systems with a generating capacity of up to 25 kilowatts. Net excess generation is credited to the following month. When an annual period ends, utilities must purchase unused credits at the utility's avoided-cost rate Utilities may not charge net-metered customers additional fees beyond the minimum monthly charges that apply to other (non-net-metered) utility customers in the same rate class.

Center for American Progress

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