Colorado Energy Office

FY 2016-17

Colorado Agricultural Energy Efficiency

Overview

The Colorado Agricultural Energy Efficiency Program, formerly known as the Colorado Dairy and Irrigation Efficiency Program, was launched statewide in the summer of 2015, building on the success of its 2014 pilot initiative. According to the Colorado Agricultural Energy Market Research Report, Colorado farmers spend more than $400 million annually on energy, equaling 7% of the industry's total expenses, with dairy, irrigation farming, and greenhouses having the highest energy costs.

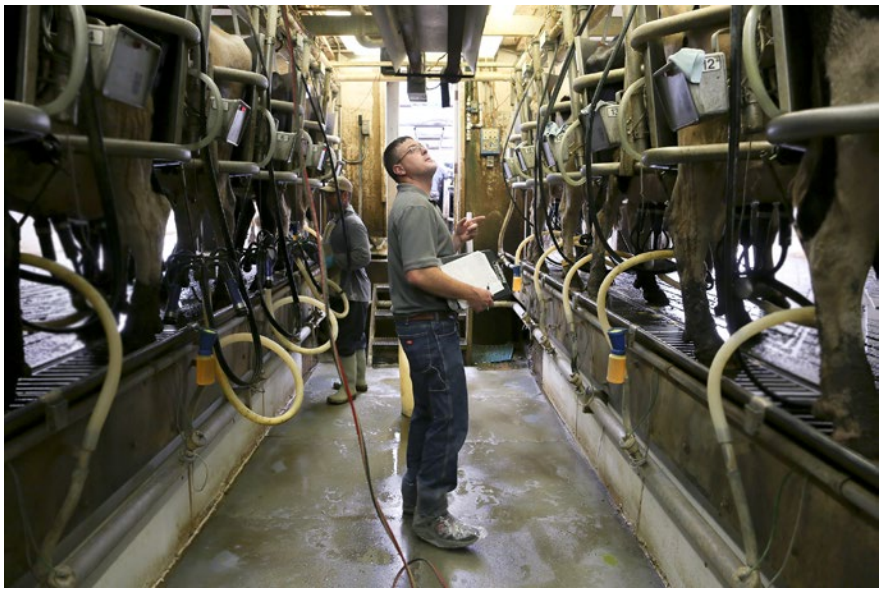
The Colorado Energy Office (CEO), in partnership with the Colorado Department of Agriculture, created the Colorado Agricultural Energy Efficiency Program to make achieving energy efficiency easy for Colorado agricultural producers. The program addresses barriers that prevent producers from investing in energy efficiency by improving access to existing resources and leveraging new funding with a turnkey approach. Program participants receive a free energy audit, a preliminary renewable energy assessment, technical assistance, energy coaching, support accessing financing and implementing projects.

Colorado farmers spend more than $400 million annually on energy, equaling 7% of the industry's total expenses

Program Success to Date:

- 74 producers have been approved for the program.
- 29 producers are in the process of implementing projects and will leverage over $400,000 in U.S. Department of Agriculture (USDA) funds.
- CEO was selected for a $1.1 million USDA award to help finance energy efficiency improvements for Colorado farmers. The award comes through USDA's Natural Resources Conservation Service's (NRCS) Regional Conservation Partnership Program, and is matched through a $1.3 million contribution from CEO, the Colorado Department of Agriculture and utility and industry partners.

Over the next two program years, the efficiency improvements are expected to achieve over 5,250 MWh of electricity savings and 524,000 gallons of water savings annually, and generate more than $4.5 million in potential savings for approximately 200 Colorado producers.



Over the next two program years, the efficiency improvements are expected to achieve over 5,250 MWh of electricity savings and 524,000 gallons of water savings annually, and generate more than $4.5 million in potential savings for approximately 200 Colorado producers.

Colorado C-PACE

Overview

The Colorado Energy Office (CEO) spearheaded the development of the New Energy Improvement District and its 2015 launch of the Colorado Commercial Property Assessed Clean Energy (C-PACE) program. Colorado C-PACE is an innovative financing model that enables building owners to fund 100% of the cost of energy efficiency, renewable energy, and water conservation improvements. Colorado C-PACE can pay for new heating and cooling systems, lighting improvements, solar panels, water pumps, insulation, and more for a variety of commercial properties.

Owners repay the cost of eligible improvements over a period of up to 20 years through an additional charge (assessment) on their property tax bill. The energy savings typically outweigh the annual assessment payment, thereby enabling cash-flow-positive projects. Because the assessment is tied to the property, the repayment obligation automatically transfers to the next owner if the property is sold.

Colorado C-PACE provides property owners a number of benefits:

- 100% financing
- No out-of-pocket expense
- Long-term private sector financing (up to 20 years)
- Lower energy costs
- Cash-flow-positive projects
- Competitive rates
- Owner retention of all tax incentives
- Automatic transfer upon sale

Program Accomplishments

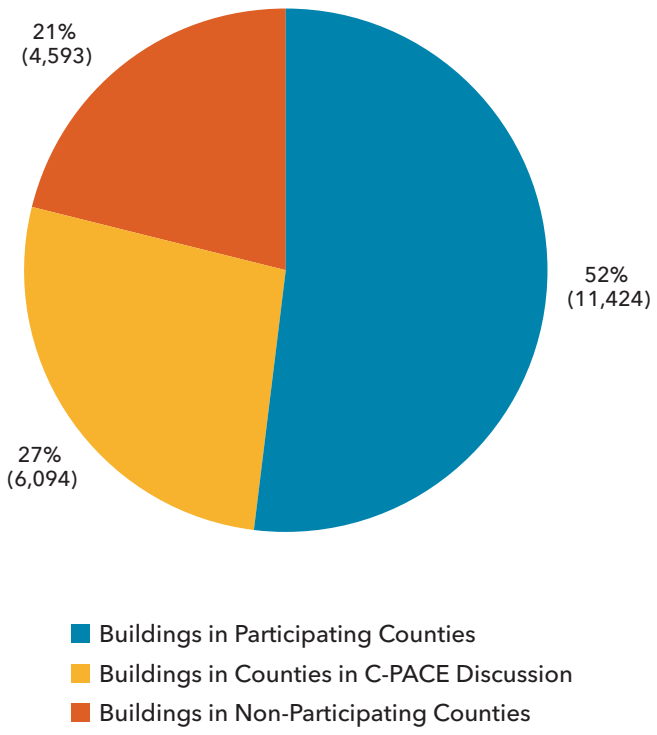
Following its launch in December of 2015, Colorado C-PACE has seen eight counties pass resolutions to participate in the program—enabling commercial property owners in their jurisdictions the opportunity to pursue PACE financing. The eight counties currently participating in the program include: Adams, Arapahoe, Boulder, Broomfield, Denver, Eagle, Jefferson, and Pitkin. It is expected that by the end of calendar year 2016, several more counties will have opted into the program.

Colorado C-PACE offers business and economic opportunities to local partners involved in PACE projects. For example, counties that opt into the program will see an increase in property value of participating buildings. On the lending side, the open finance model of the program allows lenders, including local and regional banks, the opportunity to expand their lending services by securely investing in energy and water improvement projects. Finally, the local contractor and development community can utilize PACE to generate additional projects, thus creating jobs and stimulating economic development.

The eight counties currently participating in the program include:

Adams
Arapahoe
Boulder
Broomfield
Denver
Eagle
Jefferson
Pitkin

Commercial Building Eligibility for Colorado C-PACE

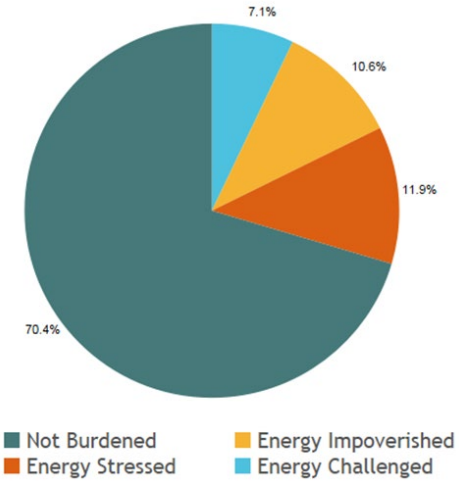


Overview

The Colorado Energy Office (CEO) is addressing household energy burden—the amount of household income spent on energy costs—of low-income residents statewide. While average Colorado households spend between 1% and 3% of income on home energy, low-income households, those earning at or below 200% of the Federal Poverty Level, are considered energy burdened and pay more than 4% of household income on energy costs. Over 1.6 million Colorado households are considered energy burdened; approximately 600,000 of those households fall into the category of energy impoverished, defined as paying more than 10% of household income on energy costs.

To effectively address energy burden, both home heating and electricity costs must be reduced. CEO is developing strategic utility partnerships and a savings-to-investment-based approach to low-income energy services to reduce low-income household energy burden. This includes the Weatherization Assistance Program (WAP), administered by CEO, and low-cost solar energy offerings.

Energy-Burdened Households in Colorado



Census.gov American Commmunity Survey

Over 1.6 million Colorado households are considered energy burdened

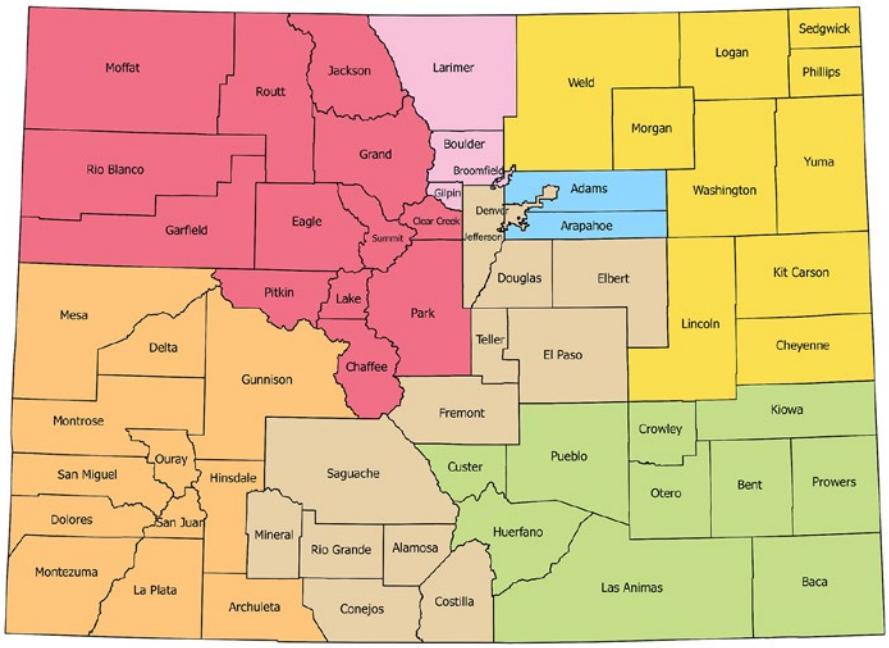
Weatherization Assistance Program

This year, the state's WAP celebrates 40 years of providing energy efficiency services, such as insulation, air leakage reduction, heating system and appliance improvements, to income qualified households. Since 2012, the CEO WAP has served 14,173 eligible households across every county in the state. Installed improvements have saved clients more than $6.7 million on their energy bills, more than 4.1 million therms of natural gas, and more than 20.5 million kWh of electricity. In fiscal year 2015–16, the CEO WAP delivered service to 2,969 eligible households throughout the state. These savings are achieved through site-specific auditing and the installation of measures such as insulation, appliance replacement, and air sealing.

On average, WAP annually serves more than 2,800 residences, saving households on average more than $200 per year on energy costs, and bringing low-income customer utility payments closer to parity with their non-income qualified counterparts. Due to a decline in severance tax revenues, CEO anticipates a significant reduction in the number of households that will receive services during fiscal year 2016–17.

CEO partners with eight local agencies throughout the state to provide weatherization services. Local service providers include: Arapahoe County Weatherization Division, Boulder County Housing Authority's Longs Peak Energy Conservation, Energy Outreach Colorado, Energy Resource Center, Housing Resources of Western Colorado, Northeastern Colorado Association of Local Governments, Northwest Colorado Council of Governments, and Pueblo County Department of Housing and Human Services.

Weatherization Service Areas



Since 2012, the CEO WAP has served 14,173 eligible households across every county in the state.

Overview

To effectively reduce household energy burden, both the heating and electric costs must be addressed and reduced. Existing offerings designed to minimize home heating costs are robust; however, few resources have been available to reduce household electric use. To address this issue, the Colorado Energy Office (CEO) recently implemented two cost-effective low-income solar energy offerings as part of its effort to comprehensively address household energy burden. Both offerings are intended to demonstrate the feasibility of combining energy efficiency and solar options to help reduce utility bills for residents most in need, those paying more than 4% of household income on energy costs.

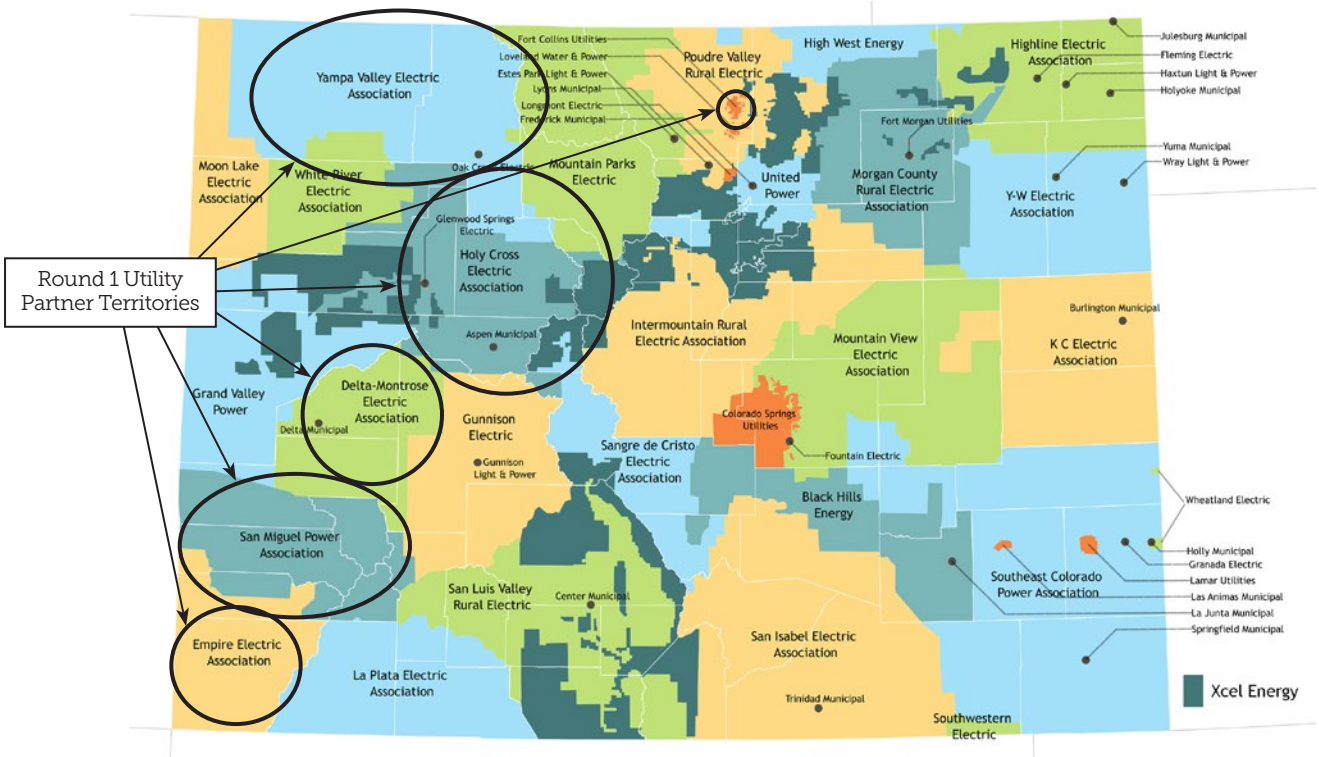
Low-Income Community Solar Demonstration Project

As part of its effort to maximize energy cost savings for each of its low-income customers, CEO launched the first-in-the-nation Low-Income Community Solar Demonstration Project in 2015 to offer affordable community solar options to households that are eligible for weatherization services. The project aims to holistically address energy burden by offering affordable community solar options to households eligible for weatherization services.

CEO is developing a portfolio of low-income community solar models as part of the project. Once complete, the portfolio of models cumulatively will serve 300 income-eligible families per year (over the 20+ year life of these assets) and will amount to at least 1 megawatt of installed solar capacity. CEO has partnered with six utility partners to create the models as part of the project. Several more utility partners are expected to be announced in the coming months. Current partners include: Empire Electric Association, Delta Montrose Electric Association, Holy Cross Energy, San Miguel Power Association, Yampa Valley Electric Association, and the City of Fort Collins Utilities.

CEO launched the first-in-the-nation Low-Income Community Solar Demonstration Project in 2015

Low-Income Community Solar Demonstration Project—Colorado Electric Utility Service Territories



Each partner will develop a cost-effective variation on the low-income community solar model, which will include varying sizes, unique siting approaches, innovative community engagement efforts, and the application of varying subscriber crediting structures. On average, subscribers of each community solar model are expected to save between 40% and 50% annually on their energy bills as a result of innovative crediting structures developed by each utility partner.

Weatherization Assistance Program Rooftop Solar Program

CEO recently received approval from the U.S. Department of Energy (DOE) as the first state WAP program in the nation to integrate rooftop solar into weatherization services, offered as part of a pilot project in Colorado. Historically, DOE only has allowed for energy efficiency measures to be installed as part of the WAP. Integrating solar offering into installed weatherization measures on a case-by-case basis significantly will advance efforts to reduce household energy burden using a holistic approach. Household energy cost savings are estimated to be between $400 and $600 annually with the addition of rooftop solar.

On average, subscribers of each community solar model are expected to save between 40% and 50% annually on their energy bills as a result of innovative crediting structures developed by each utility partner.

Overview

The Colorado Energy Office (CEO) works to improve the use of all the state's energy resources, offering guidance in technical areas, policy and public communications, as well as financial support. CEO conducts energy market studies identifying development opportunities for emerging technologies to promote innovative energy production and efficient energy consumption. The following are a few of the areas with CEO's focus:

POLICY & RESEARCH | Hydropower

For many years, CEO has assisted in the development of hydropower resources, including small and micro hydropower systems, agriculture hydropower systems, and conduit hydropower systems, among others. Following successful efforts to streamline regulations, CEO has been able to expose new and specific types of hydropower opportunities. CEO promotes the expanded use of available hydropower resources, and has produced a PRV-Hydropower Market Assessment that identifies hydropower opportunities within water utility delivery systems where the energy released through pressure reducing valves (PRVs) can be captured for electricity generation.

To facilitate data collection and provide access for this assessment, CEO developed an online mapping application called a geoportal. This database gives CEO the ability to refine the estimated potential of PRV-hydropower projects that could be developed.

This project identified two water utilities, the City of Montrose and North Table Mountain Water and Sanitation District, for case studies to examine PRV-hydropower projects within their systems. The studies determined that the potential projects are technologically and economically feasible. CEO's next step is to work with these utilities on project development.

A conservative estimate is that there is 20 to 25 MW of hydropower potential in modifying PRVs in Colorado statewide. The projected potential of PRV to hydropower within the state and the detailed case studies point to a positive future for the development of this renewable energy source.

In industrial processes that transform raw materials into useful products—at steel mills, paper plants, refineries, chemical plants, oil and gas pipelines—the resulting heat is wasted as a byproduct. Recycled energy—also known as "waste heat to power"—is the process of recovering the heat that otherwise would dissipate into the atmosphere, and converting it into electricity with no additional emissions or fuel consumption.

Recycled energy reduces the energy costs to industrial facilities, and also reduces the total emissions of existing plants by offsetting electricity that would have been purchased from the grid. While recycled energy is classified as an "eligible energy resource" under Colorado's Renewable Energy Standard (RES), projects using this technology are not yet broadly deployed in the state, with only one or two projects in place.

In the near future, Xcel Energy will offer incentives for up to 20 MW of renewable energy over the next two years, thereby improving the economic case for new projects.

The Colorado Energy Office (CEO) is involved in several activities to help move the market for this technology.

In 2015 and 2016, CEO worked with ICF International to conduct a Colorado-specific study of recycled energy market potential:

- The goal of the Colorado study was to better understand the potential market for recycled energy in Colorado, while identifying key barriers to developing these projects and potential solutions.
- The study showed that there are 52 sites in the state where it would be economically feasible to generate more than 106 megawatts from recycled energy. Of these, 10 sites have a projected payback of less than five years.
- This research shows that there is significant potential to develop this underutilized clean energy resource in the state.
- CEO plans to expand this study in the coming year to include the market potential for smaller-sized systems and lower heat sources. CEO is helping to fund feasibility studies that ideally will lead to projects. As a follow-up to this study, CEO is partnering with the U.S. Department of Energy's Southwest Combined Heat and Power Technical Assistance Partnership program to offer no-cost feasibility assessments for four sites in the state with high potential for recycled energy systems.

Recycled energy reduces the energy costs to industrial facilities, and also reduces the total emissions of existing plants by offsetting electricity that would have been purchased from the grid.

The Colorado Energy Office (CEO) promotes geothermal resource development, and has focused on making resource data and feasibility studies available for local communities wanting to develop geothermal projects. During fiscal year 2016, CEO completed an economic assessment on geothermal for the town of Rico, and updated the state's geothermal heat gradient maps.

CEO partnered with the Colorado School of Mines to perform an economic assessment of the geothermal resource in Rico. The assessment identified three potential direct-use projects. All three are supported by local residents and by the Town of Rico's Master Development Plan Committee. Economic models and forecasted revenue streams were created for a hot springs spa, a geothermal greenhouse focused on food production, and a district-level heating system. All of the options will need committed community stakeholders, development partners, and access to financing. CEO is working with community leaders on the next steps with the goal of assisting Rico to be a geothermal development leader in Colorado.

A key strategy to help boost the geothermal industry in Colorado has been to provide potential developers and local communities more accurate information of the geothermal resources that exist in our state. In fiscal year 2016, CEO partnered with the Colorado Geological Survey to update Colorado's geothermal heat gradient maps. The updated maps provide more accurate information to potential project developers. The ability to visually analyze geothermal potential will help in the planning stages of project development and is a crucial component to advancing Colorado's geothermal industry.

CEO actively supported the Town of Pagosa Springs in its efforts to build a first-of-its-kind showcase for geothermal potential in the Education Greenhouse, which offers information about and the demonstration of the feasibility of year-round vegetable production, using geothermal heat. CEO also encouraged the Shadows Ranch Magnetic Exploration project, which assessed Clear Creek County's geothermal resource assessment to find a target zone for drilling wells.

CEO actively supported the Town of Pagosa Springs in its efforts to build a first-of-its-kind showcase for geothermal potential in the Education Greenhouse.

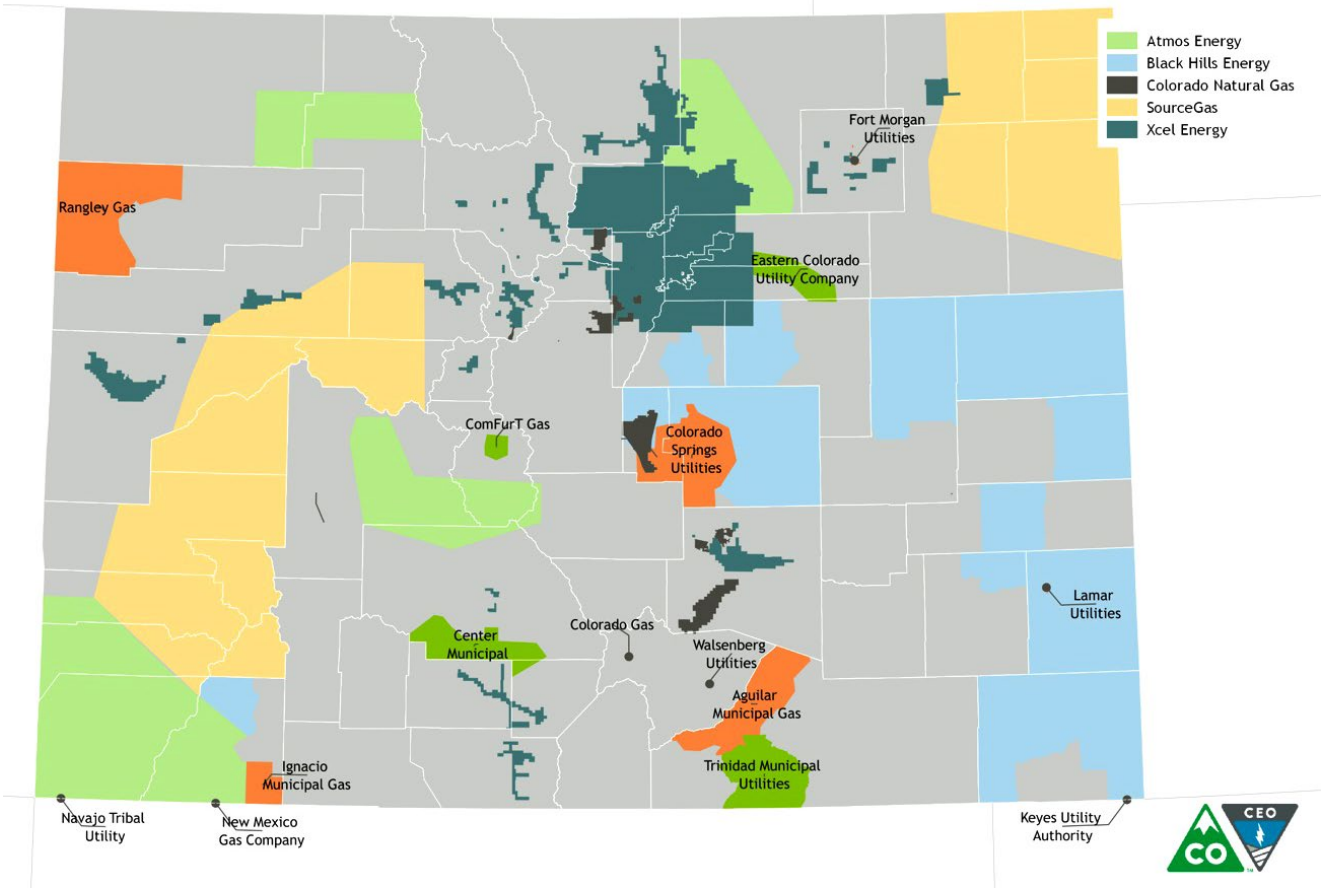
The Colorado Energy Office (CEO) is about to begin its third year of participation in the Energy Information Administration's State Heating Oil and Propane Program (SHOPP). Colorado is located in the PADD 4 region (Petroleum Administration for Defense District), that includes Colorado, which generally has low production and low consumption of propane. However, the propane demands associated with polar vortex and wet harvesting season of 2013/2014 left Colorado deprived of propane for heating during one of the coldest winters in recent history.

While utilities provide natural gas for heat to the majority of Coloradans (see the map below), many rural parts of the state use propane as the primary heating fuel during winter months. When propane prices increase, consumers are impacted, especially low-income citizens. Providing the state and industry an aggregated average price can help track supply side disruptions, thereby reducing uncertainty for independent dealers and their customers. This helps the state to be aware of regional concerns that may impact Colorado.

All SHOPP data collected by the state is reported to the Energy Information Agency (EIA). The data is aggregated to show average propane prices for Colorado throughout the data collection period (October–March) and is displayed as an average on the EIA website.

CEO partnered with researchers at the Colorado School of Mines to develop a Propane Forecast Model to better identify possible supply shocks and shortages in the propane market. Due to warm winter weather during the 2015/2016 season, demand for propane was low. Actual propane prices remained relatively flat from October through May. The forecast prices from this model oscillated closely, and therefore accurately, around those actual prices. These strategic efforts have helped Colorado create and implement a proactive versus reactive strategy for ensuring energy supply assurance.

Natural Gas Utilities in Colorado



The Colorado Energy Office (CEO) works with the Public Utilities Commission and the Department of Public Safety to monitor energy risks, prepare for fuel shortages and electrical outages, and respond to emergency situations. Part of this preparation included the development of an Energy Assurance Emergency Action Plan in 2012. CEO updated the Energy Assurance Emergency Action Plan in fiscal year 2016 to incorporate lessons learned from natural disasters and better prepare for human threats like cyberattacks.

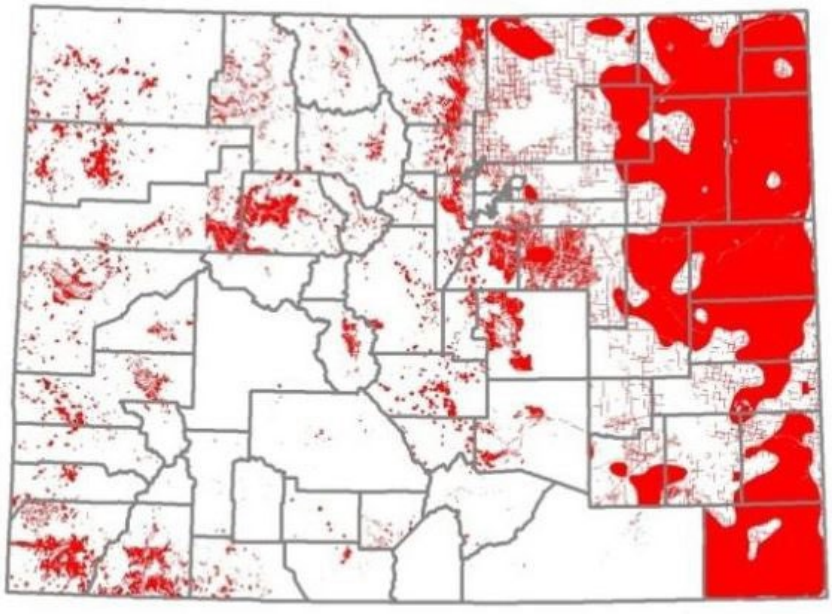
The Colorado Energy Assurance Emergency Action Plan lays out steps for state agencies and private stakeholders to take during an energy emergency. It uses an all-hazard, whole community approach to address six overarching goals:

1. Provide specific actions for how the state government gathers information and responds during an unfolding emergency impacting energy supplies and availability.
2. Develop effective plans and procedures to minimize the impacts of an energy supply interruption and rapidly restore energy availability, should an emergency occur.
3. Assess potential risks and hazards threatening the state's critical energy infrastructure.
4. Consider short- and long-term preparation and mitigation measures to reduce risk and vulnerability.
5. Encourage investment in appropriate energy reliability and resiliency.
6. Increase energy security awareness among key stakeholders and the public.

Varying degrees of energy emergencies are common, ranging from trees falling on local electric distribution lines to floods knocking out key transportation infrastructure for petroleum products. Consistent and thorough communication with key stakeholders enables CEO to respond quickly to emergency situations affecting energy resources.

Notable responses have included working with the governor to issue an emergency Executive Order for propane customers in February 2014, as well as rebuilding community infrastructure and granting an "hours of service" waiver for petroleum transporters when railway infrastructure was destroyed in the September 2013 floods.

High to Very High Wildfire Hazard Potential Map



CEO updated the Energy Assurance Emergency Action Plan in fiscal year 2016 to incorporate lessons learned from natural disasters and better prepare for human threats like cyberattacks.

POLICY & RESEARCH | Key Colorado Energy Office Publications–Studies, Reports, Assessments

Coal Mine Methane Market Research Study–2016

The study identifies and highlights opportunities to capture and redirect into productive use the coal mine methane (CMM) emissions from active and inactive coal mines in Colorado. Re-directing CMM emissions released during or as a result of coal mine operations has the double benefit of repurposing an otherwise wasted resource while also reducing the adverse impact of methane upon the environment. CMM is an energy resource that is severely underutilized nationwide. This study is a catalyst for industry stakeholders to recognize and act upon CMM opportunities within Colorado.

Colorado Customer-Sited Energy Study–2016

This study provides an overview of the deployment of customer-sited energy systems in Colorado, such as wind, solar and geothermal. The results identified gaps in energy system data and recommended best practices for permitting that can help streamline the process for reporting and tracking the information. Better data make these markets more accessible to prospective investors as well as support more informed policy decisions.

Greenhouse Gas Neutrality Assessment–2016

In 2013, Colorado's Renewable Energy Standard (RES) added energy produced from coal mine methane (CMM) and synthetic gas produced by pyrolysis of municipal solid waste (MSW) as qualified energy resources for meeting the standard. "Greenhouse Gas Neutrality" is a condition placed upon the eligibility of these resources to qualify for RES compliance. This assessment provides a framework and evaluation tools for project developers and the Colorado Public Utilities Commission (PUC) to determine the greenhouse gas neutrality of CMM and MSW projects.

Marijuana Industry Energy Use Report–2016

As the recreational marijuana industry continues to grow in Colorado, it is important to understand the impacts that this industry has on its electric grid and water system. This report gives an overview of energy and water use by the marijuana-grow industry, and provides a framework and evaluation tool for industry stakeholders to implement energy and water efficiency measures.

Pressure Reducing Valve Hydro Study–2016

Pressure reducing valves (PRV) are just as essential to Colorado's water network as transformers are to the electric grid. PRVs help monitor and manage pressure differentials in water systems that occur due to elevation changes. However, PRVs can be replaced with small hydropower systems to generate electricity. This study outlines two case studies for PRV electricity generation systems in Colorado and helps to create a central repository for tracking, through GIS, Colorado's water system and PRV locations.

STEM Natural Resources Survey–2016

Colorado's education system has a vested interest in teaching about Colorado's energy and natural resources, and cultivating talent for the next generation. Filling future industry gaps and positions is critical to sustaining this sector. This survey aimed to better understand the availability and utilization of science, technology, engineering and math (STEM) curriculum related to natural resources and energy issues among high school students.

Colorado Recycled Energy Market Overview–2016

Recycled energy in Colorado is more commonly known nationwide as waste heat to power (WHP), which is a process of capturing heat from industrial processes and utilizing that heat to generate electricity. This report assesses the recycled energy market in Colorado, incorporating market and policy trends for this industry to provide policy and program recommendations for encouraging recycled energy adoption in Colorado.

Updated Colorado Energy Assurance Emergency Plan–2016/2012

The State Emergency Operations Plan (SEOP) provides a framework for state agencies to coordinate their efforts during emergency situations. The SEOP prepares for situations ranging from natural disasters to cyberattacks that shut down Colorado's energy network either locally or statewide. This plan aims to create awareness of energy security issues for the state of Colorado and describes how to most effectively and efficiently address and identify these issues as they arise.

Low-Income Community Solar–2015

Since 2010, solar gardens have been required by Colorado law to maintain a 5% carve-out for low-income residents. This is the first comprehensive report on the effectiveness and current opportunities for low-income energy customers to participate in solar gardens. This report helps stakeholders gain a better understanding of best practices for the industry. It aims to increase the usage and access to community solar for Colorado's potential low-income subscribers.

Updated Small Hydropower Handbook–2015/2013

This handbook is a step-by-step guide to permitting, designing and building small hydropower systems in Colorado. The handbook provides information to evaluate Colorado's existing hydropower sites and hydropower's untapped potential. Outlining steps in small hydropower project development, the handbook is a valuable tool for project developers considering the construction and operation of a hydropower system.

Colorado Market Assessment of Agricultural Anaerobic Digesters–2015

The market assessment focuses on the potential of anaerobic digesters (AD) in the state of Colorado, primarily on dairy facilities. The main objectives included assessing success criteria and barriers for AD projects. This was done through interviews with market participants and literature research, identifying potential market size and areas in Colorado, as well as identifying possible strategies Colorado could use to develop the market.

Colorado Climate Change Vulnerability Study–2015

The study was commissioned by the Colorado Energy Office in accordance with the Colorado Legislature's HB13-1293. The study is a sector-by-sector analysis of the challenges that state residents and leaders will have to address in coming decades. It also details many of the ways Coloradans are already grappling with these issues, and where other strategies may help mitigate risk.

Electric Vehicle Market Implementation Study–2014

The study provides a framework for implementing effective policies and programs, as well as identifying other opportunities that the state could pursue to facilitate EV adoption in Colorado. This study is a tool intended for use by program managers, policymakers, and other parties to facilitate discussions on developing an effective statewide EV strategy.

Colorado State Fleet Opportunity Assessment–2014

The assessment identifies near-term, cost effective opportunities for the state to work toward its petroleum reduction and air quality goals. The report's findings and recommendations highlight opportunities to cost-effectively deploy alternative fuel vehicles (AFV) and other petroleum reduction technologies, as well as strategies to address some of the inherent barriers to achieving the state's fleet goals.

Colorado State Energy Report–2014

The Colorado State Energy Report lays outs the framework through which Colorado will continue to pursue its energy policy. The report provides the values and goals that guide Colorado's energy policy. It also serves as a report card of the state's progress by emphasizing Colorado's achievements in meeting these goals and highlighting future actions Colorado will take to improve upon these efforts.

Produced Water Beneficial Use Dialogue–2014

The Colorado Energy Office and the Water Center at Colorado Mesa University held a dialogue for 65 Grand Junction stakeholders to discuss the potential future reuse of produced water from oil and gas operations on Colorado's Western Slope. This water was looked at as an opportunity to supply water for use in drought conditions.

KIN Energy Report–2013

The report provides an assessment of the economic importance of the energy industry to the state, and assesses opportunities. It provides recommended strategies to help advance the energy industry and the state's economy. It also sets a framework for collaborative initiatives between industry, academia and state organizations to pursue for increasing Colorado's energy industry global competitiveness.

Colorado Agricultural Energy Market Research Report–2013

The Colorado Energy Office (CEO) report focuses on the state's energy opportunities in the agricultural sector. It addresses key barriers facing agriculture that need to be overcome for farmers to invest in energy projects. It explores best practices for financial and technical incentives, policies and programs that CEO can support through coordination, education, outreach and/or implementation.

Colorado Energy Office Residential Photovoltaic Systems Case Study–2013

The case study examined 30 single-family homes in the north and northwest Denver Metro Area to analyze the impact of solar photovoltaic (solar PV) on the home-buying process. The study was to determine whether solar PV receives a monetary value in the home market place, and how demand, supply, resources, cost and politics factor in Colorado.

Colorado Natural Gas Vehicle Market Implementation Study–2013

The market implementation study identified natural gas as a low-cost alternative to gasoline and diesel. Colorado has 8% of the proven natural gas reserves in the United States. The study sets the basis for CEO to develop a natural gas vehicle implementation plan.

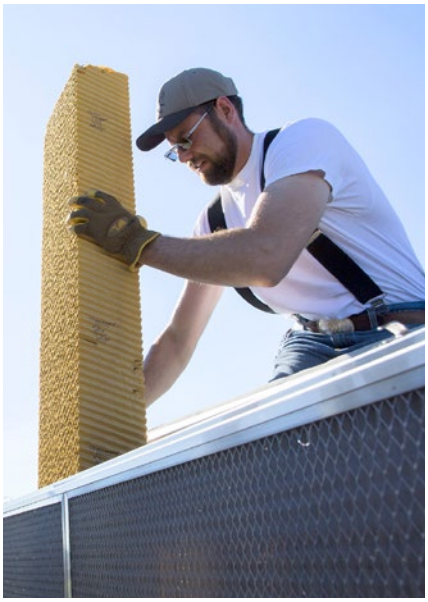
Colorado Industrial Energy Market Research Report–2012

The market research report outlines the current state of industrial energy use in Colorado. The in-depth analysis included current market trends, least cost opportunities for energy efficiency, renewable energy, and fuel use. The report considers market barriers and solutions, and makes recommendations regarding the most appropriate and impactful role for CEO in the market. The opportunities presented in this analysis were justified based on research, and include best practices from other states.

Public Buildings

Overview

The Colorado Energy Office works with public building owners, including schools and state agencies to improve the efficiency of their buildings. Activities include providing energy management information, energy audits, and technical assistance to achieve measurable savings. The Energy Performance Contracting, Energy Savings for Schools, and Greening Government initiatives use outreach strategies and presentations to establish agreements implementing energy and cost savings with local jurisdictions, special districts, and state agencies.



The City and County of Denver chose an EPC project that would provide an average of 17% energy efficiency savings for 14 participating buildings at a total cost of $2 million, which will be returned in 15 years through energy efficiency savings.

The Colorado Energy Office's (CEO) Energy Performance Contracting (EPC) Program helps public building owners reduce energy consumption with no upfront cost to the owner. Through the EPC Program, a building owner can finance energy efficiency improvements and pay back the financing through annual utility cost savings resulting from the usage reductions.

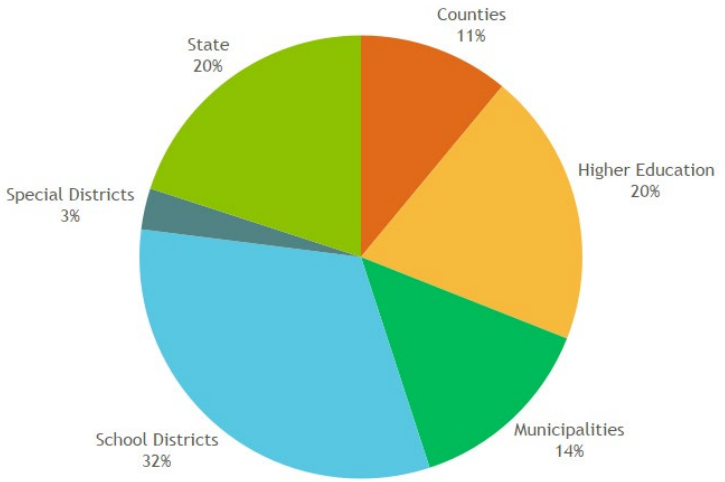
Public jurisdictions can select an energy service company (ESCO) from CEO's list of pre-qualified ESCOs to conduct high-quality energy efficiency audits, the results of which can be used by the ESCO to provide a guarantee of utility cost savings. ESCOs identify areas for improvement such as lighting and other electrical, mechanical and plumbing upgrades that can reduce utility expenses and address long-standing, controlled maintenance needs in public facilities. CEO delivers free assistance in stewarding technical, legal and financial aspects of energy performance contracting throughout the life of the project.

Participation in the program starts with a Memorandum of Understanding between CEO and the public building owner and an agreement to select one of CEO's pre-qualified ESCOs. High standards for success are maintained by CEO to achieve the building owner's goals. State- and industry-approved contracts, rigorous audit protocols, guidance documents, communication protocols and toolkits aid in the selection of an ESCO and assist in securing private sector financing.

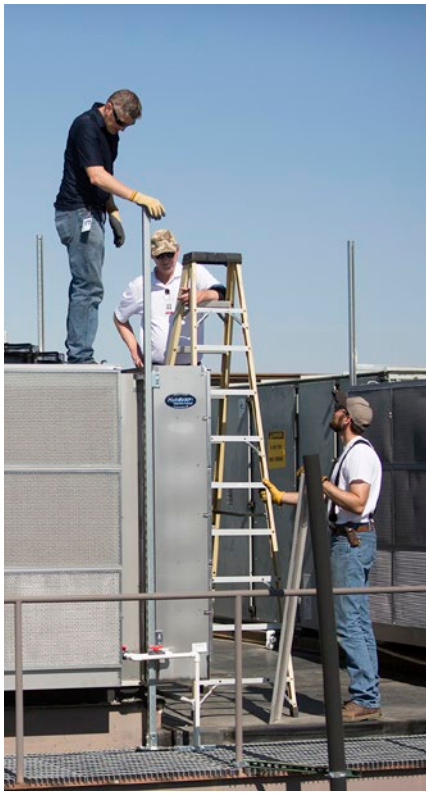
Since Colorado established its Energy Performance Contracting Program in the mid-1990s, 146 public jurisdictions have worked with an ESCO to identify nearly $31 million in annual utility savings through a technical energy audit. Because each technical energy audit is "investment-grade," the ESCO's guarantee of utility savings has been leveraged to attract financing for more than half-a-billion dollars in capital improvement funds. As of June 2016, 194 EPC projects have improved the performance of public school and university buildings, veterans' facilities, libraries, parks, community centers, wastewater treatment plants, prisons and other government buildings in communities across 75% of Colorado's counties.

The City and County of Denver chose an EPC project that would provide an average of 17% energy efficiency savings for 14 participating buildings at a total cost of $2 million, which will be returned in 15 years through energy efficiency savings. The positive return on the investment and CEO staff's assistance choosing pre-approved vendors and authenticating the proposed investments made EPC a good choice, according to David Basich, Energy Manager for the City and County of Denver.

Better Building Through EPC
Total Investments by Market Segment—$514,713,505 as of August 2016



Since Colorado established its Energy Performance Contracting Program in the mid-1990s, 146 public jurisdictions have worked with an ESCO to identify nearly $31 million in annual utility savings through a technical energy audit.



The Colorado Energy Office's (CEO) Energy Savings for Schools Program (ESS) provides technical resources to all Colorado schools, with a focus on rural and low-income schools, for energy/water efficiency and renewable energy and provides a consolidated platform for all of CEO's K12 sponsored programs. The ESS Program includes a free energy audit, preliminary renewable energy assessment, technical and implementation support, and energy coaching. Schools also are connected to other resources that can help them meet their energy goals including CEO's Energy Performance Contracting (EPC) program. EPC has been shown to be a valuable financial tool for many schools. The ESS Program works with more than 20 schools per year to achieve measurable savings and create sustainable energy programs.

Program Success to Date:

- 21 schools are enrolled in the ESS Program.
- 1,849,490 kWh of electrical savings, 108,140 therms of gas savings, and 2,097 kgallons of water savings have been identified.
- Over $733,600 has been secured to help schools finance project implementation through the Colorado Department of Public Health and Environment's Supplemental Environmental Project program.

An exchange component of the program has been developed to provide a long-lasting, self-sustaining, and capacity-building platform for schools to develop relationships with other schools and to learn from their experiences.

The ESS Program helps schools to implement energy efficiency measures and leverage low- to no-cost options to pay for upgrades that yield long-term benefits for Colorado. Schools reap the benefits of lower monthly utility bills and higher classroom comfort and safety, and students increase their energy literacy and gain a valuable understanding of how their behaviors influence consumption of resources.

CEO currently is working with Weld County School District RE-3J to offer the ESS program to three schools within the district. Through the ESS program, these schools will install energy efficiency projects including upgraded lighting, HVAC controls, and new high-efficiency boilers, which will save the school an estimated 250,000 kWh per year and over $125,000 in five years.

The ESS Program helps schools to implement energy efficiency measures and leverage low- to no-cost options to pay for upgrades that yield long-term benefits for Colorado.

In 2015, Gov. John Hickenlooper issued an Executive Order on Greening Government and established goals that reflect the state's commitment to efficient and sustainable government operations for six areas: energy and water management, vehicle petroleum consumption, environmentally preferable purchasing, recycling and waste prevention, and greenhouse gas emissions. To operationalize the executive order, the Greening Government Leadership Council (GGLC) was created and is comprised of representatives from each executive state agency and department. This council is a resource to help agencies set and achieve annual and multi-year goals for efficient and sustainable government operations. Each state agency is responsible for supporting the development and implementation of plans, programs, and policies that incorporate sustainability practices into daily agency decision-making and long-term planning across all agency activities and functions.

The Colorado Energy Office (CEO) supports the GGLC and the Executive Order's goals by developing and documenting performance baselines and evaluation protocols for each of the goals. CEO created templates for annual reporting, facilitated data entry into the state's utility database, EnergyCAP, and provided feasibility studies for Energy Performance Contracting (EPC) projects on state-owned facilities. CEO is coordinating ongoing, high-level, feasibility studies at approximately 750 buildings for EPC projects. CEO will work with each agency to identify the best candidates for EPC.

Pursuant to the Executive Order, a report of the state's executive agencies will be presented to the governor and the cabinet each year.

Each state agency is responsible for supporting the development and implementation of plans, programs, and policies that incorporate sustainability practices into daily agency decision-making and long-term planning across all agency activities and functions.

Residential Program

Overview

The Colorado Energy Office (CEO) focuses in two areas of residential building efficiency: new and existing homes. To address new homes, CEO works with Colorado jurisdictions to adopt energy efficient codes and with builders to improve the efficiency of new homes. To address existing homes, CEO works with the real estate industry and homeowners/homebuyers to improve consumer awareness concerning how much energy a home is using and what cost-saving energy efficiency improvements could be implemented.

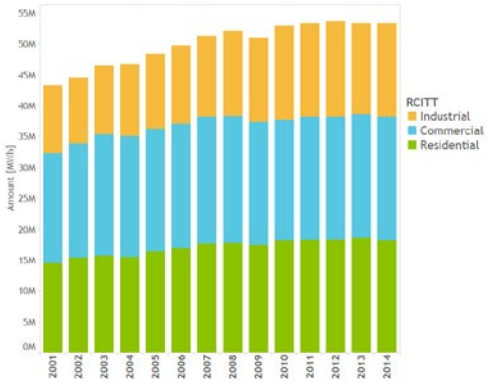
New Homes and Energy Codes

In fiscal year 2016, CEO continued to address energy efficiency of the new home construction market through building industry training, including energy code adoption.

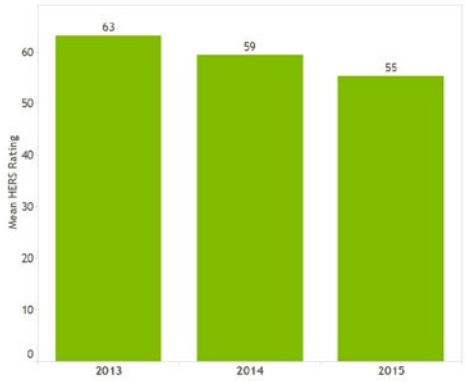
Over the last nine years, CEO's Residential Program has worked with industry stakeholders to increase use of the Home Energy Rating System (HERS) Index. This rating tool measures a home's energy efficiency, similar to a miles-per-gallon rating for new vehicles. In fiscal year 2016, there were 8,832 HERS ratings conducted for single family homes in Colorado resulting in a statewide average HERS rating of 55. Generally, a rating of 100 means that the home is 2006 code-compliant, regarding energy features. Colorado improved the average HERS rating from 57 in 2015 to 55 in 2016, which means homes built in 2016 are 45% more efficient than a home built to the 2006 code.

In addition, CEO focused its efforts in Colorado Springs, working with six builders to make HERS Index and energy efficiency recommendations. CEO targeted Colorado Springs after reviewing HERS Index data, which showed a market penetration rate of less than 15% of all new homes receiving a rating compared to 67% in the Denver metro area or 50% statewide. CEO identified areas to improve new homes built in Colorado Springs such as increasing the use of LED lights, installing more efficient hot water heaters, and training to improve installation of insulation. Based on continual assessment of the state's HERS penetration, in fiscal year 2017, CEO will implement builder training in the Colorado Springs and Grand Junction markets.

Building Energy Consumption



HERS Rating by Year



CEO works with the real estate industry and homeowners/homebuyers to understand how much energy a home is using and what cost-saving energy efficiency improvements could be implemented.

Commercial Code Compliance Study

CEO continues to provide commercial building energy code trainings across the state to explain energy code requirements and provide technical assistance for energy code implementation and enforcement (30-28-201 C.R.S., 31-15-602 C.R.S.). CEO also began a commercial code compliance study.

An energy code compliance checklist was developed for the study and site visits were scheduled in 10 jurisdictions with the highest number of commercial construction and renovation projects. With completion targeted for fiscal year 2017, the study will identify cost and energy savings and highlight opportunities for additional code training.

Existing Homes

CEO launched the U.S. Department of Energy's (DOE) Home Energy Score (HES) platform on Sept. 17, 2015, at the Colorado Association of REALTORS® annual convention. The HES offers owners of existing homes an easy-to-understand assessment of their home's energy use to help them make educated choices about how to improve the efficiency of their homes. It provides the market with data that can be used in energy efficient mortgage transactions, offering marketable features for real estate sales. The HES also gives information for appraisers to use in determining the value of a home. The data allows a homebuyer the ability to plan for future capital improvements and possible equipment failures.

Over the course of five years, CEO worked with real estate stakeholders to develop the necessary infrastructure for the HES to enter the Colorado market. CEO is educating consumers and stakeholders on the value of this new tool.

CEO and DOE worked together to incorporate the HES into federal mortgage programs, including the U.S. Federal Housing Administration Energy Efficient Mortgage Program. In addition to bridging utility-sponsored audit programs, this back-of-the-house work will make it easier for consumers statewide to obtain an HES and have a resource to help make energy efficient improvements when buying a new home.

The HES offers owners of existing homes an easy-to-understand assessment of their home's energy use to help them make educated choices about how to improve the efficiency of their homes.

Transportation

Overview

Coloradans want to have the ability to make choices that will positively impact the state's economic and environmental health. Market conditions and public policies offer an opportunity for an increase in the adoption of alternative fuel vehicles, including compressed natural gas and electric. The Colorado Energy Office (CEO) is working to remove market barriers for alternative fuels by increasing the number of publicly accessible alternative fueling stations along Colorado's major transportation corridors. CEO is coordinating the strategic placement of refueling/charging infrastructure, thereby reducing concerns expressed by potential alt-fueled vehicle purchasers concerning range limitations.

ALT Fuels Colorado

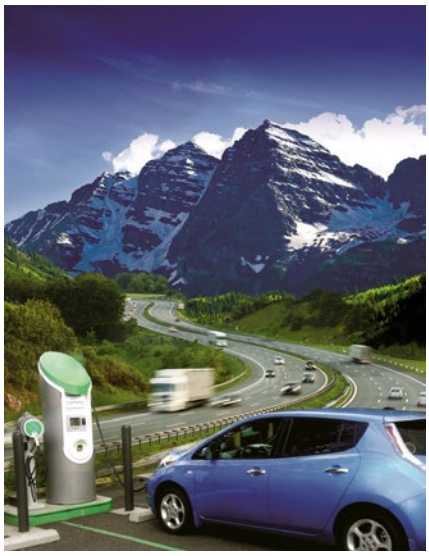
The ALT Fuels Colorado grant program, designed to address the need for fueling infrastructure, provides funding for alternative fueling stations. Partnering with the Regional Air Quality Council, the program also provides incentives to offset incremental costs in the initial costs of alternative fuel vehicles. Funding comes from the federal Congestion Mitigation and Air Quality (CMAQ) program, which is focused on providing air quality benefits.

- $30 million will be distributed between 2014 and 2017 to incentivize the adoption of alternative fuel vehicles (AFV). Half the funds will go to infrastructure, and half will go toward alternative fuel vehicles for fleets.
- Fueling stations along the state's major transportation corridors is the priority, in order to create a statewide system for AFV travel. Up to $500,000 may be awarded for public compressed natural gas (CNG) stations. Additional grants are available to station developers who want to add fast charging electric vehicle (EV) stations and propane fueling stations next to CNG stations.
- Vehicle emissions are the largest contributors to ground level ozone pollution, and studies have shown that CNG vehicles can reduce ozone-causing pollutants by 60% to 90%.

Infrastructure grants include CNG fueling station equipment, and co-located EV charging and propane auto gas station equipment. Building a CNG market for consumers, especially fleets and trucks, helps reduce reliance on imported gasoline and diesel while introducing a cleaner burning fuel source. Colorado is ranked 6th, by the U.S. Energy Information Administration, for natural gas production. As such, Colorado is a net exporter, annually producing more than it consumes. Colorado consumers benefit, not only because natural gas is locally produced, but also because CNG prices are competitive with, and more stable than gasoline or diesel prices over the long term.

The Colorado Energy Office (CEO) is working to remove market barriers for alternative fuels by increasing the number of publicly accessible alternative fueling stations along Colorado's major transportation corridors.

Charge Ahead Colorado

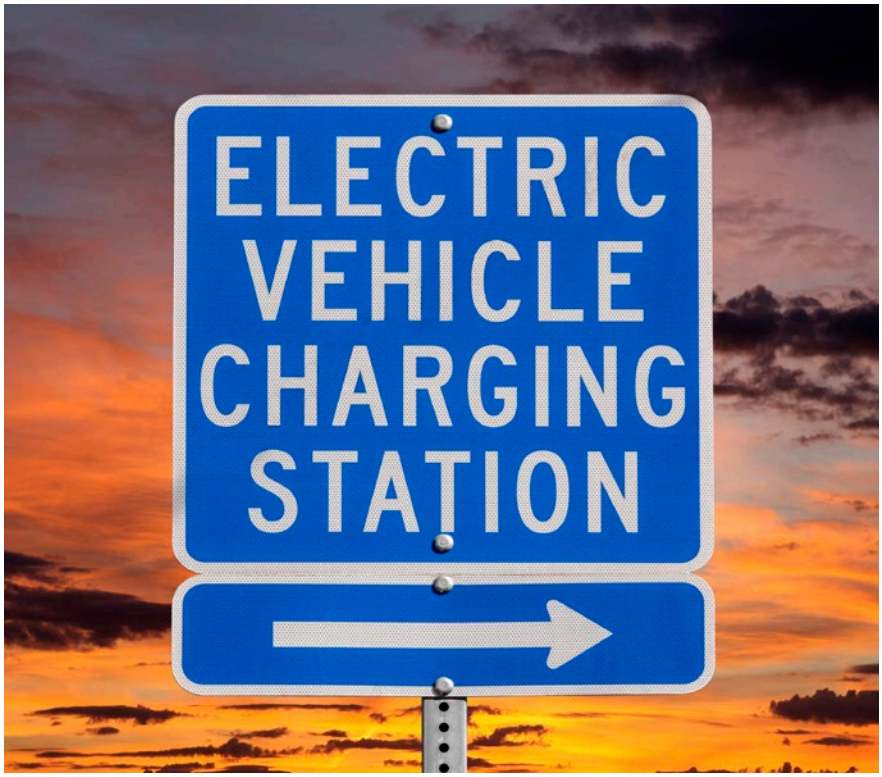


In partnership with the Regional Air Quality Council (RAQC), CEO administers Charge Ahead Colorado, an electric vehicle (EV) charging program. The program is funded in part by the Electric Vehicle Grant Fund (24-38.5-103 C.R.S), that provides competitive grants to local governments, state agencies, public universities, public transit agencies, private nonprofit or for-profit corporations, landlords of multifamily apartment buildings, and homeowner associations to install electric charging stations. The intent of the program is to serve registered EVs by expanding Colorado's network of EV chargers. A prevailing impediment to EV adoption is limited access to public charging, leading to "range anxiety," or the worry that an EV driver's battery will run out of power before their destination.

There are three levels of EV charging stations. Level I chargers are relatively inexpensive to purchase and install, at $1,000 or less, but it may take eight to 12 hours to recharge a battery. Level II chargers typically cost between $6,000 and $10,000 to purchase and install, and can charge a vehicle in about four to six hours. Fast charging units (Level III chargers) can cost between $50,000 and $100,000 and can fully charge a vehicle in 15 to 30 minutes. Prior to 2013, there were 79 publicly available EVSE units. As of August 2016, CEO has awarded grants for 129 EVSE units. In total, the program has funded 367 publicly available charging stations.

Charge Ahead Colorado focuses on the benefits of EVs:

- At $1.05 per egallon (electric gasoline gallon equivalent), charging a vehicle with electricity is more affordable than filling a vehicle's tank with gasoline.
- EVs have zero tailpipe emissions, and they can reduce lifecycle pollution.
- EVs are charged by domestically produced electricity, while 40% of the nation's petroleum is imported from other countries.
- Colorado's transportation portfolio will be diversified with increased access to EV charging, adding to the reasons to have an EV.



A prevailing impediment to EV adoption is limited access to public charging, leading to "range anxiety," or the worry that an EV driver's battery will run out of power before their destination.

Resources:

- Charge Ahead Colorado funds EV charging stations throughout Colorado.
- Charge Ahead Colorado funds the purchase of EVs in the Denver metro area.
- Charge Ahead Colorado partner RAQC provides funds for EVs and EVSE units in the Denver metro area.
- Charge Ahead Colorado partner CEO funds EV charging stations in the rest of the state.
- Charge Ahead Colorado's incentives include up to $6,260 for Level II chargers and up to $16,000 for fast charging units; however, incentives are capped at 80% of the total project cost.
- RAQC funding will pay 80% of the incremental cost differential between a gasoline vehicle and an EV, capped at $8,260 per vehicle.

Colorado EV Wired Workplaces

The growth of the electric vehicle (EV) market is dependent on the availability of workplace charging. According to the U.S. Department of Energy, employees working at businesses that offer EV charging at the workplace are six times more likely to drive an EV than the average worker.

Benefits

- More employees want to work at companies that have a commitment to sustainability and innovation, according to the MIT Sloan Management Review.
- A vehicle driving on electricity doesn't produce tailpipe emissions.
- The average EV in Colorado reduces greenhouse gas emissions by 37%, compared to the average gasoline vehicle.
- EV charging can contribute to LEED certification for the business, and demonstrate leadership in corporate sustainability.
- Workplace charging extends an EV's range and reduces commuting costs.
- Workplace charging is a perk like a company gym or a transit pass for employees.

Refuel Colorado

Refuel Colorado works to tangibly connect Colorado stakeholders with valuable financial opportunities through the Colorado Energy Office's (CEO) ALT Fuels Colorado and Charge Ahead Colorado programs. It offers free technical assistance to fleets statewide by helping to identify monetary savings and other advantages from the conversion to alternative fuel vehicles. Fleet coaches actively work with community leaders, fuel providers and auto dealerships to build self-sustaining local alternative fuel markets.

They offer fleet managers the ability to determine the costs and usage of alternative fuel vehicles that fit with their fleets' needs. Refuel Colorado is free of charge and available statewide.

- Fleet coaches help fleet managers assess the life-cycle cost savings from a switch to alternative fuel vehicles, and guide them to identify grants and tax credits. They also locate existing fueling infrastructure and provide information about stations being planned or under construction.
- Refuel coaches work with business and government leaders to develop an understanding of the financial, environmental, economic development and energy security advantages for the use of clean, Colorado fuels.
- Fuel providers work with Refuel Colorado coaches to learn about market opportunities and financial incentives for alternative fuel vehicles and get an understanding about the engineering and design requirements for fueling or charging stations.
- Automobile dealerships consult Refuel Colorado coaches to identify the popular alternative fuel vehicles to stock for sale and to find potential customers. Coaches have information on alternative fuel costs, state tax credits and other financial incentives.
- Funded by CEO, Refuel Colorado is administered by BCS, Inc. and works in partnership with Northern, Southern, and Denver Metro Clean Cities groups, Clean Energy Economy for the Region (CLEER), South Central Council of Governments (SCCOG), and Four Corners Office for Resource Efficiency (4CORE).

Refuel Colorado offers free technical assistance to fleets statewide by helping to identify monetary savings and other advantages from the conversion to alternative fuel vehicles.