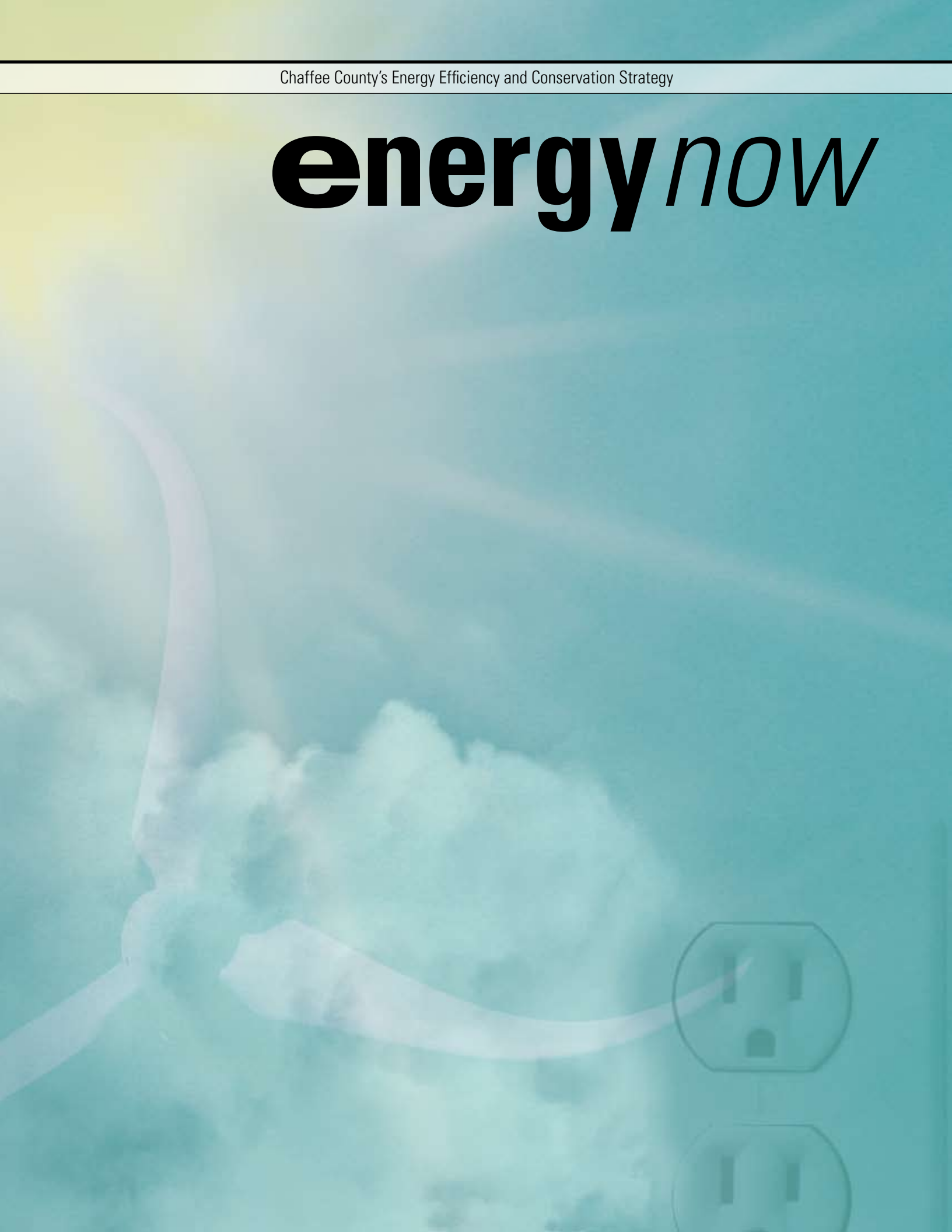


# **energy** *now*



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**Department of Local Affairs**



*Strengthening Colorado Communities*



**Governor's Energy Office**



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# Vision

Chaffee County and the municipalities of Buena Vista, Poncha Springs and Salida promote and support energy conservation, energy efficiency and innovative uses of renewable resources and technology.

# Introduction

**energynow** is the Energy Efficiency and Conservation Strategy for Chaffee County, Buena Vista, Poncha Springs and Salida. This strategic plan draws upon leadership provided by local government officials and staff and the Governor's Energy Office (GEO) as well as the preferences expressed by local residents.

By incorporating energy use data, energy sources and renewable energy resources, **energynow** identifies six categories with 27 strategic actions that represent the most prudent and fiscally responsible means by which Chaffee County and the communities can reduce energy use, utilize renewable energy resources and realize economic benefits. An emphasis on education, conservation and energy efficiency reflects the wishes of county residents and ensures a high level of public support.

**energynow** fulfills a GEO requirement that qualifies Chaffee County, Buena Vista, Poncha Springs and Salida for additional Energy Efficiency and Conservation Block Grant funding through the GEO to implement the strategies of **energynow**. Approval of the plan qualifies Chaffee County and municipalities for additional grant funding from state and federal sources.

## Chaffee County and Energy

Chaffee County is located on the eastern slope of the Rocky Mountains in central Colorado and has a year-round population estimated by the U.S. Census Bureau at 16,733 in 2007. The population density was estimated to be 16 persons per square mile, compared to 46.9 persons per square mile for the State of Colorado and an average density of 86.2 for the entire United States.

A rural area, Chaffee County encompasses 649,452 acres with over 80 percent of that land in public ownership. Municipalities located in Chaffee County are the City of Salida, the Town of Buena Vista and the Town of Poncha Springs.

Chaffee County's primary use of energy is electricity provided by two suppliers: Sangre de Cristo Electric Association in the northern portion of the County (Buena Vista) and Xcel Energy to the south (Salida and Poncha Springs). As part of Touchstone Energy Cooperative, Sangre de Cristo purchases its electricity from Tri-State Generation and Transmission Association.

Atmos Energy provides natural gas throughout Chaffee County, and three privately owned companies supply propane to residents and businesses, reflecting another highly used resource for heating. A preliminary greenhouse gas inventory puts Chaffee County emissions for 2007 at 453,139 metric tons (999 million pounds) carbon dioxide equivalent.

Governor Ritter's *Colorado Climate Action Plan* establishes a goal of reducing greenhouse gas emissions in 2020 by 20 percent relative to emissions in 2005. Local government actions taken to assist meeting this goal can provide multiple local benefits, including decreasing air pollution, creating jobs, extending landfill life, and reducing energy expenditures for the county, its businesses and its citizens.

The Chaffee County **energy***now* Plan:

- . Guides decision-making and policy development by local government in the management of energy use and conservation efforts,
- . Provides an inventory of current energy use and renewable energy sources and
- . Recommends a set of strategies to meet the energy use goals of the county.

### **The Planning Process**

The **energy***now* planning process occurred over a six-month period with steering committee oversight and community involvement. Planning focused on energy use and sources, public meetings, public outreach and individual meetings. The planning process included:

- . A county-wide energy use analysis,
- . A review of renewable resources,
- . An exploration of funding options and
- . Community input.

Energy use and emissions data were gathered for buildings, transportation, livestock, food production and distribution, fuel production and waste for inclusion in a greenhouse gas emissions inventory. The data collected was provided to the University of Colorado at Denver to produce greenhouse gas calculations using accepted formulas and methodologies.

Extensive data from the Chaffee County GIS (geographic information system) provided logistical information about renewable energy resources and their potential for development.

On October 15, 2009, more than 65 community members and local officials participated in an economic development summit focused on renewable energy.

Public meetings were also held November 18, 2009, at the Community Center in Buena Vista and November 19, 2009, at the Chaffee County Fairgrounds. The results from these community input meetings indicate a strong community desire for actions directed toward education, conservation and efficient use of energy.

Community input indicates 69.4 percent of residents surveyed believe “developing alternative energy/ clean energy in the county” is “critically important,” with residents favoring solar and geothermal resources. A resounding 93.1 percent support investments in renewable energy technology for public buildings.

### **Chaffee County Energy Efficiency and Conservation Steering Committee**

Dennis Giese, Chaffee County County Commissioner  
 Bob Christiansen, Chaffee County Administrator  
 Dan Short, Chaffee County Finance Director  
 Robert Flint, Buena Vista Trustee  
 Sue Boyd, Buena Vista Administrator  
 Aaron Kroschel, Poncha Springs Trustee  
 Greg Smith, Poncha Springs Public Works Director  
 Scott Damman, Salida City Councilman  
 Jack Lewis, Salida City Administrator  
 Kurt Jones, Colorado State University Extension Agent

### **Utility Partners**

Atmos Energy, Kevin Kerrigan  
 Sangre De Cristo Electric Association, Bill Bennett  
 Sangre De Cristo Electric Association, Linda Nyberg  
 Xcel Energy, Kathy Worthington



# Strategies

The Vision of **energy**now can be achieved through a combination of strategies. An analysis of energy use, available resources and funding mechanisms produced a list of strategies that provide the best local opportunities to reduce energy consumption, minimize greenhouse gas emissions, reduce energy expenditures, support the local economy and sustain the local environment.



*Edison Electric Light Company of Salida built the first steam-powered electric generation plant in Salida in 1887. The coal-fired plant was 28 feet square with an attached boiler room and a 75-foot-tall smokestack. It began by supplying power for 750 electric light bulbs including, for the first time, street lights on F Street.*

*The Edison Electric Light Company of Salida merged in 1905 with Salida Light Power and Utility Company, which had constructed a hydroelectric generating system on the South Arkansas River.*

*“Work began . . . on the auxiliary power plant of the Salida Light Power and Utility Company. The new powerhouse will be just below Maysville where the North Fork empties into the main river, and the water will be piped from the upper plant to this point. The new plant will run two dynamos, and on its completion the smelter will be wired and power furnished.” The Salida Record, July 17, 1908.*

*The original power company, organized by local citizens, became part of the Public Service Company of Colorado in 1924. The steam plant supplied electrical power to Salida from 1887 to 1958 when it was taken out of service.*

## Overview

**energy***now* strategies are organized in six categories as follows.

### Local Government

- . Property-assessed Financing
- . Building Codes
- . ENERGY STAR Partnership
- . Resource Development Regulations
- . Energy Efficiency Planning
- . Climate Protection Agreements
- . Community Energy Coordination
- . Local Event Permits
- . Utility Resource Planning

### Energy Production

- . Sustainable Energy Finance Program
- . Renewable Energy Production
- . Utility Rebates
- . Utility Incentives
- . Solar Equipment Leasing

### Built Environment

- . Energy Audits
- . Retrofit Buildings
- . Weatherization Programs
- . Outdoor Lighting

### Transportation

- . Fuel Efficiency
- . Multi-modal Transportation
- . Clean Vehicle Technology

### Waste

- . Paper Reduction
- . Recycling
- . Methane Capture

### Education

- . Online Information Hub
- . Local Media
- . Agencies and Organizations

### Economic Benefits

The vast majority of money spent on energy related bills immediately leaves the local economy. Finding ways for each household, business and government entity to spend less on energy means a significant amount of funds can be used on other priorities, generating economic benefits. Clean energy also represents one of the few opportunities for new growth in a stagnant economy and can be a significant source of local jobs.

Energy conservation, energy efficiency and renewable energy strategies generally produce the same kinds of economic benefits, and while the return on investment varies, all **energy***now* strategies can produce long-term economic benefits for Chaffee County, Buena Vista, Poncha Springs and Salida.



## 1. Local Government

County and municipal governments can set the example for energy efficiency, energy conservation and innovative uses of renewable energy by reviewing existing policies and revising them to promote **energy***now* strategies.

Economic benefits will accrue as energy conservation and efficiency initiatives reduce operating costs. Strategies that support energy-saving measures for businesses and residents will reduce energy expenditures and keep more money in the local economy.

Local government strategies can also establish energy policies that bolster energy-related business opportunities for suppliers, builders and funding institutions.

### 1.1 Property-assessed Financing

#### Action

Pursue the development of county, municipal and/or special district Property-Assessed Clean Energy (PACE) programs to finance renewable energy and energy efficiency improvements for local property owners as authorized with the passage in 2008 of H.B. 1350 (C.R.S. 30-20-601.5 and C.R.S. 31-25-500.2).

#### Implementation

Implementing a PACE program requires voter approval to issue bonds to finance clean energy improvements for property owners.

Qualifying improvements would be determined locally and could include insulation, windows and doors, automatic energy control systems, HVAC systems, caulking and weather-stripping, energy efficient lighting, passive lighting, energy-recovery systems, geothermal heat pumps solar water heating, solar thermal-electric, photovoltaic, wind, biomass, hydroelectric, geothermal-electric, bio-fuels, and/or fuel cells.

Funds for a PACE program can be generated using existing bond potential or by creating improvement districts that issue bonds. The bonds provide financing for property owners making qualifying renewable energy improvements. The borrowers then repay the loans through a special assessment on their property.

### 1.2 Building Codes

#### Action

Update existing building codes to promote energy efficiency and renewable energy for new construction and remodeling projects.

#### Implementation

Implementation would be at the discretion of the appropriate county and municipal authorities during code revision sessions.

Identify existing codes and principles for adoption. Examples include the International Energy Conservation Code, Built Green Colorado, Energy Star, LEED and the U.S. Department of Energy's "Building America" program.

### 1.3 ENERGY STAR Partnership

#### Action

Continue to partner with the Governor's Energy Office to encourage construction of ENERGY STAR certified new homes and use of ENERGY STAR appliances.

#### Implementation

Annually apply for program renewal with the Colorado Governor's Energy Office to promote the benefits of ENERGY STAR certified homes. Funding is provided through a matching grant program from the Colorado Governor's Energy Office.





## **1.4 Resource Development Regulations**

### **Action**

Enhance local regulations to support responsible development of renewable resources.

### **Implementation**

Review and update special land use (1041) regulations to address potential issues associated with development of renewable energy resources.

## **1.5 Energy Efficiency Planning**

### **Action**

Consider energy efficiency as an important component of all future county and municipal building plans, including new construction and remodeling projects.

### **Implementation**

Develop policies that incorporate energy efficiency, energy conservation and renewable energy considerations as a component of all future county and municipal plans.

## **1.6 Climate Protection Agreements**

### **Action**

Investigate and potentially adopt climate protection agreements and initiatives.

### **Implementation**

Consider a resolution to adopt broad-based agreements such as the Sierra Club's Cool Cities or Mayors Climate Protection agreements as well as local and grass roots initiatives.

For example, cities participating in the Mayors Climate Protection Agreement commit to take the following three actions:

- . Strive to meet or beat the Kyoto Protocol targets in their own communities through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
- . Urge state and federal governments to enact policies and programs to meet or exceed the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol – seven percent reduction from 1990 levels by 2012; and
- . Urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation, which would establish a national emission trading system

## **1.7 Community Energy Coordination**

### **Action**

Provide ongoing support for **energy***now* efforts.

### **Implementation**

Establish a community energy advisory board to provide guidance for the community energy coordinator and oversight of community energy initiatives.

Support the community energy coordinator hired by Chaffee County to organize and coordinate energy-related efforts among various entities and departments in Chaffee County, Buena Vista, Poncha Springs and Salida.

Initial funding for this position will be provided by the Governor's Energy Office through the U.S. Department of Energy's Energy Efficiency and Conservation Block Grant Program.

The energy coordinator will be responsible for implementing community outreach and education, reviewing and updating **energy***now* on an annual basis, and positioning the county to access GEO programs and funding opportunities.

Support bi-annual assessments of greenhouse gas emissions in Chaffee County.

Enhance existing data to provide more accurate numbers for future greenhouse gas emissions assessments, including

- . Propane usage,
- . Traffic counts at county boundaries to distinguish between local and non-local traffic, and
- . Information on locally produced food to reflect lower emissions from food distribution.

## 1.8 Local Event Permits

### Action

Update event applications to incorporate energy efficiency requirements, recycling and use of renewable resources.

### Implementation

Update event and park use applications to incorporate conservation, energy efficiency and clean energy sources for local events such as the Chaffee County Fair, FIBArk, Gold Rush Days and holiday events.

## 1.9 Utility Resource Planning

### Action

Increase participation in electric utility resource planning.

### Implementation

Identify the fuel mix used by local electric utilities and their plans for building capacity. Identify opportunities to comment on electric utilities' resource planning matters that affect fuel mix and, therefore, the potential to meet emissions reduction goals as outlined by **energy***now*.

## 2. Energy Production

With energy production dominated by utility companies, production strategies require close cooperation with the utilities and a commitment to expand, adopt and implement policies to address responsible development of renewable energy production projects.

Energy production strategies offer the greatest potential for creating local jobs as well as enhancing revenue for existing businesses, including agriculture. For example, in addition to creating jobs and revenue, woody biomass fuel production would also support wildfire mitigation in areas suffering from unhealthy overgrowth or beetle kill. Bio-fuel strategies could promote new cash crops for local agriculture, while distributed solar and wind electricity production can offset energy expenditures and offer long-term revenue opportunities.

### 2.1 Sustainable Energy Finance Program

#### Action

Support the development of county, municipal and/or special district Property-Assessed Clean Energy (PACE) programs to finance renewable energy and energy efficiency improvements for local property owners as authorized with the passage in 2008 of H.B. 1350 (C.R.S. 30-20-601.5 and C.R.S. 31-25-500.2).

#### Implementation

Implementing a PACE program requires voter approval to issue bonds that would finance clean energy resource development. Voter-approved bonds can be issued through the county, municipalities or through a special improvement district.



Qualifying improvements would be determined locally and could include technologies for solar water heating, solar thermal electricity, photovoltaic electricity, wind-generated power, biomass energy, hydroelectric power, geothermal electricity, bio-fuels and hydrogen fuel cells.

Funds for a PACE program can be generated using existing bond potential or by creating improvement districts that issue bonds. The bonds provide financing for qualifying renewable energy improvements, and loans are repaid through a special property assessment.

## 2.2 Renewable Energy Production

### Action

Partner with utilities and private businesses to develop local distributed energy production.

### Implementation

Consider construction of larger energy production capacity through bond issues, partnerships with business and other appropriate measures. As identified in the "Renewable Energy Resources" section, the most promising local possibilities include solar-based technologies, geothermal-based applications and bio-fuels, including bio-fuel crop production and bio-fuel processing (e.g., Solix facility near Durango).

Promote enhanced use of net-zero construction principles to supply locally produced power on a building-by-building basis.

## 2.3 Utility Rebates

### Action

Maximize the use of utility rebate incentives.

### Implementation

Consider using utility rebates to install renewable energy production equipment at public facilities. Encourage residents and business to take advantage of these rebates as well.

## 2.4 Utility Incentives

### Action

Support increased utility demand and power supply incentives, including an aggressive renewable portfolio standard.

### Implementation

Partner with local utilities to support incentivized energy conscious policies and accelerated implementation of Smart Grid technology.

## 2.5 Solar Equipment Leasing

### Action

Allow for lease-to-own programs for residential solar power equipment and commercial solar systems up to 500 kilowatts.

### Implementation

Investigate programs created under new state legislation, including SolarCity in Westminster and SunRun of San Francisco. Both companies have developed lease-to-own programs for residential solar power equipment and commercial systems in Colorado.



### 3. Built Environment

The built environment encompasses all of the manmade features in our surroundings, ranging from public buildings and infrastructure to homes. Based on the *Chaffee County Greenhouse Gas Inventory Report*, our built environment consumes over 30 percent of the energy used in Chaffee County, more than any other category. Buildings dominate this category with commercial and government buildings accounting for sixteen percent and residential buildings for fourteen percent.

As the largest consumer of energy in the county, the built environment offers the greatest opportunity for reducing energy consumption and saving money. Energy audits can identify and help prioritize specific projects like weatherization, energy-efficient appliance upgrades and renewable energy technologies.

Energy efficient equipment and conservation technologies pay for themselves in reduced energy costs, after which the savings translate into reduced expenses for local governments, businesses and residents. Renewable energy technologies also reduce energy expenditures and provide a potential source of revenue.

#### 3.1 Energy Audits

##### Action

Conduct energy audits to identify energy-saving opportunities in buildings.

##### Implementation

Promote energy audits of all public buildings.

Support energy audits for commercial and residential buildings.

Pooling resources and developing strategic partnerships with local utility providers, the GEO and/or Southwest Conservation Corps offer cost-effective options.

#### 3.2 Retrofit Buildings

##### Action

Promote retrofitting buildings for energy efficiency and renewable energy generation.

##### Implementation

Enhance planned upgrades to government buildings by implementing recommendations from energy audits.

Promote replacement of incandescent and halogen light bulbs with fluorescent and LED lights, possibly through retailer partnerships or rebates.

Promote replacement of T12 fluorescent lamps (magnetic ballast) with more efficient T8 fluorescent lamps (electronic ballast).

Promote use of ENERGY STAR appliances through bulk community buying.

Promote “smart” power strips to reduce phantom power drain.

Promote room occupancy sensors to control lighting and temperature in individual rooms.

Additional retrofit projects could include adding insulation, replacing old windows, installing ground source heat pumps, installing photovoltaic panels where appropriate, installing solar hot water equipment, using biomass for heat, installing combined heat/power equipment, and implementing other net-zero principles.



### 3.3 Weatherization Programs

#### Action

Continue working with the Northwest Colorado Council of Governments to facilitate weatherization assistance for low to middle-income residents.

#### Implementation

Encourage coordination among county agencies to get weatherization assistance for homes.

### 3.4 Outdoor Lighting

#### Action

Enhance existing outdoor lighting for energy efficiency.

#### Implementation

Identify opportunities to replace public outdoor lighting – including traffic signals, streetlights and parking lot lights – with more efficient lights.

In conjunction with lighting upgrades, consider retrofitting fixtures for “dark sky” downcast lighting to ensure efficient use of light and minimal light pollution.

## 4. Transportation

Transportation accounts for 21 percent of energy use in Chaffee County, second only to the built environment. Transportation presents a unique set of challenges due to the need for “portable power,” which creates a heavy reliance on fossil-based fuels.

Conservation efforts can produce significant savings, and developing local bio-fuel capacity can create jobs and revenue within the county, particularly in agriculture, while providing a fuel source that contributes no additional carbon to the atmosphere.

### 4.1 Fuel Efficiency

#### Action

Increase the efficiency of fleet vehicles and heavy equipment.

#### Implementation

Identify ways to enhance fuel efficiency and reduce harmful emissions in local vehicle fleets. Possible improvements include vehicle operation requirements (e.g., no idling, proper tire inflation, regular tune-ups); replacing old, inefficient vehicles and equipment with models that reduce fuel consumption and/or emissions; and use of alternative fuels.

### 4.2 Multi-modal Transportation

#### Action

Promote pedestrian, bicycle and low-emission vehicle traffic in Chaffee County.

#### Implementation

Enhance existing trail systems, bike lanes, sidewalks, ordinances, safe routes to schools and other measures that promote walking and bicycling.

Promote use of low-emission vehicles like golf carts and scooters in appropriate settings (e.g., municipalities and other communities).

Review ordinances and planning considerations to enhance these alternative modes of transportation.



### **4.3 Clean Vehicle Technology**

#### **Action**

Support clean vehicle technology in local mass transit – school buses, rafting buses, Chaffee Shuttle, and Monarch shuttle.

#### **Implementation**

Implementation could include supporting large-scale conversion of local vehicle fleets to natural gas, bio-diesel, electricity, hydrogen or other fuel sources.

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## **5. Waste**

Waste accounts for over 10 percent of Chaffee County's greenhouse gas emissions, including diesel exhaust from waste-handling equipment and methane from the landfill. Strategies to minimize these emissions have the added benefit of minimizing the negative environmental and land-use impacts of traditional waste management practices.

In addition to reducing emissions, **energy***now* strategies can reduce waste management costs through streamlining, enhanced recycling and reduced landfill requirements. Diversion of wood waste could also supply feedstock for biomass energy and generate revenue.

### **5.1 Paper Reduction**

#### **Action**

Enact progressive paper use policy.

#### **Implementation**

Promote paper conservation practices such as copying on both sides of paper, using recycled paper, developing paperless forms and the use of multiple computer screens.

### **5.2 Recycling**

#### **Action**

Support increased recycling and reuse of waste materials

#### **Implementation**

Enhance existing paper, plastic, glass and metal recycling efforts at local government facilities.

Partner with Waste Management, Upper Arkansas Recycling and other entities to facilitate single-stream curbside recycling, proven to be the most energy-efficient recycling process.

Enhance existing landfill operations to increase recycling and reuse of waste materials (e.g., wood waste for fuel; compostable waste for farming, gardening and environmental restoration).

Support the addition of battery and appliance recycling to local recycling services.

### **5.3 Methane Capture**

#### **Action**

Identify potential for methane capture at landfill.

#### **Implementation**

Begin to investigate methane emissions at the county landfill and determine the costs and benefits of installing a methane capture capability. Captured methane could then be used as fuel.

## 6. Education

Raising public awareness about energy issues is crucial to reducing energy use while systematically developing renewable energy production in a responsible manner. Educational efforts should raise awareness about:

- . The economic and environmental benefits of energy conservation,
- . Cost effective ways to improve energy efficiency,
- . Rebate and incentive opportunities,
- . Current available uses of renewable energy sources and
- . New renewable energy technology.

Public education helps local residents make informed decisions that benefit their communities by reducing energy costs, minimizing harmful emissions and preserving the natural environment.

Conservation represents the quickest and easiest way to achieve economic benefits related to energy, and the level of energy conservation achieved is directly related to the level of effort invested in education.

Education strategies can also inform county residents about local energy efficiency and renewable energy suppliers and contractors, thereby supporting local businesses.

### 6.1 Online Information Hub

#### Action

Change the county's existing energy Web site [www.chaffee-county-energy.com](http://www.chaffee-county-energy.com) to [www.chaffee-county-energy-now.com](http://www.chaffee-county-energy-now.com) and maintain the site as a hub for energy information pertinent to Chaffee County.

#### Implementation

Maintain the county's Web site to include up-to-date information and links pertaining to energy conservation, energy efficiency, renewable energy, tax incentives, energy grants, local technology and equipment suppliers, local contractors, local utility incentives and any other information that can help Chaffee County and its residents make informed energy choices.

Include links to county and municipality Web sites and any other appropriate community resources.

### 6.2 Local Media

#### Action

Utilize local media outlets to inform and educate residents and visitors about energy-related accomplishments and projects, as well as the benefits of energy efficiency and conservation.

#### Implementation

Promote public awareness by providing regular press releases and public service announcements to local media outlets in a coordinated media campaign that provides timely energy-related information via local radio stations, newspapers, magazines and Web sites.

### 6.3 Agencies and Organizations

#### Action

Work with existing government agencies and local organizations to promote education about energy efficiency, conservation, renewable resources and "green" job opportunities.

#### Implementation

Coordinate with agencies and organizations – like the Colorado State University County Extension Office, the CSU Global Campus program and the Colorado Mountain College green job training program – to disseminate correct and factual information about energy and energy-related jobs.





# Funding

Funding mechanisms for energy efficiency, conservation and renewable energy improvements vary widely, and creative new funding opportunities are continually being developed.

Funding opportunities run the gamut from government grants and loan guarantees to property-assessed financing and power purchase agreements. Given the wide range of funding options, choosing the best funding mechanism for a given project is important.

## **Performance Contracting Program**

Performance contracting provides a mechanism for making energy conscious upgrades to buildings with no initial cost to the owner. Improvements are financed and then paid for with the resulting energy savings. Businesses that develop, install, and arrange financing for these types of projects are known as energy service companies. Energy service companies act as project developers for a wide range of tasks and assume the risks associated with the project. Their services fees are bundled into the project cost and are repaid through the savings generated by the project.

## **Power Purchase Agreements**

A power purchase agreement is a contract between an electricity generator and a power purchaser. The power purchaser agrees to pay a set rate for electricity for the life of the contract, which then enables the power generator to secure financing for construction of power generating capacity.

Through power purchase agreements, businesses, schools and governments can finance non-utility-owned electricity generating facilities that tap renewable resources and reduce greenhouse gas emissions.

## Grants

### **Colorado Governor's Energy Office**

The Colorado Governor's Energy Office, using American Reinvestment and Recovery Act monies, is providing grant funding for energy efficiency, energy conservation and renewable energy projects. The list of available grants changes monthly.

### **U.S. Department of Agriculture**

The U.S. Department of Agriculture is providing grant funding to agricultural producers and small rural business owners interested in improving their energy efficiency or investing in renewable resource technology. Part of the Farm Security and Rural Investment Act of 2002, the grants are available to businesses in population centers of 50,000 or less and to farmers and ranchers.

The department's Renewable Energy for America Program provides loan guarantees and grants for renewable energy systems, energy efficiency improvements, feasibility studies and energy audits. The program is available to agricultural producers and rural small businesses.

### **Property-assessed Clean Energy Financing**

Legislation passed in 2008 (HB 1350) permits local governments to issue bonds to create a fund for loans to finance private renewable energy systems and energy efficiency installations. The bill also authorizes creation of special improvement districts for the purpose of investing in renewable energy resources.

### **Additional Funding-related Legislation**

See appendix.



# Renewable Energy Resources

Chaffee County's renewable energy resources were identified through the development of thematic maps using existing solar, wind, geothermal and biomass data from the the U.S. Department of Energy's National Renewable Energy Laboratory in Golden.

The Chaffee County Renewable Energy Plan Geographic Information System (GIS) is comprised of 35 background information layers and 13 renewable energy layers depicting the county's energy potential and inventory. Four of the 13 renewable energy mapping layers represent potential energy sources: solar, wind, geothermal and biomass.



## *Large Hydropower in the Upper Arkansas Valley*

*Water is diverted from the West Slope's Fryingpan River Basin. A series of interconnected tunnels and small diversion dams, all at elevations above 10,000 feet (3,000 m), collect snowmelt and run it, via gravity, to the Charles H. Boustead Tunnel. The Boustead runs water underneath the Continental Divide 5.5 miles (9 km) before discharging it into Turquoise Reservoir just west of Leadville. Water then leaves Turquoise Reservoir via the Mt. Elbert Conduit, which runs nearly 11 miles (18 km) to the Mt. Elbert Forebay. Water is stored in the Forebay to build up "head" or energy before being dropped down over half a mile (1 km) in elevation to the Mt. Elbert Power Plant.*

*The power plant takes its name from Mt. Elbert, Colorado's tallest peak, and sits at its base. The two-unit facility is the largest federally owned and operated hydroelectrical power plant in the state of Colorado. It has a capacity of 200 megawatts and a maximum generating head of 477 feet (145 m). During nighttime hours, when power rates are less expensive, the reversible pump-back units take water from Twin Lakes – water already used at least once by the units to generate electricity – back up to the Forebay so it can be used again for even more power generation.*

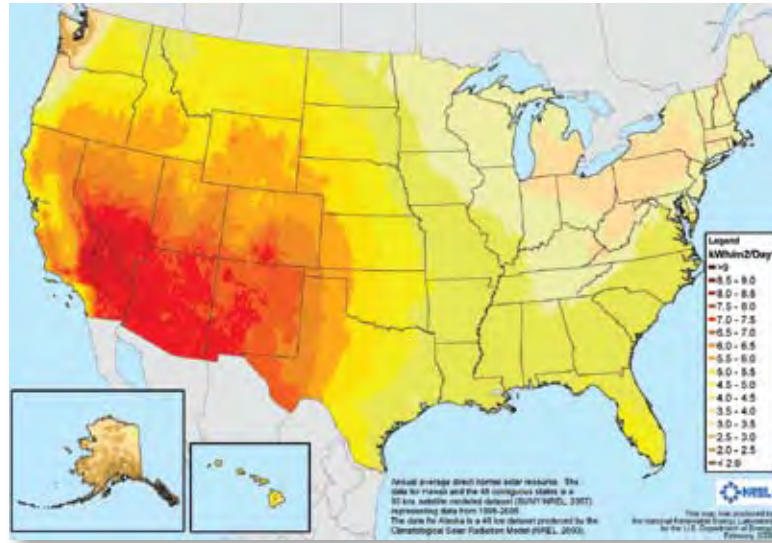
*The Western Area Power Administration markets the power generated at the plant.*

# Solar

As indicated by the solar resource map, most of Chaffee County receives very good ratings for solar resource development, especially the eastern portion of the county.

## Concentrating Solar Resource: Direct Normal

Annual

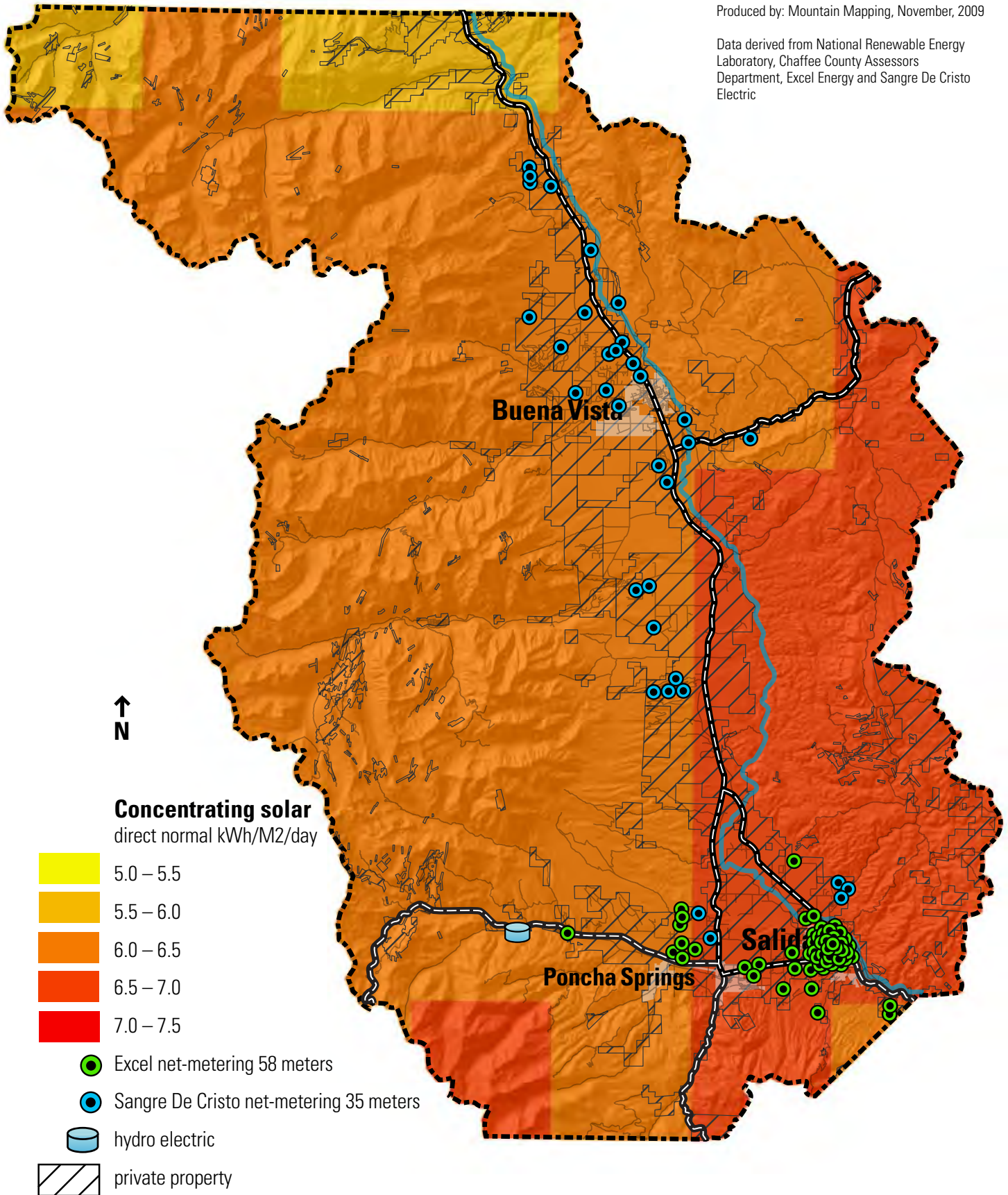


Map produced by the National Renewable Energy Laboratory for the U.S. Department of Energy February 2009.



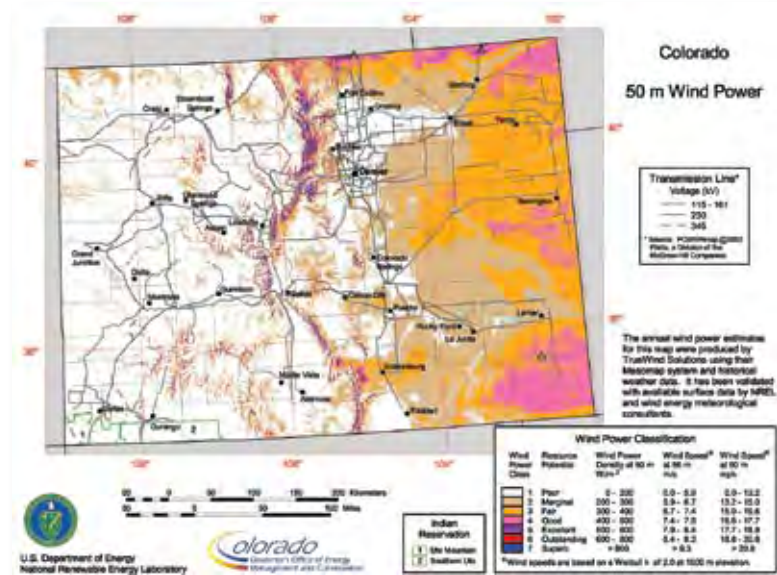
Produced by: Mountain Mapping, November, 2009

Data derived from National Renewable Energy Laboratory, Chaffee County Assessors Department, Excel Energy and Sangre De Cristo Electric

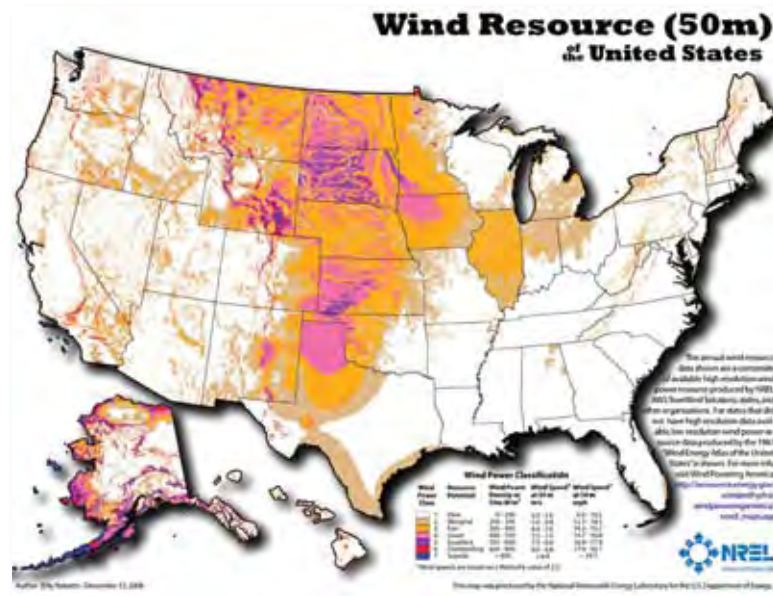


# Wind

As indicated on the wind resource map, most of the land in Chaffee County is rated as “marginal” for wind power generation. The notable exceptions are associated with the high mountain ranges, particularly along the Continental Divide. Virtually all of this land is owned by the federal government and is either off limits or not feasible for wind energy development. One noteworthy possibility for wind development is the Monarch Pass area.



Map produced by the National Renewable Energy Laboratory for the Colorado Governor's Office of Energy Management and Conservation.

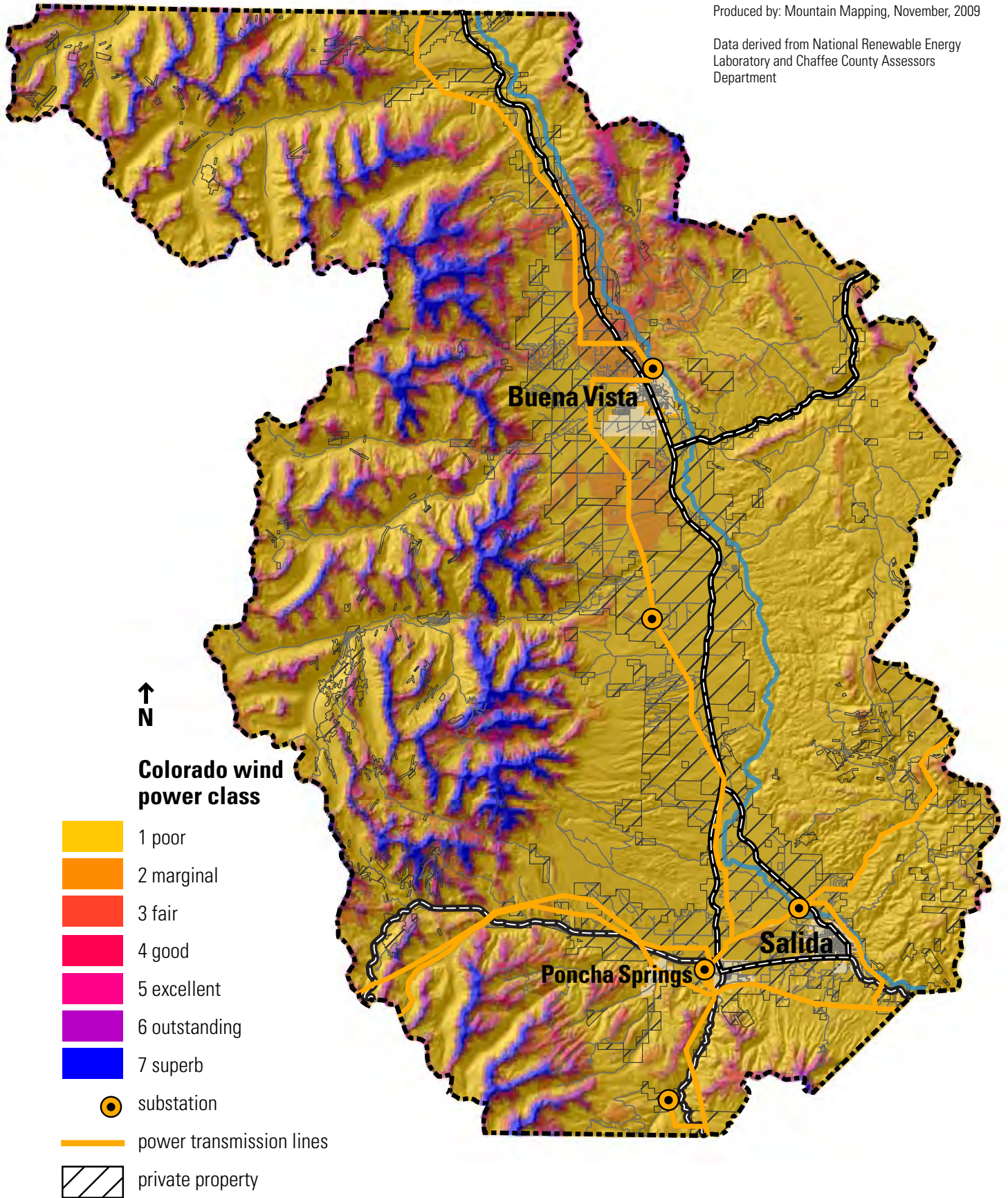


Map produced by the National Renewable Energy Laboratory.



Produced by: Mountain Mapping, November, 2009

Data derived from National Renewable Energy Laboratory and Chaffee County Assessors Department

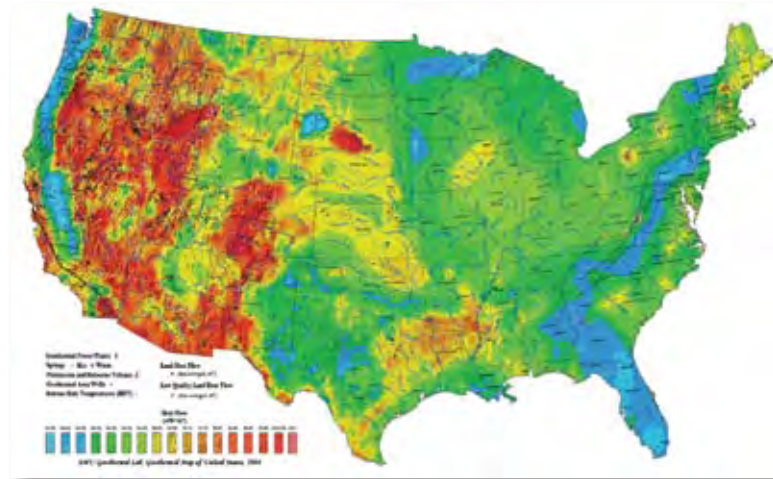


# Geothermal

The geothermal resource map shows hot springs temperatures and flow rates at three principal hot springs locations in Chaffee County (Colorado Geological Survey Open File Report 95-1).

More detailed and up-to-date information was presented by Matthew Sares at the Chaffee County Sustainability Summit in October 2009. A copy of his report is available online at [www.chaffeecounty-energyplan.com/sustainability-summit](http://www.chaffeecounty-energyplan.com/sustainability-summit).

## Geothermal Heat Flow in the U.S.

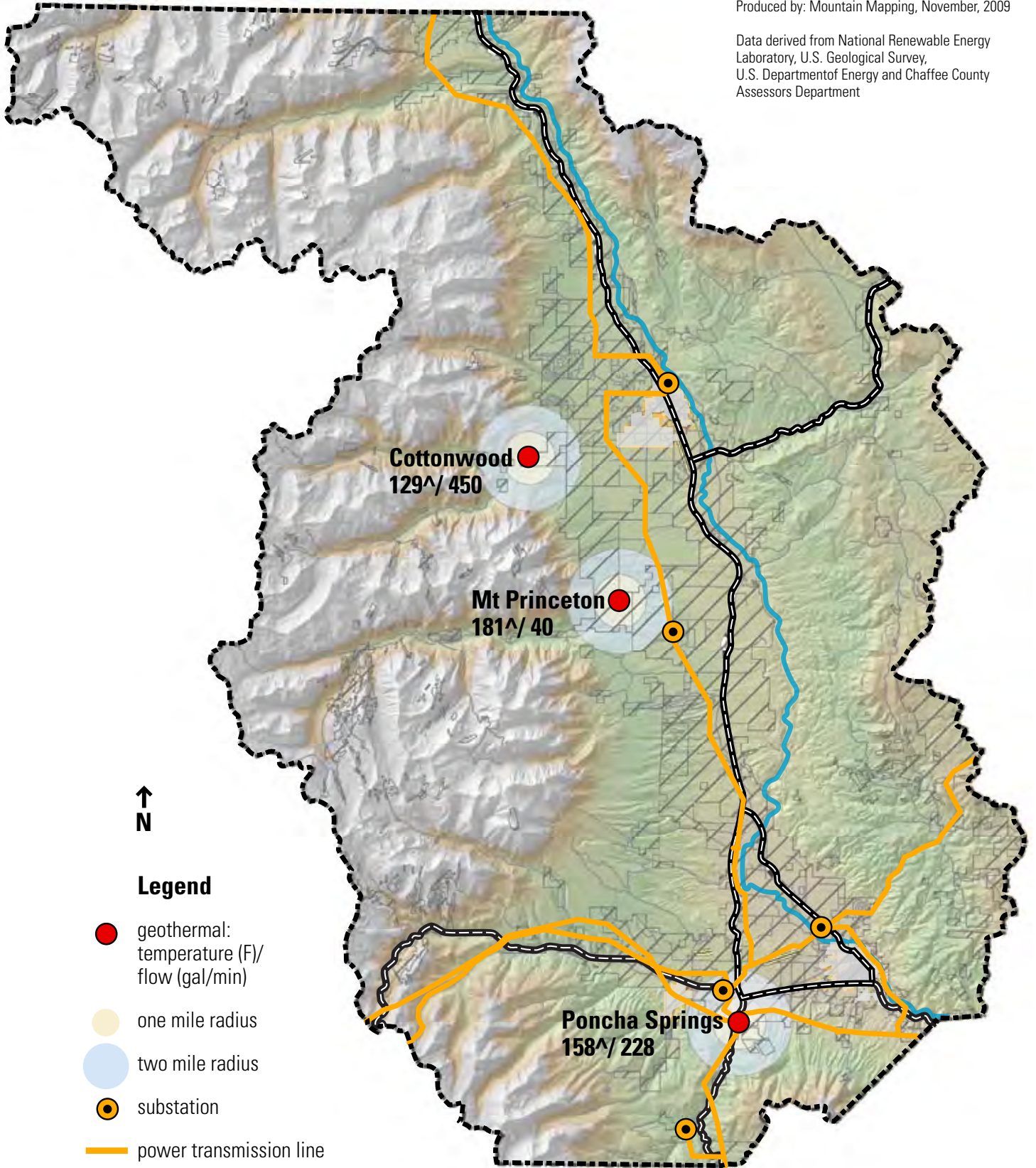


Map produced by the SMU Geothermal Lab.



Produced by: Mountain Mapping, November, 2009

Data derived from National Renewable Energy Laboratory, U.S. Geological Survey, U.S. Department of Energy and Chaffee County Assessors Department

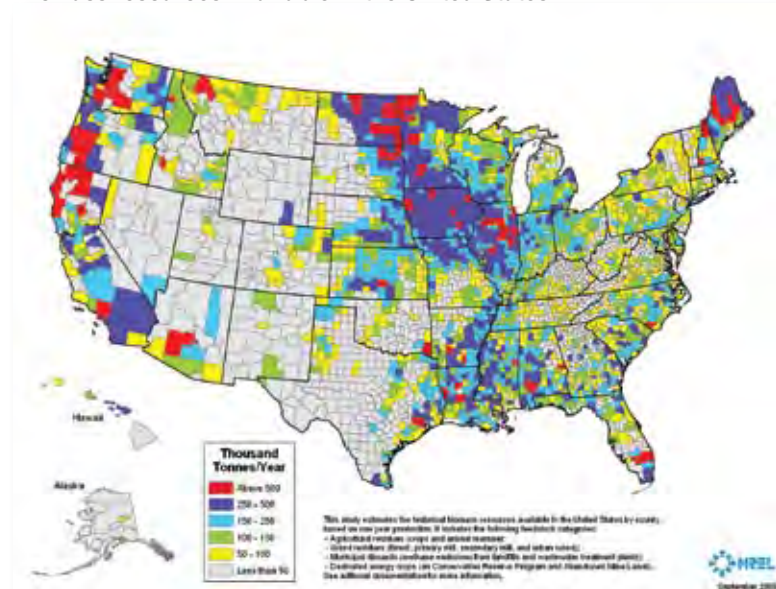


# Biomass

The biomass map indicates a good potential energy source based on available biomass feedstocks. Feedstock resources include:

- . **Agricultural residues** (crop and animal manure),
- . **Wood residues** (forest, primary mill, secondary mill and urban wood),
- . **Municipal discards** (methane emissions from landfills and wastewater treatment plants), and
- . **Dedicated energy crops** (on Conservation Reserve Program and Abandoned Mine lands).

## Biomass resources Available in the United States

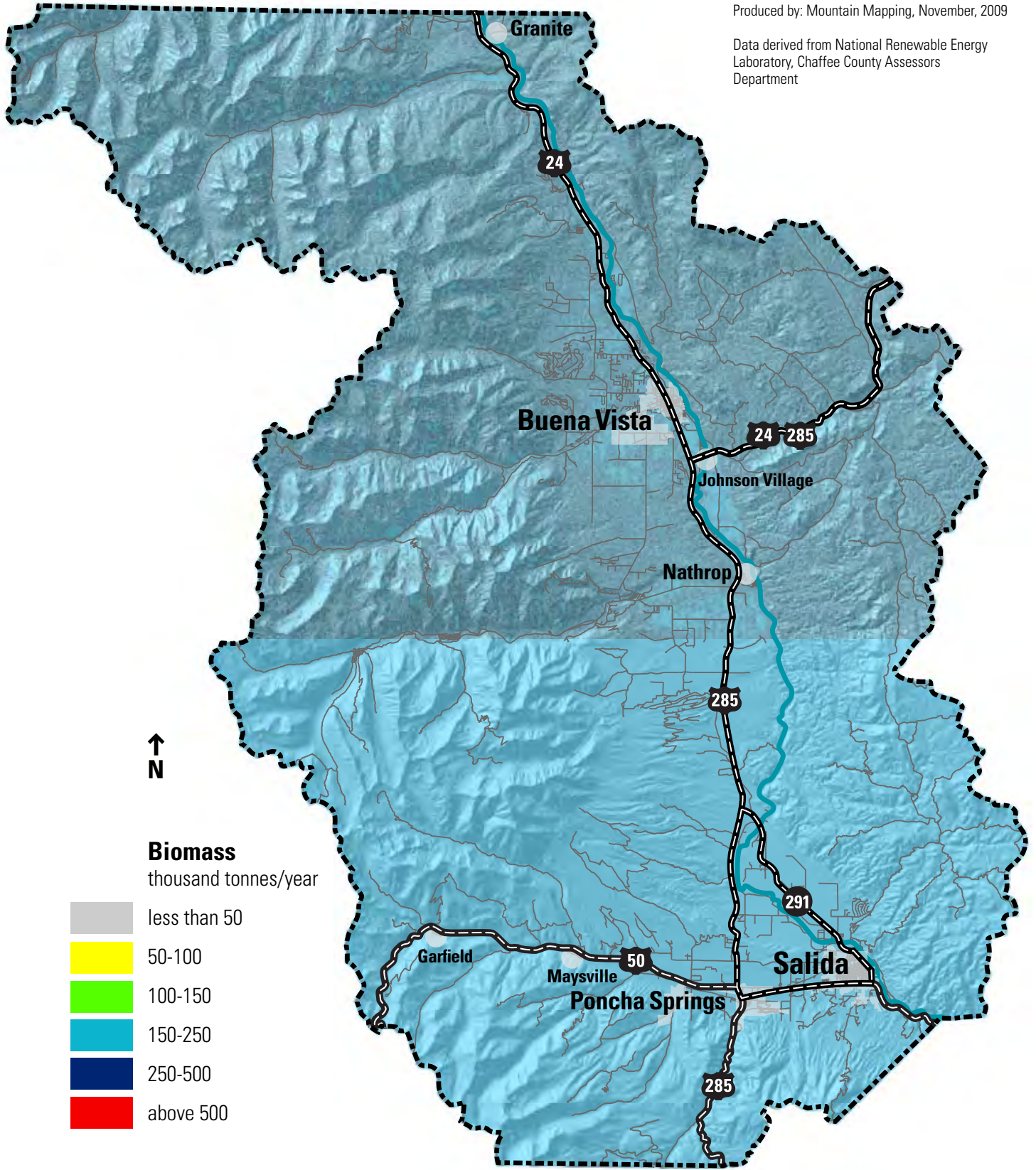


Map produced by the National Renewable Energy Laboratory September 2005.



Produced by: Mountain Mapping, November, 2009

Data derived from National Renewable Energy Laboratory, Chaffee County Assessors Department



# Inventory

## Additional Resources

The remaining ten of the 13 renewable energy mapping layers were compiled by Mountain Mapping from local sources and local knowledge or extrapolated from existing Chaffee County mapping layers.

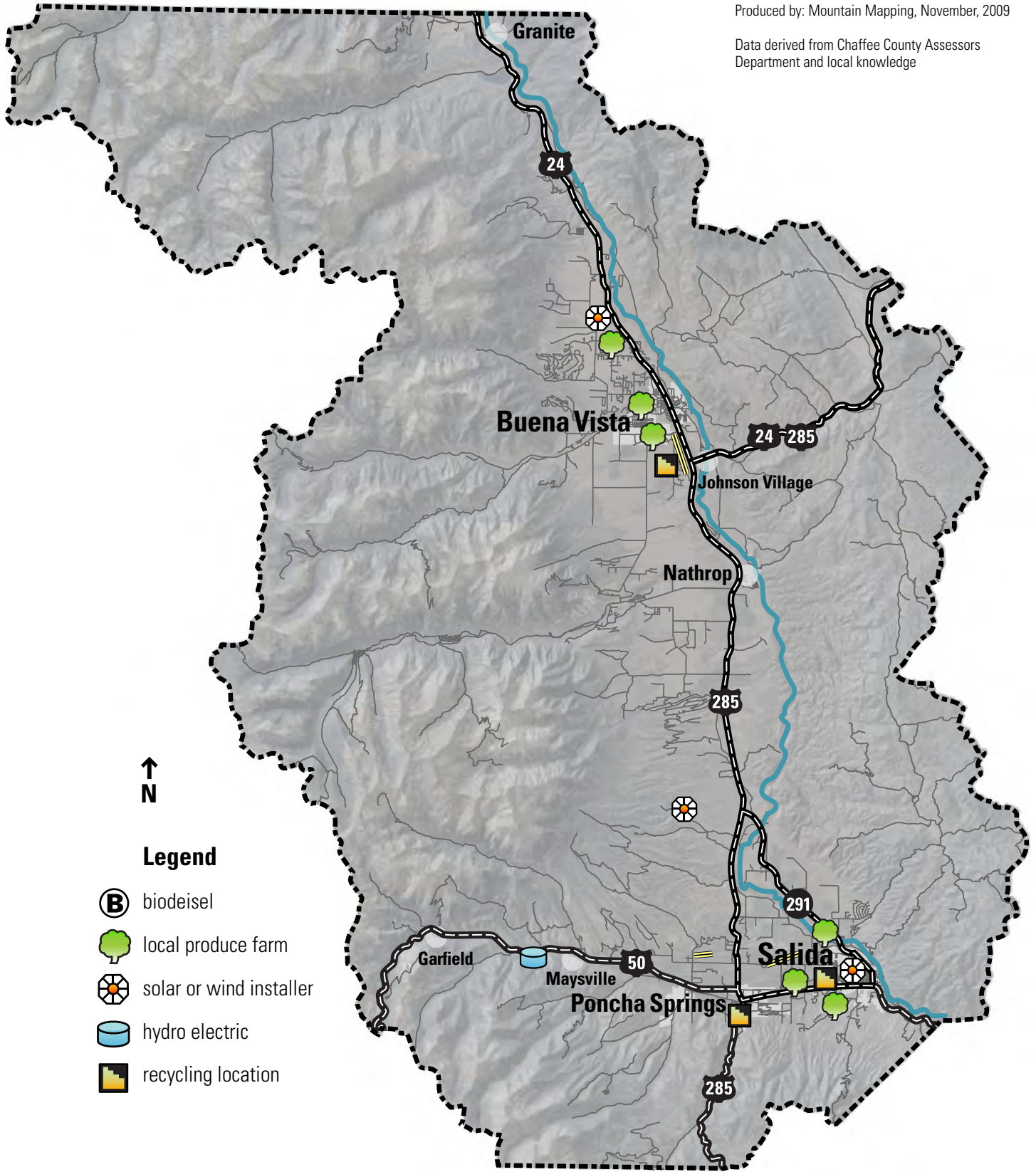
- . Bio-diesel locations
- . Local Produce Farms
- . Solar or Wind Installers
- . Excel cogen (combining heat and power) meters
- . Sangre De Cristo cogen (combining heat and power) Meters
- . Hydro Electric Locations
- . Recycling Locations
- . Local Government owned lands
- . One-mile radius from geothermal source
- . Two-mile radius from geothermal source

## Small Hydroelectric

While potential hydroelectric resources were not included in GIS mapping, the GEO is currently funding feasibility studies for small hydroelectric power generation. Chaffee County's mountain streams, Arkansas River locations, agricultural irrigation and municipal water supply systems offer potential sites for small-scale electrical power generation, and potential sites should be identified for study while funding is available through the GEO.

Produced by: Mountain Mapping, November, 2009

Data derived from Chaffee County Assessors Department and local knowledge



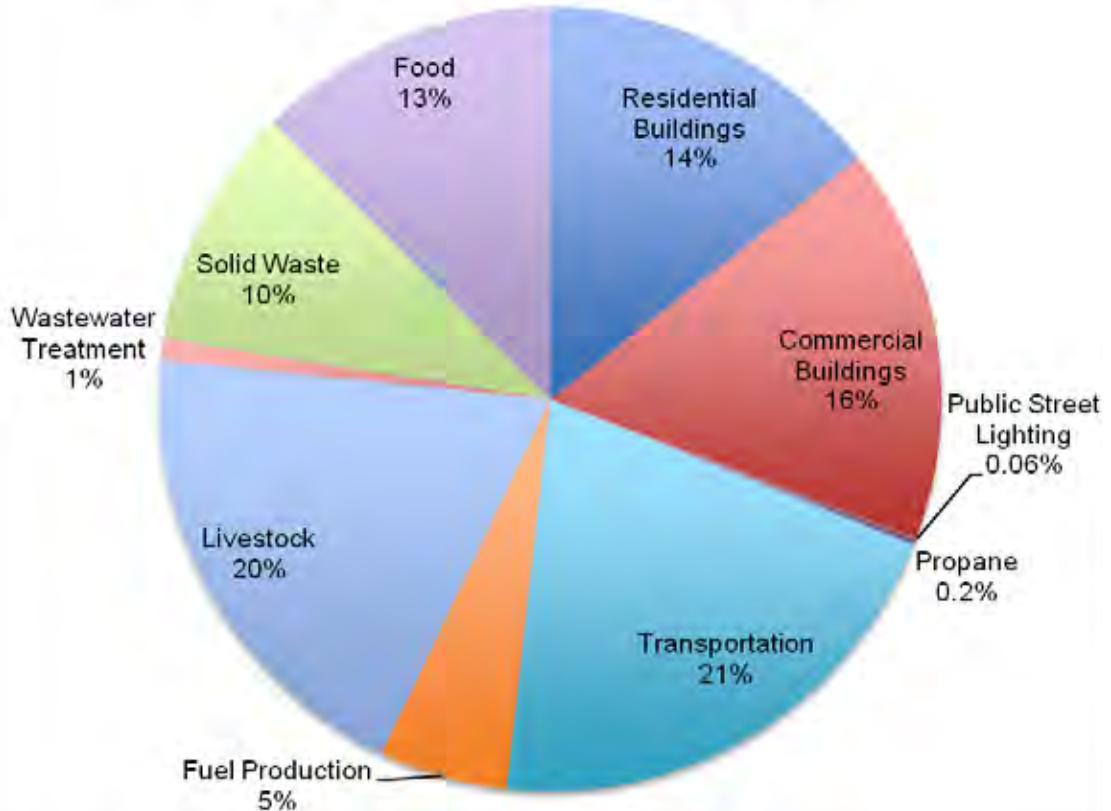


# Energy Use Analysis

Using existing data sources, the University of Colorado Denver program in Sustainable Urban Infrastructure conducted an energy use analysis to provide a greenhouse gas inventory and report using advanced methodologies that have already been applied by the university to other communities consistent with World Resources Institute and Environmental Protection Agency Climate Leaders Program.

The greenhouse gas inventory puts Chaffee County emissions for 2007 at 453,139 metric tons (999 million pounds) carbon dioxide equivalent. The pie chart below illustrates the percentage of greenhouse gas emissions attributable to each sector.

## 2007 Chaffee County Greenhouse Gas Emissions Total: 453,139 mt-CO<sub>2</sub>e



## Chaffee County/Denver Benchmark Comparison

	Chaffee County 2007	Denver 2007
<b>Residential Buildings</b>	665 kWh/hh/mo 44.5 therms/hh/mo	528 kWh/hh/mo 65 therms/hh/mo
<b>Commercial Buildings</b>	137 kBtu/s.f.	179 kBtu/s.f.
<b>Transportation</b>	598 gal/person/year	638 gal/person/year
<b>Food Purchases</b>	\$3,091/household	\$3,000/household
<b>Livestock</b>	5.3 mt-CO <sub>2</sub> e/person	0 mt-CO <sub>2</sub> e/person

The information will be used as a benchmark for future comparisons, and efforts should be made to improve energy use and emissions data to enhance the accuracy of future greenhouse gas inventories.

For example, propane usage is under-represented in the existing inventory due to lack of consumption data. Performing traffic counts at county boundaries could improve future inventories by providing data to distinguish between local and non-local traffic. Also, information on locally produced food would lower the calculated emissions from food distribution.

# Community Input



*In the early days of Buena Vista, the smelter located in the site of the ball fields would dump slag into the river. This created a dam, which became the head for the turbine. There was a diesel backup. To start the diesel, a half stick of dynamite was used to get the wheel turning.*

*Art Judd was the manager of the power plant. Joe Cogan would take his 6-volt battery up to the power plant and Art Judd would charge it for free. Joe used the battery to power his radio.*

*Today, Joe Cogan's house works off a high-head water turbine that has been in operation since 1919. The initial output was 3 kilowatts, today it is 11 kilowatts and drops to 5 kilowatts during irrigation.*



An important component of the planning process was to gather citizen input on the direction Chaffee County and local municipalities should take in regards to renewable energy development and conservation efforts. Citizens were encouraged to take part in local meetings and post comments and ideas to the Web site [www.chaffeecounty-energyplan.com](http://www.chaffeecounty-energyplan.com).

## Sustainability Summit October 15, 2009

The Chaffee County Sustainability Summit featured the 57-participant South Central Region Sustainability Roundtable in Salida.

### Roundtable Participants

Fifty-seven local community leaders participated in the 3.5-hour workshop on October 15 and included representatives from business, non-profit, government and academic sectors.

State and local government officials included State Sen. Gail Schwartz; county commissioners for Gunnison and Chaffee counties; representatives from the Governor's Energy Office; the U.S. Department of Agriculture, Colorado Geologic Survey, Chaffee County, City of Salida, Town of Buena Vista and Town of Poncha Springs.

Education representatives attended from Salida School District, CSU Chaffee County Extension, Western State College Small Business Center and Colorado Mountain College, Lake and Chaffee County campuses.

Prominent local nonprofit organizations included groups focused on food co-ops and local food production, fundraising consulting, peak oil, climate change, safeguarding local watersheds, cultural heritage preservation, conservation training, community projects, citizen advocacy, natural ecosystem protection and business finance assistance.

Local business representatives from Xcel Energy, Atmos Gas, Mount Princeton Geothermal and Sangre de Cristo Electric Association participated. Other businesses offering management and communication facilitation, project financing for green technologies, solar/wind products and installations, green events, algae growth systems, cartography services, web design and consulting, outdoor gear, energy consulting and custom-design construction were well-represented.

Individuals representing the local publications The Mountain Mail and Colorado Central magazine also participated.

### Sustainability Discussion Excerpts

*Question 1: What local sustainability efforts are in place and working?*

#### Energy

##### *Solar:*

Design and installation industry growing because of 30% tax credit and Xcel rebates. Several local businesses such as EcoDepot USA, Peak Solar Designs and Colorado Solar Energy offer solar products and services.

##### *Wind:*

The Sangre de Cristo Electric Association Wind Program provides customers with 100kWh blocks of wind power for a small monthly surcharge. Xcel's Windsource Program offers customers a chance to purchase 100kWh blocks or a 100% Windsource, which assures that all power needs comes from wind-generated sources.

##### *Natural Gas:*

A large part of Colorado's natural resources and economic development. Natural gas appliances can be highly efficient (e.g., top-of-the line furnace >90%, tankless heaters that only heat water as needed).



*Energy efficiency programs and retrofits:*

The Chaffee County Energy Star Program offers federal tax credits and state rebates for new home-builders. Through this program, certified homes within the Sangre de Cristo service territory may qualify for a \$300 rebate. If your home is within Xcel's gas territory, there are rebates for ENERGY STAR homes that vary between \$400-\$800 per home.

*Gunnison Valley Office of Resource Efficiency and Energy Action Planning:*

Energy plans are being adopted by the City of Gunnison, Gunnison County and the Town of Crested Butte that create an inventory of all emissions coming from buildings, transportation, etc.; reduce emissions from these sectors and produce jobs; implement programs focused on energy audits and weatherization for residential and commercial buildings; adopting more efficient building codes; and pursuing renewable energy pilot projects.

**Local Food and Community-supported Agriculture***Salida and Buena Vista Farmer's Markets:*

Salida's market, for example, has been in operation for 3 years and is well attended.

*Central Colorado Food Shed Alliance:*

Formed in 2007 to unite local producers with consumers and educate consumers about the value of getting food from their own foodshed (raw milk; goat cheese, dairy and meat; local beef; Community Supported Agriculture (CSA) projects).

*Guidestone:*

A nonprofit organization that grows farmers through educational programs, connects people to the land, and brings buyers and producers of local goods together by supporting, promoting and/or offering opportunities such as CSAs, product distribution centers, farmers markets, and events.

*Backyard CSA:*

A group of gardeners who formed a CSA project to use homeowner's yards and other unused spaces in Salida to produce vegetables, flowers, and other value-added projects. Produce is marketed through CSA shares, the Salida and Buena Vista farmers markets, local natural food stores, and restaurants.

*Jumping Good Goat Dairy:*

Family-owned goat dairy providing quality cheeses dedicated to sustainable agriculture and community development and education.

**Green Building***Salida Early Childhood Center:*

Silver LEED certification pending for new construction. Green features include passive solar and natural lighting, occupancy sensors, high-efficiency water heater with separate-temperature water shuttled to kitchen, all no-to-low VOC materials including linoleum, glues and paints.

*Historic Building Restoration:* Inventory of Downtown Salida historic buildings is being conducted that includes evaluating adaptive new-use possibilities and making buildings energy-efficient.

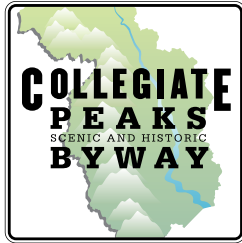
*City-County Community Services Complex:*

Old hospital in Salida. Energy audit revealed that energy efficient features could cut operating costs from \$250,000 to \$50,000 a year.

**Open Space and Historical Preservation***Land Trust of the Upper Arkansas:*

Advances the conservation and stewardship of agricultural lands, wildlife habitat, open space, scenic beauty and other diminishing natural and historical resources in Chaffee, Fremont and Lake counties. Established voluntary 1% tax program for conservation easements.





*Chaffee County Heritage Area Program:*

Seeks to preserve the heritage area of Chaffee County with a focus on natural landscapes, historic structures, and resource stewardship. Under this program, more than 2 acres of the working open space Hutchinson Homestead was donated to the Town of Poncha Springs for preservation as a Museum and Cultural Center.

*Buena Vista Heritage:*

Nonprofit organization created to preserve and share the history of BV and Chaffee County. Projects include restoration and operation of The Turner Farm, St. Elmo Schoolhouse and an ongoing restoration of the Denver-Leadville-Gunnison Depot.

*Collegiate Peaks Scenic Byway:*

This byway stretches 57 miles through the heart of three historic communities in Chaffee County: Buena Vista, Salida and Poncha Springs. Some of the unique natural and cultural heritage characteristics found in this area are high altitude ranching, commercially developed hot springs and the most commercially rafted Arkansas River.

### **Education**

*Colorado Mountain College:*

Looking at all campus facilities and selecting group to perform audits for retrofits in heating, doors and windows. New program that provides 3 Solar Industry certifications. Working with National Renewable Energy Lab (NREL) to integrate educational programs with workforce development.

*Western State College (WSC):*

Several student environmental groups merged to become the Sustainability Coalition in an effort to become a real force in student government. This action led to the WSC President signing the University Climate Commitment Pledge and several green building efforts: three campus buildings (Business, Kelly Hall and the 2010-slated Student Center) have attained or applied for LEED Silver or Gold status.

### **Recycling**

*Angel of Shavano Recycling:*

has comprehensive recycling capability, including plastics 1-7, with multiple drop-off locations throughout Chaffee County. Provide commercial pick-up since 2007 and volunteer for many community activities and events upon request.

### **Business and Green Jobs**

*Southwest Conservation Corps (SCC):*

Veterans Green Jobs (VGJ) has combined efforts with the SCC to create Veterans Green Corps (VGC), which provides training and employment in a variety of green jobs including environmental conservation, habitat restoration and forestry, as well as residential energy conservation and weatherization.

*Project 350:*

The largest "Shop Local" campaign in the history of this area. A free card offers shoppers discounts at local participating businesses across Chaffee, Fremont and Custer counties.

### **Transportation**

*Salida and Buena Vista are both pedestrian- and bicycle-friendly:*

A trail along County Road 120 is almost complete and will link Poncha Springs and Salida. Over 300 miles of biking, hiking and off-road recreational trails exist in Chaffee County.

*Chaffee Citizens for Sustainability:*

Created in opposition to Nestlé Waters North America's plan to bottle water from springs near Nathrop. The organization's focus is to support programs that ensure long-term community viability and well-being.

*Question 2: Which opportunities are ripe for development? Of all the opportunities presented, which ones are the most important?*

### **Education**

#### *Sustainability Model School and BEST Grant:*

Colorado Department of Education's BEST Grant supports improvements in quality school facilities throughout the state. Salida School District R-32-J is currently preparing to resubmit the application and has a community-based facility planning committee that is working on the design elements of the revised proposal. The proposal includes the construction of a new high school and a new elementary school, with plans to retrofit the current middle school using geothermal exchange technology. All new structures will meet or exceed LEED requirements. The plan allows for the potential of having at least one net zero campus and the others be as energy efficient as possible.

*Public School Curriculum:* There is a need to develop and implement strong core sustainability curriculum in K-12 to establish a 'culture' of sustainability early on.

#### *Citizenry Education:*

A handbook/pamphlet for residents could offer guidance on weatherization, energy efficiencies, other conservation practices and local resources.

### **Energy**

#### *Geothermal Plant:*

The Mount Princeton Geothermal Energy Project would produce the first geothermal electricity in Colorado utilizing an air-cooled 10MW plant. It would be the first Colorado geothermal plant to provide up to 85% load for Sangre de Cristo Rural Electric Association (REA) in three counties. The co-op can be served through an existing transmission infrastructure. The project is entering its third phase development: deep reservoir drilling to test necessary sustainable flow. This phase requires additional funding to match potential DOE funds. The proposed plant and production infrastructure have low maintenance costs, no storage requirement, and will produce baseline 24/7 renewable energy without damages to water tables, pollution or surface heat. There are also geothermal prospects for city-owned land in Poncha Springs.

#### *Algae research, BioVantage Resources:*

Develops flexible growth systems for algae, for use by a broad range of industries serving the production of clean water, food and fuel. Working with local authorities (including Incite Consulting) to establish a "pilot" facility in Salida to validate the functional output of the algae growth system. The pilot facility would produce algae for local livestock feed use and after a period for validation, would likely be expanded to produce algae for a mix of uses.

#### *Micro Hydropower:*

Energy can be harvested from small streams, canals, or irrigation ditches. It only takes a small amount of flow (as little as two gallons per minute) or a drop as low as two feet to generate electricity and can be delivered as far as a mile away to the location where it is being used. Commonly used on local ranches.

#### *Hydroponics/Aquaculture:*

This has been sufficiently tested at a local level. Funding is needed to expand its application. Hydroponic greenhouses could be located in backyards to allow easy and year-round food production.

#### *Wind Turbine for Ski Resort and Monarch Pass:*

Some studies show that wind conditions at Monarch Pass (~18mph) are optimal for wind-generated power to supply Monarch Ski Resort. Installation would include a community-sized Northwind 100 Turbine and could produce 110kW or 195,000kWh/yr.

#### *Solar:*

There is potential and interest to develop a medium to large scale Solar PV system at the local prison.

*Woody biomass:*

At Western State College in Gunnison, a \$21 million renovation project for Taylor Hall now includes plans to utilize a boiler system that relies on woody biomass for fuel, and grant funding is being pursued to help create the local infrastructure necessary to supply the product. In Chaffee County, 80% is public lands and the Bureau of Land Management (BLM) could provide a sustainable supply of wood. The Forest Service would potentially support the cull of standing dead wood to sell for pellets.

**Sustainable Local Food***The Guidestone Land-Link Initiative:*

This will potentially serve as a statewide pilot project to connect retiring farmers and non-farming landowners with next generation farmers who desire to work the land, produce food, and otherwise participate in a local food economy. The program will create a database that provides solutions to the challenges of access to farmland, security of tenure, long-term affordability and stewardship of the resources.

**Green Building and Development***Encourage and incentivize developers*

to create "Cluster" development, which keeps open spaces. Rather than mandate solar, education should be used to encourage solar installations at the front end of development.

*Educate owners*

about building codes and energy efficient options (but has to be competitive with their price). For new owners and builders, provide a "Homeowner's Guide" that provides green building technologies, weatherization practices, information on how and what to recycle, list of local solar providers, Energy Star Incentives, and general education like turning off appliances, buy local, etc.

*For ENERGY STAR-rated houses,*

provide a refund on building permits and both federal and state tax credits.

*The final 2008 Buena Vista Citizen's Roundtable conclusions*

resulted in a vision document for updating the Chaffee County Land Use Code. Included were recommendations for mixed-use development and clustered subdivisions to achieve more open space protection. For transportation projects, particularly redevelopment of the Highway 50 and 24 corridor, a holistic approach needs to be taken that involves plans for bike, pedestrian and transit-friendly options. The plan now needs to be made operational through code changes and policy implementation.

**Transportation***Union Pacific Railroad Track:*

Use abandoned Union Pacific Railroad Track as commuter rail from Leadville to Cañon City and/or a proposed "Rail-n-Raft" project that could transport the proposed 380,000 visitors down the canyon during the Over the River art installation.

*Complete pathway*

along County Road 120 between water treatment plant and Fairgrounds for commuting.

*Transition Salida:*

Community-driven movement to address the challenges and opportunities of peak oil, climate change and economic stability through strengthening more locally-based and sustainable energy and food systems. Future plans include an inventory of community awareness, determining key areas of quality of life, and developing an Energy Descent Action Plan.



*Question 3: What are the next steps needed to improve collaboration locally and statewide?*

*Advance education* on energy conservation and renewables not just at schools, but to the public. Types of information needed are the costs and benefits of actions, incentives and rebates, and advantages to the individual.

*Create a website* that links to all local resources on renewable energy projects and efforts (public, private, municipal, academic...).

*Share resources and experience* to avoid duplication of efforts. Create a "Clearinghouse" to share best practices and information.

*Establish common messaging* – break out into municipalities to discuss, sort and brainstorm priorities and projects and then come back together to focus as a group.

*Identify leadership* – offer a paid position at the County level to a person who can focus efforts, create collaborations, inventory projects and disseminate information.

*Be proactive on legislation* –develop an energy plan, work with elected officials to move policies forward. Meet 2020 goal of getting 10% of energy to come from renewable sources.

*State is conducting a Broadband Connectivity Inventory* to determine how more rural areas can stay "connected" and up to date on information.



# Attachments





The development of **energy***now* strategies included a review of existing county and municipal plans.

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## Chaffee County

The following Chaffee County plans and resolutions were considered during the development of **energy***now* strategies.

### **Comprehensive Plan**

Adopted in March 2000, the Comprehensive Plan for Chaffee County makes no mention of energy efficiency, energy conservation or renewable energy.

### **Building Codes**

Chaffee County Ordinance No. 2007-01 included adoption of the *2006 International Energy Conservation Code*.

### **Community Assessment**

Adopted in 2006, the *Chaffee County Community Assessment* makes no mention of energy efficiency, energy conservation or renewable energy.

### **Community Action Plan**

Adopted in 2006, the *Chaffee County Community Action Plan* makes no mention of energy efficiency, energy conservation or renewable energy.

### **Community Wildfire Protection Plan**

Adopted in 2009, the *Chaffee County Community Wildfire Protection Plan* endorsed efforts to reduce the fuel load in forested areas in Chaffee County.

The need to reduce fuel load offers an opportunity to provide feedstock for a woody biomass energy project while mitigating wildfire risks. Pine and ips beetle infestations have devastated forests in Grand and Summit counties and continue to spread southward. The beetles' arrival in Chaffee County will exacerbate the existing wildfire dangers and could provide abundant biomass feedstock.

### **Economic Development Profile**

The 2009 Chaffee County Economic Development Profile makes no mention of energy efficiency, energy conservation or renewable energy.

### **Roundtable Resolution No. 2008-69**

"Whereas, the Roundtable unanimously concluded, and the BoCC finds that the County's agricultural lands and water resources are critical to economic, historic, cultural, environmental, and aesthetic standing of Chaffee County. The Roundtable Recommendations provide a framework for protecting and enhancing the viability of such lands and resources, without diminishing private property rights, and adoption of such Recommendations is essential to the public health, safety and welfare of the citizens of Chaffee County."

"Recommendation 7— Resource Standards" ensure Chaffee County's unique natural and cultural resources are sustained for future generations.

"Recommendation 8— Transportation" encourages long-range multi-modal transportation planning to meet the needs of anticipated growth.

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## Buena Vista

The following Town of Buena Vista plans and resolutions were considered during the development of **energy***now* strategies.

### **Municipal Code**

Adopted in 1992 and revised October 23, 2008, the *Town of Buena Vista Municipal Code* includes the 2006 *International Energy Conservation Code*, chapters one through six (Sec. 18-101).

### **Comprehensive Plan**

Developed in 2008, the *Town of Buena Vista Comprehensive Plan* establishes a goal of promoting and pursuing “sustainable development standards in new and redevelopment projects” (Chapter 9, Goal 5.E).

Furthermore, “Buena Vista will promote development that incorporates principles of sustainable design to reduce both energy and resource consumption including but not limited to: minimizing energy and water use; promoting renewable energy sources and locally-produced materials; minimizing the use of pesticides, herbicides and other toxic chemicals; utilize sustainable design standard such as ‘BuiltGreen Colorado’ and the U.S. Department of Energy’s ‘Building American’ program (Policy 5.E.1).

Chapter 10, Goal 6.D states, “Buena Vista will operate, maintain and develop its parks, open space and recreation system in such a manner as to minimize adverse local and regional environmental impacts. The corresponding policy statement (6.D.1) reads, “Buena Vista should use green building materials, renewable energy sources, native plant species and energy efficient operations whenever feasible with park and trail development.”

## Poncha Springs

The following Town of Poncha Springs plans and resolutions were considered during the development of **energy***now* strategies.

### **Comprehensive Plan**

Adopted September 21, 1998, the *Town of Poncha Springs Comprehensive Plan* supports collaborative efforts “to explore development of the Poncha Springs Hot Springs as a geothermal energy resource” (Policy ENR-5). The plan also calls for exploration of “joint improvements and use of the Poncha Springs Hot Springs water main” (Policy SI-21).

(Policy SI-27). The plan also endorses partnering with Chaffee County, the City of Salida, local property owners and Greater Outdoors Colorado to extend the regional trail from Salida to Poncha Springs.

### **Standard Design Criteria**

The *Town of Poncha Springs Standard Design Criteria*, updated in 2009, does not mention energy efficiency, energy conservation or renewable energy technology.

### **Land Use Code**

Adopted Sept. 28, 1998, and updated in 2009, the *Town of Poncha Springs Land Use Code* makes no reference to solar, geothermal, hydropower, energy efficiency, energy conservation, renewable energy or sustainability. However the code specifically allows “wind energy conversion systems and associated facilities.” The code establishes a 20-kilowatt capacity as the upper limit for “small” systems versus “large” systems.

The code also specifies, “Only high pressure sodium (HPS), low pressure sodium (LPS) or incandescent fixtures shall be permitted in commercial and multifamily residential parking areas.” This requirement should be changed to allow use of new energy-efficient LED outdoor lighting and to prohibit the use of inefficient incandescent lights.

### **Highway Corridor Plan**

The *Town of Poncha Springs Highway Corridor Plan* makes no mention of energy efficiency, energy conservation or renewable energy.

**Community Wildfire Protection Plan**

Adopted July 2009, the *Town of Poncha Springs Community Wildfire Protection Plan* identifies the need to remove dead wood, down trees and ladder fuel in order to reduce the wildfire risk. Use of the woody biomass from mitigation efforts would support the development of a countywide woody biomass to energy initiative.

**Action 22**

Action 22 is a volunteer-driven membership organization of individuals, cities, communities, counties, associations, businesses and organizations in a 22-county region, banding together for a stronger voice on statewide discussion tables, the State Legislature and in Washington, D.C. Action 22's mission is to give voice to Southern Colorado and serve as a leader for cohesive action to affect change and shape the future of Southern Colorado.

Action 22's energy committee mission is to "assess, advocate and act through the building of partnerships and/or coalitions to improve and develop energy systems that promote a strong Southern Colorado economy and a healthy environment" ([www.action22.org](http://www.action22.org)).

**Salida**

The following City of Salida plans and resolutions were considered during the development of **energy***now* strategies.

**Comprehensive Plan**

Adopted in 2000, the *City of Salida Comprehensive Plan* refers to a resolution in June 1996 in accordance with the *Colorado Water Conservation Act*, which committed the city to further consider requiring water-efficient fixtures and appliances. The plan contains no other mention of energy-related topics.

**Municipal Code**

The *City of Salida Municipal Code* includes Ordinance NO 06-2009 regarding a temporary sales tax exemption for solar power components purchased by net metering customers.

The municipal code's "Land Use Development Codes" (Chapter 16) protects "solar access" to protect "reasonably placed solar energy systems from shadow-blocking exposure to the sun during hours of high insolation."

Requirements for planned development districts include utilizing "design and technology to provide a significant increase in the efficiency with which energy, water, land and natural resources are utilized, recycled and conserved" (Section 16-4-80).

"Land Use Development Codes" establish outdoor illumination standards that "provide for safety, security and energy efficiency" (Section 16-7-10).

For solar design in new developments, the code also requires "a description of the steps that have been taken to protect and enhance the use of solar energy in the proposed subdivision" during the preliminary plat review. "This shall include how the streets and lots have been laid out and how the buildings will be sited to enhance solar energy usage" (Section 16-14-60).

The code's "Building Regulations" (Chapter 18) includes "Article XIII: Energy Conservation Code," which adopts chapters 1 through 6 of the *2006 International Energy Conservation Code*.

**Community Survey**

Completed in 2009, the City of Salida Community Survey gathered residents' opinions relative to energy efficiency, conservation and renewable energy.

Among respondents, 13.2 percent endorsed recreation and trails as the city's "main economic development focus" while 12.6 percent endorsed renewable energy.

When asked, "What are the 3 most important issues that will be facing the City of Salida in the next 5 years?" 42.6 percent indicated affordable housing, 19.8 percent listed water, 15 percent said renewable energy initiatives, and 9 percent chose local food production.

Given a hypothetical \$100 to budget towards city projects and services, the average of all responses created a budget that allocated \$17 for economic development, \$15 for affordable housing, \$10 for preserving lands for open space and \$9 for renewable energy projects.

Finally, respondents indicated a high level of engagement in environmentally conscious activities:

- . Recycling 85.9 percent
- . Buying local 85.9 percent
- . Improving home energy efficiency 69.1 percent
- . Reducing auto fuel use 64.6 percent
- . Backyard vegetable gardening 43.6 percent
- . Composting 35.1 percent

### **Historic Downtown Improvement and Economic Sustainability Plan**

Adopted in 2007, this plan does not mention anything relating to energy use or conservation.

### **Highway Corridor Improvement Plan**

Adopted in 2007, this plan does not mention anything relating to energy use or conservation.

### **Strategic Housing Plan**

Adopted May 2008, the *City of Salida Strategic Housing Plan* includes a measure promoting housing rehabilitation. "Many houses on the market in Salida most likely require substantial upgrades and repairs – expenses that households purchasing their first home have difficulty affording. The City should encourage and promote the UAACOG Housing Rehabilitation Program to address these issues and implement other measures to address the housing conditions of existing residential properties in Salida." The measure also promotes energy efficiency programs and development of a funding mechanism to support rehabilitation programs. "for low-moderate income owners" (Measure Four).

Under "Measure Eight: Encourage Energy Conservation and Green Building," the housing plan states: "Housing that is not energy efficient is not affordable because families are stressed to make high utility payments along with meeting other living obligations. The City of Salida promotes green building and energy conservation initiatives to address this escalating problem.

- a. Support the adoption of building codes in the County that support this goal.
- b. Require developers to have a reasonable percentage of their units meet one of the following green building/energy standards: Energy Star, Colorado Built Green, or LEED for homes.
- c. Consider starting a city-wide greening program to promote sustainable practices including energy conservation, green building, and education
- d. Develop a review system for City funded projects similar to the NEPA process for federally funded projects, to assure environmental impacts are considered.
- e. Support the development of a County Wide CLT that has a sustainability and community education mission (see Measure Eight) 09 City Survey."

### **Salida Recreation Plan**

Adopted in 2008, the *Salida Parks, Recreation and Open Space Master Plan* suggests in Chapter III, "The Salida Community and Identified Needs" that trends increasing in popularity are:

"Green design techniques and certifications such as Leadership in Energy and Environmental Design (LEED). A recent BCA survey indicated that 52% of the recreation-industry survey respondents indicated they were willing to pay more for green design knowing that it would significantly reduce or eliminate the negative impact of buildings on the environment and occupants."

## 2009 House Legislation

Building on the success of the last two years of New Energy Economy legislation, including the doubling of the state's renewable energy standard, the legislature and Governor Ritter continued to make Colorado a national and global leader in the New Energy Economy with the 2009 legislative session.

**1126 "Encourage Solar Thermal Installations"** (Hullinghorst/Schaffer) (PDF 32KB)

Allows local governments to provide the same incentives for solar thermal installations – the type of project that uses solar-heated water as an energy source - as exists for solar electric installations. This bill also adds a corresponding exemption from state sales and use tax for solar thermal, similar to what's in place for solar PV and wind.

**1149 "Solar Home Prewire"** (Merrifield/M. Carroll) (PDF 28KB)

Requires homebuilders to offer prospective homebuyers the option of having their home pre-wired for solar or having a system installed, making it easier to finance renewable energy by folding it into your home mortgage.

**1312 "K-12 School Loans"** (Kerr/Schwartz & Romer) (PDF 48KB)

Creates a loan program to help schools pay for renewable energy projects, as well as hybrid and electric buses, so that more education dollars can be in the classroom instead of on utility bills.

**1331 "Incentives for Efficient Motor Vehicles"** (Gagliardi/Boyd) (PDF 96KB)

Creates incentives through updated tax credits to buy fuel-efficient vehicles as well as convert vehicles to plug-in electric hybrids or compressed natural gas. The bill updates tax credits to exclude certain hybrid SUVs and other vehicles that don't meet a mile-per-gallon standard.

**1345 "Electric Utilities Integrate Transmission Infrastructure"** (Solano/Schwartz) (PDF 20KB)

Directs the public utilities commission (PUC) to study and report to the general assembly on the construction plans of owners and operators of electric transmission facilities in Colorado. The work will help guide how best to ensure new transmission projects can deliver power from renewable sources to the grid.

**1346 "Recovery & Reinvestment Finance Act Of 2009"** (T. Carroll/B. Shaffer) (PDF 24KB)

Compliments the American Recovery and Reinvestment Act (ARRA) and helps the Governor's Energy Office (GEO) with bonding. Allows the GEO to utilize state Treasurer's office to issue bonds for renewable energy projects.

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## 2009 Senate Legislation

**039 "Conserve Energy Tiered Rates Incentive"** (Schwartz/Curry) (PDF 20KB)

Authorizes cooperative electric associations to charge graduated rates for high-consuming customers as an incentive to encourage residential consumers to be more energy efficient. Also allows associations to establish a fund designed to reduce power demands by helping customers improve energy efficiency, energy conservation and weatherization, as well as install renewable energy.

**051 "Renewable Energy Finance Act"** (Carroll/Levy) (PDF 48KB)

Takes numerous steps to make solar energy systems more affordable for homeowners and improve market conditions for solar energy companies doing business in Colorado. The bill creates financing models that can help homes and businesses spread out the up-front costs of a system over several years, similar to purchasing and financing a car. The bill also provides treasury bonds to participating banks and lenders that will provide more financing options for solar installation.

**075 “Low-speed Electric Self-propelled Vehicles”** (Schwartz/Marostica) (PDF 36KB)

Takes numerous steps to make solar energy systems more affordable for homeowners and improve market conditions for solar energy companies doing business in Colorado. The bill creates financing models that can help homes and businesses spread out the up-front costs of a system over several years, similar to purchasing and financing a car. The bill also provides treasury bonds to participating banks and lenders that will provide more financing options for solar installation.

**092 “State Motor Vehicles Use Natural Gas”** (Kopp / Marostica) (PDF 20KB)

Requires a significant increase in the use of alternative fuels by state-owned motor vehicles, focusing particularly on compressed natural gas as an alternative fuel.

**098 “Tax Exempt Blended Diesel Products”** (Schwartz/Vigil) (PDF 16KB)

Simplifies the tax rebate structure to make blended biodiesel a more financially appealing alternative to traditional diesel.

**124 “Extend Ag Energy-Related Projects”** (Isgar/Roberts) (PDF 20KB)

Extends funding to the Colorado Agricultural Value-Added Development Board to promote agricultural renewable energy-related projects and research, such as those involving biofuels development or wind and solar energy.

**171 “New Energy Jobs Program”** (Schwartz/Todd and Vigil) (PDF 16KB)

Develops job training programs and helps companies train employees for participation in Colorado’s New Energy Economy.

**177 “New Solar Facility Property Tax Valuation”** (Schwartz/Vigil) (PDF 24KB)

Standardizes the method for property value assessment of solar energy facilities and wind energy facilities. This will mean longer-term economic benefit to the local community over the life of a large-scale solar system.

**297 “Expedite Federal Stimulus Act Projects”** (Sandoval/Judd) (PDF 28KB)

Allows the GEO to use Clean Energy Fund dollars for revolving loan programs, thus giving additional life to recovery dollars which can revolve back to the state for use in additional renewable energy and energy efficiency projects.

For information on the current year’s legislative session, visit the Colorado General Assembly web site.

# 2007 Chaffee County, Colorado Greenhouse Gas Inventory Report

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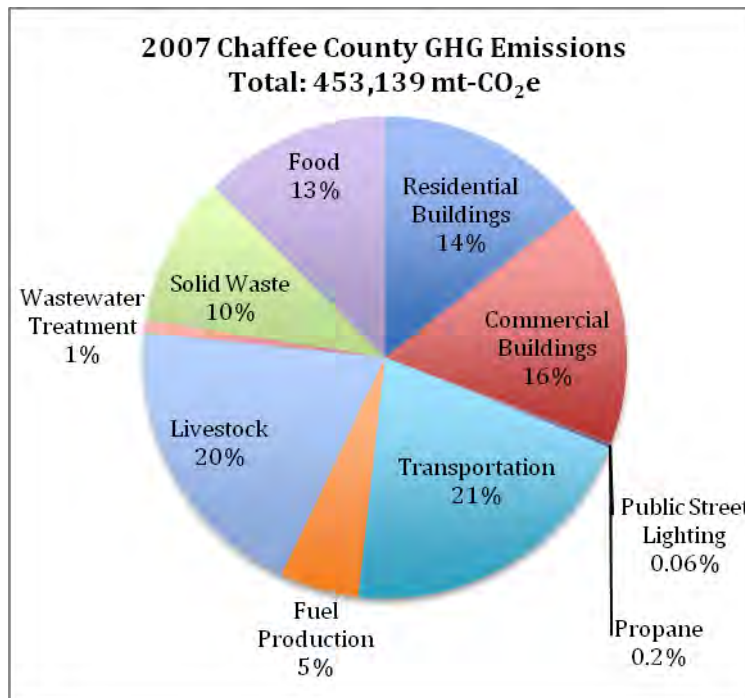
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## Executive Summary

As climate mitigation and adaptation move to the forefront of local and state policies, many local governments are beginning to assess their greenhouse gases (GHG) emissions. One tool for policymakers is a greenhouse gas inventory in which all of the emissions in an area are quantified by sector and source. Greenhouse gas inventories allow local governments to target specific sectors for emission reductions as well as to benchmark their emissions against similar areas, set quantifiable reduction goals, and measure progress.

Chaffee County is a rural area with significant agricultural activity, located in a mountainous region of central Colorado. This report uses a comprehensive inventory method based on Ramaswami et. al's demand-centered method,<sup>1</sup> incorporating elements from other accepted protocols, to develop a greenhouse gas emissions footprint for Chaffee County. Although the sources of the emissions are very different, this report finds that citizens of Chaffee County have similar per-capita greenhouse gas emissions to those of the nearest large city, Denver.



**Figure ES 1: Chaffee County 2007 GHG Emissions**

1: Ramaswami, A., T. Hillman, B. Janson, M. Reiner, and G. Thomas. "A Demand-Centered, Hybrid Life-Cycle Methodology for City-Scale Greenhouse Gas Inventories." *Environmental Science & Technology* 42 (September 2008): 6455-6461.

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## Greenhouse Gas Accounting

In recent years, increasing interest in sustainability and the protection of the global climate has led to an increased awareness of the impact of human activities on our environment. One such impact is the release of gases that have the potential to trap heat from the sun within the atmosphere, collectively dubbed “greenhouse gases” or GHGs. In sufficient quantities these chemicals have the potential to alter the Earth’s climate, so it has become a priority to substantially reduce GHG emissions caused by human activity. However, before we can take steps to reduce emissions of GHGs, it is necessary to understand their sources.

### Greenhouse Gases

The major greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and several industrial compounds called “chlorofluorocarbons.” Of these, the first three are the most important, are released in substantial quantities, and have the greatest impact on the planet, and will be considered in this report. CO<sub>2</sub> is produced primarily from burning fossil fuels and is the largest contributor to global warming. CH<sub>4</sub> is produced largely from waste decomposition (naturally or in landfills) and from fugitive emission in natural gas pipelines and wastewater treatment. Chlorofluorocarbons may be omitted unless significant production occurs in the region of interest. The different GHGs have different global warming potential (ability to trap heat in the atmosphere); their emissions are reported together on a common standardized basis as metric tons of carbon dioxide equivalent, or mt-CO<sub>2</sub>e. For example, one ton of methane can trap 21 times as much heat in the atmosphere as a ton of carbon dioxide.<sup>2</sup> Therefore 1 mt-CH<sub>4</sub> is equal to 21 mt-CO<sub>2</sub>e.

### GHGs and Sustainability

Almost every facet of modern life emits greenhouse gases. Carbon dioxide is emitted wherever and whenever fossil fuels are burned including when we drive

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2: “2009 U.S. Greenhouse Gas Inventory Report.” U.S. Environmental Protection Agency  
<http://www.epa.gov/climatechange/emissions/usinventoryreport.html>

our cars, heat our houses, and generate our electricity. Methane is emitted from farms that raise the animals we eat. Nitrous oxide is emitted from landfills and wastewater treatment plants. Factories that produce all of the products we use in our daily lives all emit greenhouse gases, and the trucks that transport these items to our cities emit more still.

Many governments are currently making it a priority to reduce greenhouse gas emissions, but there is no strong consensus regarding which steps we should take to safely and effectively reduce our greenhouse gas emissions and which steps will needlessly cripple our productivity. Part of the reason no consensus has emerged is that every part of the globe is different and will require taking different actions in order to reduce greenhouse gas emissions while maintaining productivity and a high standard of living. Greenhouse gas accounting is just one of many effective tools that policymakers can use to ensure that environmental policies are effective.

### **Greenhouse Gas Accounting**

Greenhouse gas accounting is the practice of accounting for every GHG emission within a boundary (anything from a single home to an entire country) and those emitted on behalf of the area within that boundary (for example, electricity that is produced in a neighboring county but used in the county of interest). The end product is a greenhouse gas inventory specifying how many metric tons of carbon dioxide equivalent (mt-CO<sub>2</sub>e) were emitted in a given year, broken down by sector and source and expressed in simple terms that are comparable over time.

GHG emissions inventories are an incredibly useful tool for policymakers for three reasons. If it is apparent which sector of a community is producing the majority of emissions, policies can be targeted at specific sectors where easy improvements can be made with little investment; inventories can help to identify the “low-hanging fruit.” Second, each sector can be compared on a per-user basis (per household, per employee, per square foot, etc) to the same sector in a nearby region having similar demographics and climate in order to identify if there are

specific local practices that can be modified or if there are even any improvements to be made.

Third, and most importantly, once policies have been implemented, their effectiveness can be tracked over time by performing a new inventory every year or two and comparing the results. For this reason alone, it is vitally important that any government interested in reducing its environmental impact have a “baseline” inventory to which they can make comparisons in the future.

## Objectives for the Chaffee County Inventory

The objective of this GHG emissions inventory is three-fold:

- Design an inventory method based on the principles of demand-centered hybrid life-cycle analysis.<sup>3</sup> This inventory method should be consistent, accurate, transparent, and replicable in future years.
- Provide a baseline greenhouse gas footprint for Chaffee County incorporating all of the activities of the community including residential, commercial, industrial, agricultural, and governmental; this is known as a “community-wide GHG footprint.”
- Establish concise tracking metrics to be updated in future years to assess progress over time.

This inventory is being compiled in order to facilitate climate action planning and provide tools for outcomes assessment in the future. In order to accomplish this goal, it is necessary to establish a set of procedures used to calculate the footprint that can be easily repeated in future years, or by other neighboring communities; this is known as the “inventory method.” The method used in this inventory is described further in the [GHG Accounting Method](#) section.

Most of the other communities in Colorado that have performed community-wide inventories have been high-density urban areas with intense commercial or industrial activity. Chaffee County does not fit this profile so this inventory will also establish some basic results to which other similar communities in Colorado can compare.

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<sup>3</sup>: The methodology is further explained in the GHG Accounting Method section.

## Overview of Chaffee County

Chaffee County is a predominately rural, sparsely populated county located in the Rocky Mountains in central Colorado. Nestled between the Sawatch Range on the west and the Mosquito Range on the east, Chaffee County is an extremely mountainous region with elevations reaching up to 14,000 feet.<sup>4</sup> In 2007, the population was estimated by the U.S. Census Bureau to be 16,733 persons, making it the 28<sup>th</sup> most populous of Colorado's 64 counties. During the same time period, population density was estimated to be 16 persons per square mile, compared to 46.9 persons per square mile for the State of Colorado and an average density of 86.2 for the entire United States.<sup>5</sup> The Census Bureau estimates the population growth between 2000 and 2007 to be 3.0%, substantially behind the 12.5% growth rate for the state of Colorado.<sup>6</sup>



**Figure 1: Location and Size of Chaffee County. Source: Wikimedia Commons**

Several characteristics of Chaffee County are important to consider when performing a greenhouse gas emissions inventory. The climate is substantially cooler than other lower-lying areas of Colorado,<sup>7</sup> which means that the average home will use substantially more heating fuel during more parts of the year. Many homes in Chaffee County are heated with propane that is stored on-site: 25% of

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4: "Chaffee in brief..." <http://www.chaffeecounty.org/Page.aspx?PageID=250>

5: "Chaffee County, Colorado." Wikipedia, [http://en.wikipedia.org/wiki/Chaffee\\_County,\\_Colorado](http://en.wikipedia.org/wiki/Chaffee_County,_Colorado)

6: "County Population Estimates." U.S. Census Bureau, <http://www.census.gov/popest/counties/CO-EST2008-01.html>

7: Between February and December 2007 (no data available for January), Chaffee County experienced 7,245 heating and cooling degree days compared to 5,979 for Denver for the same period. Heating and cooling degree days measure the variation from a baseline temperature and approximate the amount of heating or cooling needed to maintain a stable temperature in a home. Data from <http://www.degreedays.net/> using weather stations KCOBUENA2 and KCODENVE11.



occupied homes, or about 1,700.<sup>8</sup> Using propane for heating has a different effect on the environment that must be taken into account. Propane is delivered by private companies instead of state-regulated utilities, and comprehensive data on propane sales were not available for this report; estimates have been used instead.

Agricultural area in Chaffee County comprises over 79,000 acres, or 12% of the total area of the County. Livestock activities, which have a substantial carbon footprint, represent 62% of the economic activity in the agricultural sector. Due to the substantial presence of animal agriculture in Chaffee County, the impact of livestock has been included in this report.

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8: "DP-4. Profile of Selected Housing Characteristics: 2000." U.S. Census Bureau State and County QuickFacts, <http://quickfacts.census.gov/qfd/states/08/080151k.html>

## GHG Accounting Method

### Method and Scopes

This GHG inventory is conducted using the demand-centered hybrid life-cycle analysis method developed by Ramaswami et al.<sup>9</sup> The method uses the standard Local Government Operations Protocol (LGOP, released by ICLEI) to report GHG emissions from in-boundary activities. Out-of-boundary activities critical for a community such as the provision of food, water, fuels and shelter are added to the in-boundary activities to yield a more comprehensive GHG footprint. The inclusion of additional out-of-boundary activities is highly recommended by the Climate Leaders Program of the U.S. Environmental Protection Agency (EPA).

The Ramaswami inventory-footprint method for GHG accounting was pioneered by the University of Colorado Denver along with the City and County of Denver in 2008, and has since been utilized by other cities such as Portland, Oregon, Seattle, Washington, Arvada, Colorado, Austin, Texas and Minneapolis, Minnesota. This inventory is the first application of the methodology to a rural area with significant agricultural activity, such as Chaffee County.

### *In-boundary activities*

The following energy uses are considered “in-boundary” and are required to be reported as per the Local Government Operations Protocol (LGOP)<sup>10</sup> and World Resources Institute (WRI) protocol<sup>11</sup>:

- **Buildings Energy Use** – Use of electricity, natural gas, and propane in residential, commercial and industrial sectors in a community
- **Transportation Energy Use** – Includes tailpipe emissions from operating personal and commercial vehicles associated with a community

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9: Ramaswami, A., T. Hillman, B. Janson, M. Reiner, and G. Thomas. "A Demand-Centered, Hybrid Life-Cycle Methodology for City-Scale Greenhouse Gas Inventories." *Environmental Science & Technology* 42 (September 2008): 6455-6461.

10: Local Government Operations Protocol v 1.0, September 2008: <http://www.icleiusa.org/action-center/tools/lgo-protocol-1>

11: WRI Corporate Standard Protocol: <http://www.ghgprotocol.org/standards/corporate-standard>

- **Emissions from Waste Disposal** – Under LGOP, emissions from solid waste landfilling and wastewater treatment by residential and commercial sectors are also included in the in-boundary accounting.

Formally, the GHGs emitted directly from burning natural gas in buildings and gasoline and diesel fuels in vehicles are termed “Scope 1” while emissions from power plants to produce electricity used within the community are termed “Scope 2.” Scopes 1+2 emissions are included in the “in-boundary” activities; LGOP requires that these emissions be reported in a GHG inventory.

### **Out-of-boundary activities**

WRI designates all emissions not included in Scopes 1+2 as Scope 3; including these emissions is optional, but highly recommended by the EPA. Including Scope 3 emissions produces a much more complete and accurate inventory. Although a community may report a larger GHG footprint by including Scope 3 emissions there may also be easier, more cost-effective actions that can be taken to reduce these Scope 3 emissions. Communities that use a comprehensive inventory including all scopes are more likely to make greater reductions over time.

The following out-of-boundary activities, when added to in-boundary activities, yield a more holistic account of a community’s CO<sub>2</sub>e footprint:

- **Embodied Energy of Critical Urban Materials** – The energy use and associated GHG emissions from producing key urban materials such as water, fuels, and food, necessary to support life in cities. Some inventories also include concrete.
- **Waste Management** – Emissions relating to the collection, processing, and storage of solid and liquid wastes, including the operation of landfills and wastewater treatment plants and direct emissions from the waste itself.
- **Livestock** – Chaffee County differs from most other communities because there is significant agricultural activity within the County. Animal agriculture

has a tremendous impact on GHG emissions due to the digestive process, so this inventory will include a component missing from most inventories.

Some of the emission sources listed above are not included in this inventory, either because it was determined the source was not a major contributor in Chaffee County during the reporting year (such as concrete), or the data were not available in the baseline year. Future GHG inventory projects should seek to include these sources if they become relevant or data becomes available.

### **Energy Use Sectors and Data**

To better communicate a community's overall energy use and GHG emissions, classifying end-use of energy in three different sectors is more useful. In this report, we consistently report energy use and GHG emissions in the following four sectors:

- **Buildings Sector** – GHG emissions from residential, commercial, and government buildings and industrial facilities.
- **Transport Sector** – GHG emissions from operating cars, trucks and airplanes, termed Pump-to-Wheels (P2W) emissions.
- **Agricultural Sector** – GHG emissions from agricultural activities, specifically raising livestock.
- **Materials Sector** – GHG emissions from producing critical urban materials (food, water, cement) and fuel production (termed Wells-to-Pump, W2P) and from landfilling and wastewater treatment.

For energy (or materials use) in each sector, the following data were gathered:

- **Annual Materials or Energy Consumption** – Total kWh of electricity consumed annually, total water consumed annually, total natural gas use, etc. The annual Material/Energy Flow Analysis indicates how much is consumed as a community. Benchmarking these consumption data on a per-person or

per-household basis represents how efficient the community is its consumption patterns.

- **GHG Emissions factors** – GHG emissions factors express how much CO<sub>2</sub>e is emitted per unit of energy or material consumed. For example: kilograms of carbon dioxide equivalent emitted per kilowatt-hour of electricity consumed, or kg-CO<sub>2</sub>e/kWh.

Total emissions are computed as the product of how much is consumed and the GHG emissions per unit of the product consumed, using the following simple equation:

$$\text{Material/Energy Flow} \times \text{Emissions factor} = \text{GHG Emissions}$$

In the next section, consumption data and emissions factors for all three sectors are reported and overall community-wide GHG footprint is developed.

# Chaffee County Greenhouse Gas Inventory

## Reporting year

This section reports energy (or materials) consumption data and associated GHG emissions for 2007 for the three main sectors:

- Buildings
- Transportation (tailpipe emissions)
- Materials and Waste

For each sector, raw consumption data are collected, the data are multiplied by an emissions factor (in an equivalent unit) and the results are totaled. The total GHG emissions from each sector are consolidated and reported in an overall community-wide summary table. GHG emissions are reported in terms of metric tons (mt) of carbon-dioxide equivalents, or mt-CO<sub>2</sub>e.

## Buildings Sector

**Buildings Energy Consumption and Energy Intensity:** This sector includes electricity, natural gas, and propane consumed in residential, commercial, government, and industrial facilities. Consumption data were obtained from Xcel Energy (commercial and residential electricity and natural gas), Atmos Energy (commercial and residential natural gas) and Sangre de Cristo Electric Association (residential and commercial electricity) for the year 2007. Data regarding the number of households and the square footage of commercial spaces in the County were obtained from the Chaffee County Assessor's Office.

Sangre de Cristo Electric Association was unable to provide specific consumption data or number of premises for Chaffee County, but did provide this data for their total service area. In order to determine the energy consumption in Chaffee County it was assumed that electricity was distributed evenly between all premises in the service area, so the consumption in Chaffee County would be proportional to the percentage of Sangre de Cristo premises in the County. The number of premises was determined by subtracting the number of residential customers receiving electricity from Xcel energy from the total number of



households in Chaffee County, taken from the Colorado Division of Local Government.

Additionally, many homes in Chaffee County are heated by propane instead of natural gas. Exact data regarding propane sales were not obtained due to the proprietary nature of this data. Therefore, an estimation was utilized for this report.<sup>12</sup> See Table 1 for a summary of electricity and natural gas energy consumption and resulting emissions in the buildings sector.

The term “energy use intensity” (or EUI) refers to the amount of energy used per consumer. EUI is useful for comparing consumption rates between different areas. Although Denver and Chaffee counties have vastly different numbers of households, the amount of energy used per household can be compared. EUI is usually expressed in thousands of British Thermal Units, or “kBtu,” a measurement that includes electricity and heating fuel use. The energy use intensity for buildings in Chaffee County can also be benchmarked with similar energy intensity metrics reported by the Energy Information Agency (EIA) for homes and commercial spaces in the Rocky Mountain region.

- Including electricity and natural gas or propane, the average home in Chaffee County used 6,721 kBtu of energy in 2007. The Residential Energy Consumption Survey (RECS) published by the EIA reports that the average home in the Mountain West region used 7,483 kBtu in 2005 (the latest year for which data is available).<sup>13</sup>
- Businesses in Chaffee County used 136.95 kBtu per square foot in 2007, compared with 91.9 kBtu per square foot for office buildings in the Mountain West in 2003 (the latest year for which data is available).<sup>14</sup>

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12: Propane consumption estimate of 6.25 million cu. ft. in 2007 was provided to UC Denver and is used in this report.

13: Table US1. Total Energy Consumption, Expenditures, and Intensities, 2005. “Residential Energy Consumption Survey – Detailed Tables.” U.S. Energy Information Administration.  
[http://www.eia.doe.gov/emeu/recs/recs2005/c&e/detailed\\_tables2005c&e.html](http://www.eia.doe.gov/emeu/recs/recs2005/c&e/detailed_tables2005c&e.html)

14: Table C9. Consumption and Gross Energy Intensity by Census Division for Sum of Major Fuels: Part 3. “Commercial Buildings Energy Consumption Survey,” 2003. U.S. Energy Information Administration.  
[http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed\\_tables\\_2003/2003set9/2003pdf/c9.pdf](http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003pdf/c9.pdf)

Emissions factors for Electricity & Natural Gas: **Xcel Energy provided the GHG emissions factors for emissions factors for electricity and natural gas. Atmos Energy provides only natural gas, which has gas, which has the same emissions factor regardless of provider because it is burned on-site. Sangre on-site. Sangre de Cristo Electric Association (SdC) did not provide an emissions factor so the factor so the average emissions factor for electricity generation in Colorado was used instead.<sup>15</sup> used instead.<sup>15</sup> Emissions factors are shown in**

Table 2.

**Table 1: Energy Consumption and GHG Emissions in the Buildings Sector**

<b>Residential Energy</b>	<b>Xcel Energy</b>	<b>SdC</b>	<b>Atmos Energy</b>
Number of Electricity Customers	4,114	2,766	0
Total Grid Electricity Used (MWh)	27,213 <sup>A</sup>	27,748	0
Electricity/household/month (kWh/hh/mo)	525.43	835.97	0
Number of Natural Gas Customers	2	0	4,716
Total Natural Gas Used (therms)	2,318	0	3,511,691
Natural Gas/household/month (therms/hh/mo)	97	0	62
<b>Total Residential GHG emissions (mt-CO<sub>2</sub>e)</b>	<b>20,912</b>	<b>25,528</b>	<b>18,963</b>
<b>Total Residential GHG Emissions (mt-CO<sub>2</sub>e)</b>	<b>65,402</b>		
<b>Commercial-Industrial Energy</b>	<b>Xcel Energy</b>	<b>SdC</b>	<b>Atmos Energy</b>
Number of Electricity Customers	1,009	0	0
Total Commercial-Industrial Area (sq. ft.)	7,123,599		
Total Electricity Used (MWh)	35,412	0	0
Number of Natural Gas Customers	7	0	774
Total Natural Gas (therms)	6,628,830	0	1,918,398
Total energy use per square foot (kBtu/s.f.)	136.95		
<b>Commercial-Industrial GHG emissions (mt-CO<sub>2</sub>e)</b>	<b>63,802</b>	<b>0</b>	<b>10,359</b>
<b>Total Commercial-Industrial GHG Emissions (mt-CO<sub>2</sub>e)</b>	<b>74,161</b>		

Notes: MWh = Megawatt-hours of electricity. 1MWh = 1,000 kWh. Both electricity and natural gas use can be combined and represented as kBtu: 1 kWh = 3.412 kBtu; 1 therm = 100 kBtu).  
A. Includes 698 MWh of electricity from Xcel's Windsorce program with zero GHG emissions in 2007.

15: Emissions factors and Energy Prices for Leonardo Academy's Cleaner and Greener® Program, Page 8. Leonardo Academy, Inc. (April 21, 2009) Available: <http://www.cleanerandgreener.org/download/2009-4-21%20C&G%20Program%20Emission%20Factors%20and%20Energy%20Prices.pdf>

**Table 2: Electricity and Natural Gas Emissions Factors**

<b>Emissions factors</b>	<b>Xcel</b>	<b>SdC<sup>16</sup></b>	<b>Atmos</b>
Electricity (kg-CO <sub>2</sub> e/kWh)	0.788	0.92	N/A
Natural Gas (kg-CO <sub>2</sub> e/therm)	5.4		

**Public Street and Highway Lighting:** Xcel Energy also delivered 295 MWh for use in public streets and highway lighting during 2007. GHG emissions resulting from this consumption totaled 233 mt-CO<sub>2</sub>e.

**Propane Consumption:** Many homes in Chaffee County do not receive natural gas via a pipeline from an energy utility company, but purchase propane to be delivered and stored on-site. A propane consumption estimate of 6.25 million cubic feet was provided. Of the 6,880 households in Chaffee County, the U.S. Census Bureau reports that 25.3%, or 1,740 homes, heat with propane.<sup>17</sup> Average propane consumption for these homes would be 99.8 gallons per year. The Residential Energy Consumption Survey released by EIA reports that the average propane-burning home in the mountain west region used 501 gallons of propane during 2005.<sup>18</sup> Considering this benchmark, the propane consumption figure used in this report is likely an underestimation. Securing accurate data about residential propane consumption should be a priority for future GHG inventory reports.

Based on the estimate given here, a conversion factor of 0.0278 gallons per cubic foot<sup>19</sup> and an emissions factor of 5.74 kg-CO<sub>2</sub>e per gallon<sup>20</sup> were applied, bringing the total emissions from propane to 997 mt-CO<sub>2</sub>e in 2007.

16: Emissions factors and Energy Prices for Leonardo Academy's Cleaner and Greener® Program, Page 8. Leonardo Academy, Inc. (April 21, 2009) Available: <http://www.cleanerandgreener.org/download/2009-4-21%20C&G%20Program%20Emission%20Factors%20and%20Energy%20Prices.pdf>

17: "DP-4. Profile of Selected Housing Characteristics: 2000." U.S. Census Bureau State and County QuickFacts, <http://quickfacts.census.gov/qfd/states/08/08015lk.html>

18: Table US8. Average Consumption by Fuels Used, 2005. "Residential Energy Consumption Survey – Detailed Tables." U.S. Energy Information Administration. [http://www.eia.doe.gov/emeu/recs/recs2005/c&e/detailed\\_tables2005c&e.html](http://www.eia.doe.gov/emeu/recs/recs2005/c&e/detailed_tables2005c&e.html)

19: Connecticut Department of Revenue website, <http://www.ct.gov/DRS/cwp/view.asp?a=1511&q=267170>

20: Local Government Operations Protocol v 1.0, September 2008: <http://www.icleiusa.org/action-center/tools/lgo-protocol-1>

## Transportation Sector

**Surface Travel and Fuel Consumption:** Fuel consumption for Chaffee County was calculated from total statewide vehicle fuel sales data maintained by the Colorado Department of Revenue. Based on the assumption that citizens of Chaffee County will travel, on average, as much as other residents of the state, fuel sales were allocated based on the proportion of the population of Chaffee County to the State of Colorado. In 2007, statewide fuel sales totaled 2,193 million gallons of gasoline and 702 million gallons of diesel fuel.<sup>21</sup> The population of Chaffee County comprised 0.35% of the population of the state during this period,<sup>22</sup> so 7.58 million gallons of gasoline and 2.43 million gallons of diesel were allocated to Chaffee County.

**Airline trips:** Because there are no commercial airports in Chaffee County, airline trips were not included in this inventory. It is likely that Chaffee County residents make use of airports in other areas, thus future inventories could include an air travel component.

**Emissions Factors:** Diesel and gasoline emissions factors were obtained from Argonne National Laboratory's Greenhouse Gas, Regulated Emissions and Energy Use in Transportation (GREET<sup>23</sup>) model for pump-to-wheels analysis, appropriate for vehicle operations. The emissions factors of 9.12 kg-CO<sub>2</sub>e for gasoline and 10.2 kg-CO<sub>2</sub>e for diesel are in line with those used by ICLEI and the Intergovernmental Panel on Climate Change (IPCC), although they have been changed recently and may not exactly match emissions factors used in other inventories in Colorado. GHG emissions from the transport sector totaled 93,850 mt-CO<sub>2</sub>e. See Table 3 for a summary of fuel consumption and resulting emissions in the transportation sector.

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21: "Motor Fuel Taxes." Colorado Department of Revenue, <http://www.colorado.gov/cs/Satellite/Revenue-Main/XRM/1213954144067>

22: "County Population Estimates." U.S. Census Bureau, <http://www.census.gov/popest/counties/CO-EST2008-01.html>

23: "Argonne GREET Model." Argonne National Laboratory Transportation Technology R&D Center. [http://www.transportation.anl.gov/modeling\\_simulation/GREET/](http://www.transportation.anl.gov/modeling_simulation/GREET/)

**Table 3: Fuel Consumption and GHG Emissions in the Transportation Sector**

<b>Colorado Statewide Fuel</b>		<b>2007</b>
Gasoline (Million Gallons)		2,193
Diesel (Million Gallons)		702

Chaffee County Population Proportion		0.35%
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<b>Chaffee County Fuel</b>		<b>2007</b>
Gasoline (Million Gallons)		7.58
Diesel (Million Gallons)		2.43

<b>GHG Emissions from Transport</b>		<b>2007</b>
Gasoline (mt-CO <sub>2</sub> e)		69,101.80
Diesel (mt-CO <sub>2</sub> e)		24,748.95
<b>Total (mt-CO<sub>2</sub>e)</b>		<b>93,850.74</b>

### **Materials and Waste Sector**

This sector includes many relevant out-of-boundary activities that produce GHG emissions, including the production of food and fuels and treatment of wastewater. These results are shown in Table 4.

**Fuel Production:** Consumption of transportation fuels was determined from statewide fuel consumption as summarized in Table 3. When fuels are burned they release emissions directly into the air- this process is covered in the [Transportation Sector](#) section above. However, there are also emissions associated with the recovery, processing, and refinement of these fuels as they are transported to the County. These emissions are referred to as “wells-to-pumps,” or W2P, and the emissions factors are taken from the GREET model. W2P emissions for gasoline, diesel, and propane in 2007 totaled 23,995 mt-CO<sub>2</sub>e in 2007.

**Food Production:** The consumption of food was tracked in terms of money spent on food expenditures as reported in the Consumer Expenditure Surveys for residents released by the U.S. Bureau of Labor Statistics. In 2007, the average expenditure for food prepared at home was \$3,091 per home<sup>24</sup> in rural areas. The emissions factor for food was derived from the Economic Input-Output Life Cycle Analysis tool (maintained by Carnegie Mellon University<sup>25</sup>). The EF was found to be 2.67 kg-CO<sub>2</sub>e per dollar of food expenditure. GHG emissions from food production in 2007 totaled 56,674 mt-CO<sub>2</sub>e.

**Municipal Waste and Recycling:** The Chaffee County landfill reported the amount of waste landfilled during 2007, broken down by type (i.e. municipal solid waste (MSW), construction, yard, tires, etc). Most amounts were reported in short tons (2,000 lbs), but a few were reported in terms of cubic yards (some elements of household waste) or number (tires). For these items, conversion factors were located to provide total short tons. Additionally, the amount of recycled material (cardboard and metal) was reported in tons. The number of short tons in each category was entered into the EPA's Waste Reduction Model<sup>26</sup> (WaRM), which evaluates multiple waste disposal scenarios. In this case, waste disposal was evaluated with and without recycling. GHG emissions from solid waste totaled 45,303 mt-CO<sub>2</sub>e in 2007. Without recycling, this number would have been higher by 1,848 mt-CO<sub>2</sub>e, or about 4%.

**Wastewater Treatment:** The Local Government Operations Protocol has outlined a methodology through which average emissions for wastewater treatment can be estimated without specific knowledge of the treatment process used in a specific area, based on typical treatment plants and the population being served.<sup>27</sup> The analysis for this report includes methane emissions from anaerobic digestion of biosolids and treatment lagoons, but not fugitive emissions from septic tanks or N<sub>2</sub>O

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24: U.S. Bureau of Labor Statistics Consumer Expenditure Survey, Series ID CXUFH000809 (available: <http://data.bls.gov/cgi-bin/srgate>)

25: Carnegie Mellon University Green Design Institute. (2010) [Economic Input-Output Life Cycle Assessment \(EIO-LCA\) US 1997 \(491\) model](http://www.eiolca.net/) [Internet], Available from: <<http://www.eiolca.net/>> [Accessed 13 Jan, 2010]

26: Waste Reduction Model, U.S. Environmental Protection Agency. [http://www.epa.gov/climatechange/wycd/waste/calculators/Warm\\_home.html](http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html)

27: ICLEI Local Governments Protocol v1.0, September 2008



emissions from nitrification and denitrification. Based on this methodology, GHG emissions from wastewater treatment totaled 3,897 mt-CO<sub>2</sub>e in 2007.

**Table 4: Material Flow and GHG Emissions in the Material Sector**

<b>Material</b>	<b>Annual Material Flow</b>	<b>GHG Emissions</b>
Fuel Production	7.6, 2.4 and 0.2 million gallons <sup>28</sup>	23,995 mt-CO <sub>2</sub> e
Wastewater Treatment	16,733 users	3,897 mt-CO <sub>2</sub> e
Food Production	\$21.26 million	56,674 mt-CO <sub>2</sub> e
MSW and Recycling	19,730 short tons	45,303 mt-CO <sub>2</sub> e
<b>Total GHG Emissions for Producing Urban Materials</b>		<b>129,869 mt-CO<sub>2</sub>e</b>

### **Agricultural Sector**

Agricultural activities, specifically animal agriculture, emit a great deal of greenhouse gases. Livestock emit methane during the digestive process (referred to as “enteric fermentation”) and their wastes release additional methane and nitrous oxide while being collected, stored, and treated. Please note that this sector will include only emissions directly related to livestock and not from farm operations, which are already covered in the commercial buildings energy and transportation fuel sections.

The head of livestock in each category were taken from the 2007 Census of Agriculture<sup>29</sup> for Chaffee County, released by the U.S. Department of Agriculture. Emissions factors were taken from the 2007 U.S. Greenhouse Gas Inventory Report, released by the EPA;<sup>30</sup> specifically from Chapter 6 and are based on protocols released by the IPCC. GHG emissions from livestock total 88,626 mt-CO<sub>2</sub>e for 2007. The data supporting these calculations are shown in

28: Gasoline, diesel, and propane respectively.

29: Received in a Personal Communication with Kathryn Wadsworth, December 23 2009

30: "2007 Draft U.S. Greenhouse Gas Inventory Report." U.S. Environmental Protection Agency. <http://www.epa.gov/climatechange/emissions/downloads07/07Agriculture.pdf>

Table 5.

**Table 5: Emissions factors and GHG Emissions in the Agricultural Sector**

Type	Number	Enteric Fermentation kg-CO <sub>2</sub> /animal/year	Manure Management kg-CO <sub>2</sub> e/animal/year	GHG Emissions mt-CO <sub>2</sub> e/year
Cattle	7,928	9,019	2,157	88,603.3
Goat	259	5	N/A <sup>31</sup>	1.3
Horse	963	15	N/A <sup>31</sup>	14.4
Layers	362	N/A <sup>31</sup>	21	7.6
<b>Total GHG Emissions, Livestock Sector:</b>				<b>88,626.7</b>

### Community-Wide and Per-Capita GHG Footprint

All three sectors described in the previous sections are added together in Table 6. The result is the total community-wide GHG footprint shown in the form of a pie chart by sector in Figure 2. The community-wide GHG footprint for Chaffee County in 2007 was 453,139 mt-CO<sub>2</sub>e. Unfortunately, this number by itself is not helpful- it can't be compared to any other footprint due to differences in population size and composition; the per-capita GHG footprint is much more useful.

The per-capita GHG footprint for Chaffee County in 2007 was 27.08 mt-CO<sub>2</sub>e per person. This is similar to the per-capita emissions of 24.25 mt-CO<sub>2</sub>e for the City and County of Denver for the same period. It is important to recognize that the inventory for Chaffee County includes some sectors that were not included in the inventory for Denver, either because they weren't relevant (agriculture) or because data were not available at the time (solid waste disposal); due to all of this, the per-capita footprint is expected to be slightly higher. Some basic tracking metrics are shown in Table 7 below to illustrate the differences and similarities between the two areas.

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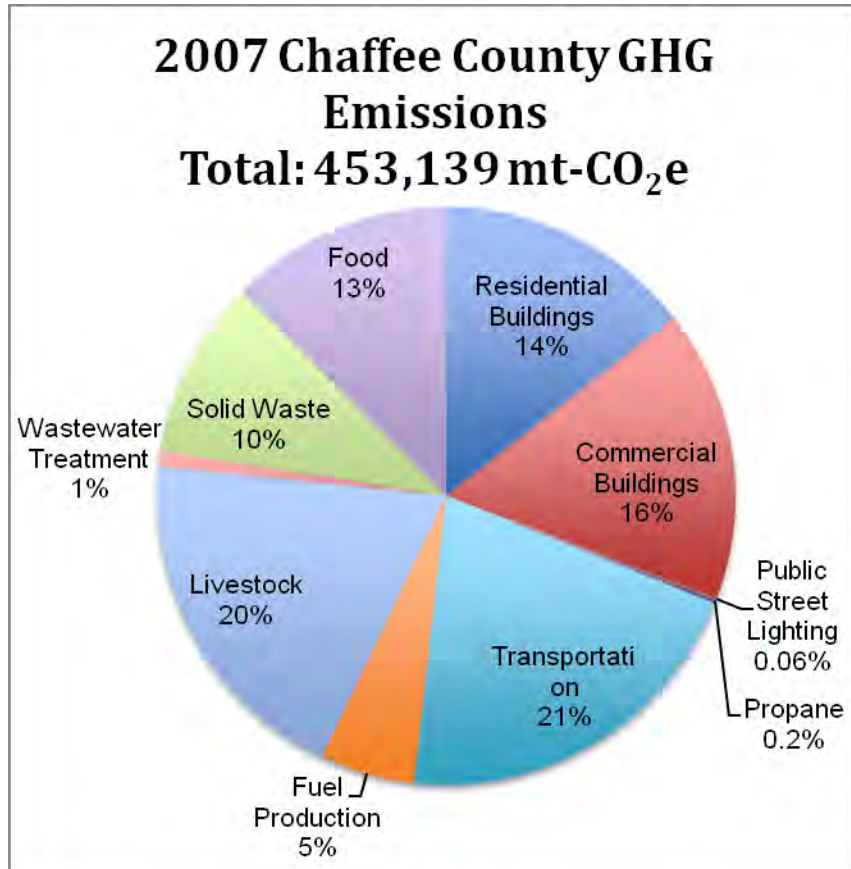
<sup>31</sup>: No emissions factor could be found.



**Table 6: Community-Wide GHG Emissions for Chaffee County**

	<b>Sector/use</b>	<b>Community-wide annual urban material/energy flows, MFA</b>	<b>GHG emissions factor (EF)</b>	<b>total GHG emitted = MFAxEF</b>
<b>Scopes 1 &amp; 2 plus waste</b>	Buildings Electricity Use	90,373 MWh (Xcel Energy, Sangre de Cristo Electric Assoc.)	0.78 (Xcel) 0.92 (SdC) kg CO <sub>2</sub> e/kWh	74,665 mt-CO <sub>2</sub> e
		295 MWh (Pub. Streetlights)		
	Buildings Natural Gas	12.06 million therms (Xcel Energy, Atmos Energy)	5.4 kg-CO <sub>2</sub> e/therm	65,130 mt-CO <sub>2</sub> e
	Fuel Consumption	7.58 million gallons (gasoline)	Gasoline PTW: 9.1 kg-CO <sub>2</sub> e/gal	94,847 mt-CO <sub>2</sub> e
		2.43 million gallons (diesel) 173,750 gallons (propane)	Diesel PTW: 10.2 kg-CO <sub>2</sub> e/gal Propane tailpipe: 5.74 kg-CO <sub>2</sub> e/gal	
	Solid Waste	19,730 short tons	Varies: ~1 mt-CO <sub>2</sub> e/short ton	45,303 mt-CO <sub>2</sub> e
<b>Scope 3</b>	Wastewater Treatment	16,733 persons served	257.9 kg-CO <sub>2</sub> e/person/year	3,897 mt-CO <sub>2</sub> e
	Fuel Production	Fuel Flow in million gallons: Gasoline: 7.58 Diesel: 2.43 Propane: 0.17	Gasoline: 2.5 Diesel: 2.0 Propane: 1.15 kg-CO <sub>2</sub> e/gal	23,995 mt-CO <sub>2</sub> e
	Livestock	7,928 Cows 259 Goats 963 Horses 362 Layers	11,716 kg-CO <sub>2</sub> e/cow (+ others)	88,626 mt-CO <sub>2</sub> e
	Food Purchases	\$21.26 million	2.65 kg-CO <sub>2</sub> e/\$	56,674 mt-CO <sub>2</sub> e
<b>Total Community Wide Emissions:</b>				<b>453,139 mt-CO<sub>2</sub>e</b>

**Figure 2: Chaffee County GHG Emissions by Sector**



**Table 7: Benchmark Comparison Between Chaffee County and Denver**

	Chaffee County, 2007	Denver, 2007
Residential Buildings	665 kWh/hh/mo	528 kWh/hh/mo
	44.5 therms/hh/mo	65 therms/hh/mo
Commercial Buildings	137 kBtu/s.f.	179 kBtu/s.f.
Transportation	598 gal/person/year	638 gal/person/year
Food Purchases	\$3,091/household	\$3,000/household
Livestock	5.3 mt-CO <sub>2</sub> e/person	0 mt-CO <sub>2</sub> e/person



Compiled Audience Response System Data

Public Meetings: 10-15-09 Salida; 11-18-09 Buena Vista; 11-19-09 Poncha Springs

\*\*Not all questions were asked each session (10-15 n=42; 11-18 & 11-19 n=47)

**I live in Chaffee County**

	Responses	
	(percent)	(count)
Part-time Resident	2.2%	1
Full-time Resident	93.5%	43
Non-resident	4.3%	2
<b>Totals</b>	<b>100%</b>	<b>46</b>

**I have lived in Chaffee County...**

	Responses	
	(percent)	(count)
Less than 3 years	21.3%	10
Between 3 years and 6 years	14.9%	7
More than 6 years	59.6%	28
I am not a resident	4.3%	2
<b>Totals</b>	<b>100%</b>	<b>47</b>

**I consider developing alternative energy/clean energy in the County...**

	Responses	
	(percent)	(count)
Critically important	69.4%	34
Somewhat important	24.5%	12
Not Important	2.0%	1
Wait for the future	4.1%	2
<b>Totals</b>	<b>100%</b>	<b>49</b>

**Chaffee County has a good wind energy resource**

	Responses	
	(percent)	(count)
Strongly Agree	9.3%	8
Agree	30.2%	26
Neutral	29.1%	25
Disagree	27.9%	24
Strongly Disagree	3.5%	3
<b>Totals</b>	<b>100%</b>	<b>86</b>

**Chaffee County has a good solar energy resource**

	Responses	
	(percent)	(count)
Strongly Agree	70.9%	61
Agree	25.6%	22
Neutral	0.0%	0
Disagree	2.3%	2
Strongly Disagree	1.2%	1
<b>Totals</b>	<b>100%</b>	<b>86</b>

**The most important clean energy technology for Chaffee County is:**

	Responses	
	(percent)	(count)
Wind Energy	1.1%	1
Solar Energy	24.2%	22
Biofuels	3.3%	3
Micro-hydro	1.1%	1
Geothermal	24.2%	22
Home Energy Conservation/Weather-ization	46.2%	42
<b>Totals</b>	<b>100%</b>	<b>91</b>

**In Chaffee County, how many buildings have solar and/or wind systems generating electricity for the utility grid (actual answer was 71+)?**

	Responses	
	(percent)	(count)
Less than 30	26.2%	11
30-50 systems	38.1%	16
51-70 systems	16.7%	7
More than 70	19.1%	8
<b>Totals</b>	<b>100%</b>	<b>42</b>

**Chaffee County should invest in renewable energy technologies at county facilities**

	Responses	
	(percent)	(count)
Yes	93.1%	81
No	6.9%	6
<b>Totals</b>	<b>100%</b>	<b>87</b>

**Chaffee County should invest funds to help local businesses install clean energy technologies**

	Responses	
	(percent)	(count)
Yes	69.9%	58
No	30.1%	25
<b>Totals</b>	<b>100%</b>	<b>83</b>

**Chaffee County should invest funds to help local homeowners install clean energy technologies**

	Responses	
	(percent)	(count)
Yes	67.1%	57
No	32.9%	28
<b>Totals</b>	<b>100%</b>	<b>85</b>

**Policies should be adopted regarding Clean Energy Technologies:**

	Responses	
	(percent)	(count)
Strongly Agree	65.1%	28
Agree	11.6%	5
Neutral	18.6%	8
Disagree	2.3%	1
Strongly Disagree	2.3%	1
<b>Totals</b>	<b>100%</b>	<b>43</b>

**Should Chaffee County set emission reduction goals?**

	Responses	
	(percent)	(count)
Yes	72.5%	29
No	27.5%	11
<b>Totals</b>	<b>100%</b>	<b>40</b>

**Should we encourage the use of renewable energy through tax or other incentives?**

	Responses	
	(percent)	(count)
Yes	90.0%	36
No	10.0%	4
<b>Totals</b>	<b>100%</b>	<b>40</b>

**Do you support attracting Renewable Energy businesses to the area by giving tax or other incentives?**

	Responses	
	(percent)	(count)
Yes	72.0%	59
No	28.0%	23
<b>Totals</b>	<b>100%</b>	<b>82</b>

**Should our local government enter into public/private agreements to bolster renewable energy initiatives?**

	Responses	
	(percent)	(count)
Yes	71.1%	27
No	29.0%	11
<b>Totals</b>	<b>100%</b>	<b>38</b>

**Would you participate in future Renewable Energy Planning sessions?**

	Responses	
	(percent)	(count)
Yes	93.0%	40
No	7.0%	3
<b>Totals</b>	<b>100%</b>	<b>43</b>

**Should the County provide funding for a rebate program on appliances and renewable energy (GEO will match)?**

	Responses	
	(percent)	(count)
Yes	65.3%	32
No	12.2%	6
Need more info	22.4%	11
<b>Totals</b>	<b>100%</b>	<b>49</b>

**Colorado HB1350 allows County residents to vote on a bond issue for homeowners/businesses to install RE technologies to be paid by their Property Taxes. Would you support this measure?**

	Responses	
	(percent)	(count)
Yes	83.3%	40
No	16.7%	8
<b>Totals</b>	<b>100%</b>	<b>48</b>