

# Energy Assessment for Southwest Colorado

Four Corners Office for Resource Efficiency



## Energy Assessment for Southwest Colorado

*Four Corners Office for Resource Efficiency (4CORE)*

A profile of electrical, natural gas, and other heating fuels used in residential, commercial, industrial, and agricultural sectors.

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12/17/2010

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## Executive Summary

This report consists of research on energy use and costs in Southwest Colorado primarily for the year 2009. When the 2009 data was unavailable, other annual data was used. Energy industries researched include electricity, natural gas, propane, coal, geothermal, biomass and various renewable sources.

Electricity use in 2009 for the five-county region was estimated at 1.68 Billion kilowatt hours (kWh), costing \$146 Million. This data was gathered from the electric co-op utilities serving the region, all members of [Tri-State Generation and Transmission Association](#), including [Empire Electric Association](#), [La Plata Electric Association](#), and [San Miguel Power Association](#).

Renewable electricity production in 2009 was estimated at 124 Million kWh, with 26,153,000 kWh purchased from non-local sources. Sources of renewables include solar, ranging from grid-tied residential to large commercial arrays, micro hydro, small wind, wind purchased from other regions, waste heat recovery, and wastewater methane capture. This data was gathered where available, primarily from Empire Electric Association and La Plata Electric Association.

Natural gas use for the region was estimated at 2,126,707 thousand cubic feet (MCF), costing \$12.3 Million. This data was gathered from [Atmos Energy](#) and [Source Gas](#), the two natural gas companies serving the southwest Colorado region.

Propane use for the region was estimated at 12.8 Million, costing \$23 Million. This data was gathered from individual propane companies serving the region. Some companies gave no data, and others used “ball park” estimates of the quantities sold in 2009. In addition, a \$1.80/gallon average price was used to calculate cost for all companies. For this reason, this data should be used with the knowledge that it is not comprehensive, nor exact in price.

## Acknowledgements

This report was compiled with data from a variety of sources, including utilities, private companies, municipalities, and one helpful truck driver. Thank you to the following people who generously gave their time and energy:

Toni Bertorello, San Miguel Power Association  
Bobbe Jones, Empire Electric Association  
Brian Martins, Atmos Energy  
Mark Schwantes, La Plata Electric Association  
Doug Sparks, Empire Electric Association

Bill Green, San Miguel Power Association  
Beverly McCallister, 4CORE  
Pete Maisel, Maisel Excavation  
Paul Smith, Source Gas  
Gordon Tarola, Source Gas

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## Introduction

The purpose of this document is to provide an overall understanding of the energy use for five southwest Colorado counties (Archuleta, Dolores, La Plata, Montezuma and San Juan) to inform the future creation of the Resource and Energy Action Plan (REAP). Potential energy objectives to consider for inclusion in the REAP are provided in the “Next Steps” Section.

This energy assessment specifies the electricity, natural gas, and other heating fuels used in the residential, commercial, industrial, and agricultural sectors, where available. In the case where this sector breakdown is not available, information on largest users is provided.

## Energy Estimates

### Electricity

Electricity use in 2009 for the five-county region is estimated at 1.68 Billion kilowatt hours (kWh), costing \$146 Million. Electrical providers in Southwest Colorado include [La Plata Electric Association](#) (Archuleta and La Plata Counties), [Empire Electric Association](#) (Montezuma and parts of Dolores County), and [San Miguel Power Association](#) (San Juan County and parts of Dolores County). These electric co-op utilities are all members of the [Tri-State Generation and Transmission Association](#).

The following map provides estimated ranges for service territories:

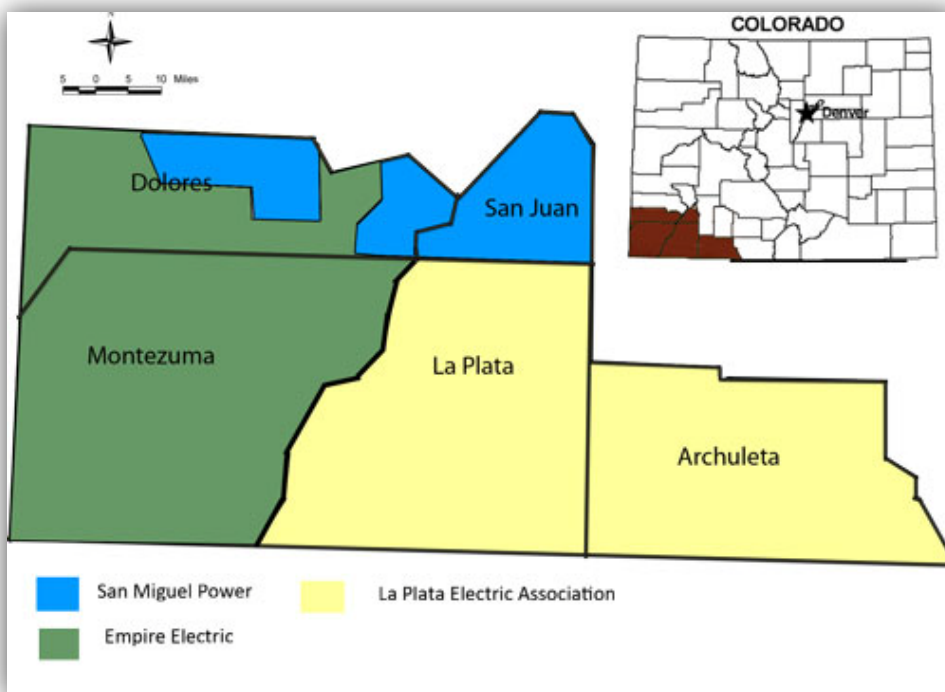


Figure 1: Map of Electric Providers in SW Colorado

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The following tables identify power usage for each sector for the year 2009. Note that information not available is identified by “N/A.”

**Table 1: Power Usage by Sector**

## San Miguel Power Association (San Juan and Portions of Dolores Counties)<sup>1</sup>:

Sector	kWh Sold	Cost
Residential	3,865,557	\$522,152
Commercial	4,226,407	\$423,305
Industrial	0	0
Agricultural	0	0
<b>Total</b>	<b>8,091,964</b>	<b>\$945,457</b>

Note: The number “0” signifies that no power is provided in this sector.

## Empire Electric (Montezuma and Portions of Dolores County)<sup>2</sup>:

Sector	# of Consumers Served	Total kWh Sold	2009 Rate/kWh	Cost
Residential	13,062	103,241,763	0.10734	\$11,081,971
Small Commercial/Industrial (1,000 kilovolt-amps or less)	2,561	106,415,401	0.10734	\$11,422,629
Large Commercial/Industrial (over 1,000 kilovolt-amps)	3	394,303,282	0.07098	\$27,987,647
Agricultural	119	1,696,273	0.10734	\$182,078
Public Street/Hwy Lighting	5	571,693	N/A	N/A
<b>Total</b>	<b>15,750</b>	<b>606,228,412</b>		<b>\$50,674,325</b>

Note: The cost of Empire Electric electricity is based on median cost values. Public lighting is not calculated based on a kWh charge, and is therefore not included in this table.

## La Plata Electric Association (La Plata and Archuleta Counties)<sup>3</sup>:

Sector	Total kWh Sold	Cost
Residential	276,390,000	\$33,111,522
Commercial	254,300,000	\$26,549,136
Industrial	528,782,000	\$34,265,550
Agricultural	2,300,000	\$358,210
<b>Total</b>	<b>1,061,772,000</b>	<b>\$94,284,418.00</b>

<sup>1</sup> Source: Director of Finance and Toni Bertorello, Executive Secretary, San Miguel Power Association

<sup>2</sup> Source: Empire Electric Association RUS Form 7 period ending December, 2009, Bobbe Jones, Assistant Member Services Manager, Empire Electric Association

<sup>3</sup> Source: Mark Schwantes, Manager of Corporate Services, La Plata Electric Association, Electricity use in 2009. Source: 2009 Annual Report “the average monthly residential bill... 11.98 cents per kWh.” This number is used as a conservative multiplier of energy costs for other sectors, as well.

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## All Counties (Non-Renewable):

Sector	Total kWh Sold	Total megawatt hours (MWh) Sold	Cost
Residential	383,497,320	383,497	\$44,715,645
Commercial	364,941,808	364,942	\$38,395,070
Industrial	923,656,975	923,657	\$62,253,197
Agricultural	3,996,273	3,996	\$540,288
<b>Total</b>	<b>1,676,092,376</b>	<b>1,676,092</b>	<b>\$145,904,200</b>

Note: Small commercial/industrial from Empire electric was categorized as commercial, and large commercial/industrial was categorized as Industrial. The numbers for public street/Hwy lighting were also included in the industrial category.

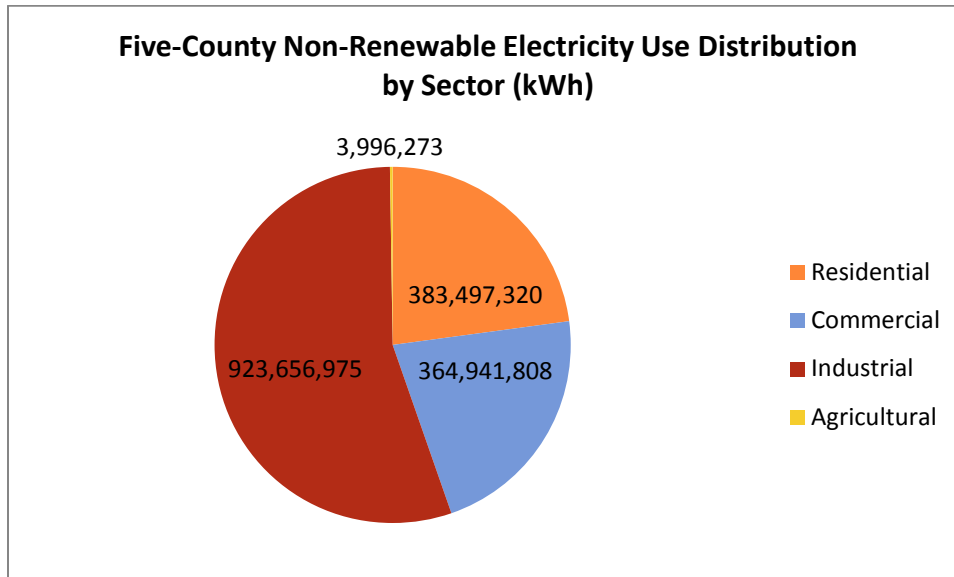


Figure 2: Five-county Non-renewable Electricity Use Distribution by Sector in 2009

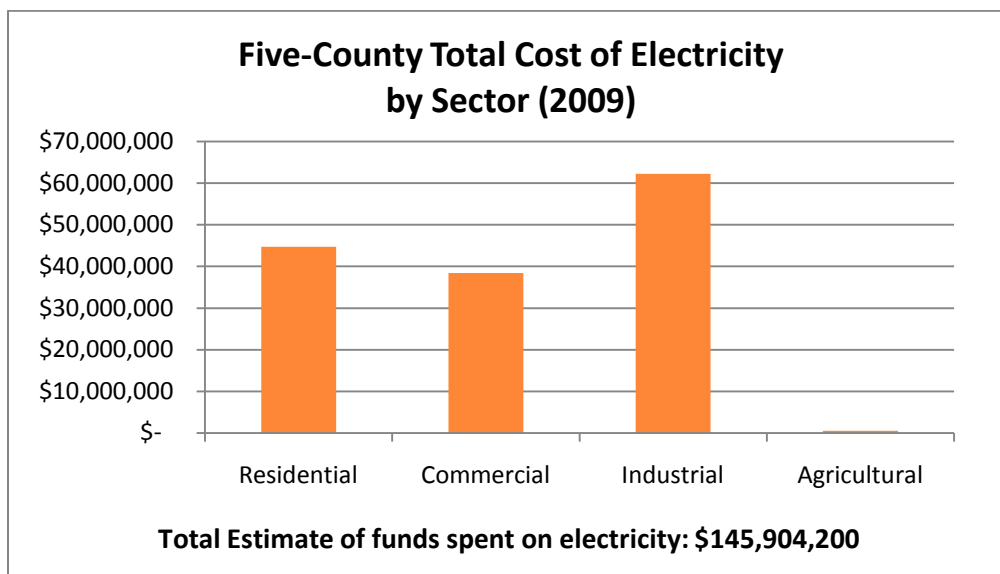


Figure 3: Total Cost of Electricity by Sector for Five Counties in 2009

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## Renewable Electricity

Renewable electricity production in 2009 was estimated at 124 Million kWh, with 26,153,000 kWh purchased from non-local sources. Sources of renewables include solar, ranging from grid-tied residential to large commercial arrays, micro hydro, small wind, wind purchased from other regions, waste heat recovery, and wastewater methane capture. This data was gathered where available, primarily from Empire Electric Association and La Plata Electric Association.

**Green Power** has been an option offered by area electric companies in Southwest Colorado for the last several years. Empire Electric Association, La Plata Electric Association, and San Miguel Power Association purchase power from Tri-State Generation and Transmission (Tri-State). Tri-State has had agreements with commercial wind farms and hog farms (biomass) in Wyoming and New Mexico to supply the demand for green electricity. Some green power has also been generated by local hydroelectric plants. Currently Tri-State is generating renewable power through the [Cimarron I Solar Project](#) in northeastern New Mexico, slated to be fully operational in December of 2010 and the [Kit Carson Windpower Project](#) in east-central Colorado.\*

Customers can support the production of wind, biomass, and hydro-generated power by paying a higher price for their electrical usage. In 2009 at La Plata Electric, a 100kWh block of Green Power cost \$0.10. Empire Electric offers a low \$0.09 per 100kWh rate. These reductions have dramatically increased participation in the program.\*

**Conservation** goals include a reduction in the amount of energy consumed per household. Average monthly consumption in Southwest Colorado is lower than both state and national averages.

Projected trends indicate that energy usage will increase due to many factors, including construction of larger homes and more air-conditioning installations. The regional electrical co-ops are all providing programs to encourage conservation and energy efficiency. Programs include free electrical and rebate-incentivized home-energy audits to identify money- and energy-saving options such as weatherization, increased insulation, use of Energy Star appliances, and use of efficient lighting. They also offer energy credits for members who purchase an electric water heater or heating systems. San Miguel Power began a solar-rebate program in June 2008. All regional co-ops also provide **Net Metered Accounts** for customers who produce more energy than they expend.<sup>4</sup>

## Montezuma and parts of Dolores Counties<sup>5</sup>

Green Power sold in 2009: 2,563,000 kWh

Solar power being produced from grid tied systems in 2009: 108,500 kWh

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<sup>4</sup> Source: Southwest Colorado Access Network, Region 9 Economic Development District, 2008 Southwest Colorado Index – Data and Trends. \*The rates and information from this source have been updated with information from 2009

<sup>5</sup> Source: Doug Sparks, Member Manager, Empire Electric Association

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Other sources of renewable power being produced currently:

- Cortez hydro began production in May of 2010 at a projected 248 kW but they are considerably under their projections. The reasons for underproduction are being investigated.
- Skanska began production in early December 2010 with approximately 258 kW solar
- Mesa Verde began production in mid-summer with approximately 76 kW solar

Table 2: La Plata and Archuleta Counties Renewable Energy Sources<sup>6</sup>

Renewable Source	Annual kWh Produced
Micro hydro	negligible (hundreds of kWh each year)
Small wind	negligible (thousands kWh each year)
Wind power purchased in 2009 (non-local)	23,590,000
Solar power produced (grid-tied systems only) - 2011 projected generation estimates based on systems installed through the end of 2010	1,646,000
Vallecito Hydro	20,000,000
Tacoma Hydro	30,000,000
Lemon Hydro	600,000
Waste Heat Recovery	45,000,000
Wastewater Methane Capstone Turbine	440,000
<b>Total</b>	<b>121,276,000</b>

The electricity currently generated in La Plata and Archuleta counties that is designated by the state of Colorado as a renewable resource is between 9% to 10% of the total green power that LPEA purchases each year. Solar alone will probably double again in just one year. An additional 2% is offset with voluntary purchases of green power.

## San Juan and Dolores Counties

San Miguel Power does not have any way to track renewable energy generated within its service territory for these two counties. It is anticipated that this document will evolve as more sources of renewables in these counties are found.

**Total renewable energy used in the five-county region is estimated at 123,947,934 kWh, with 26,153,000 kWh purchased from non-local sources.**

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<sup>6</sup> Source: Mark Schwantes, Manager of Corporate Services, La Plata Electric Association



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## Natural Gas

Natural gas use for the region is estimated at 2,126,707 thousand cubic feet (MCF), costing \$12.3 Million. This data was gathered from the gas companies [Atmos Energy](#) (Dolores, Montezuma, and parts of La Plata County) and [Source Gas](#) (Archuleta and parts of La Plata County), the two companies serving the southwest Colorado region. San Juan County does not have gas service.

The following map provides estimated ranges for service territories:

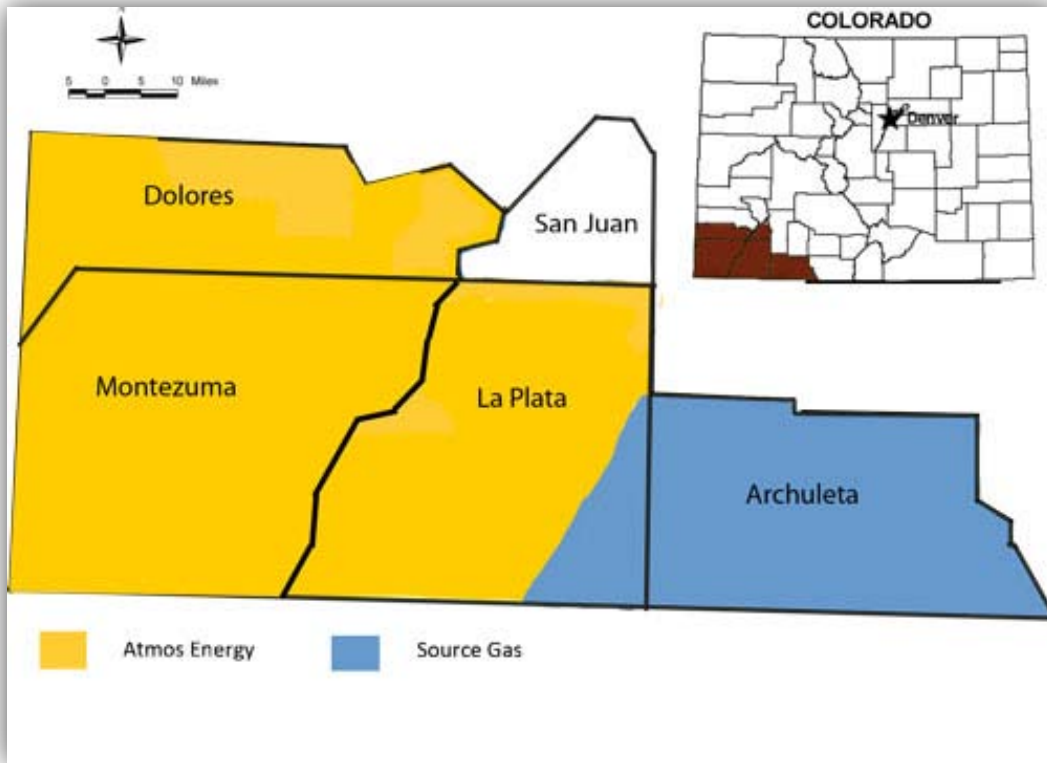


Figure 4: Map of Natural Gas Providers in SW Colorado

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The following tables define natural gas usage for each available sector:

## Atmos Energy

**Table 3: Consumption of La Plata, Montezuma, and Dolores Counties from Jan 1, 2009 to Dec 31, 2009<sup>7</sup>**

City/County	Commercial	Residential	Total
Cahone/Dolores County	592.15	1,026.26	1,618.41
Cortez/Montezuma County	216,055.74	213,293.71	429,349.45
Dolores/Montezuma County	21,387.94	42,489.24	63,877.18
Dove Creek/Dolores County	15,887.93	22,041.99	37,929.92
Durango/LaPlata County	612,908.51	728,463.88	1,341,372.40
Hesperus/LaPlata County	2,791.05	1,082.22	3,873.27
Mancos/Montezuma County	34,171.09	28,423.31	62,594.40
<b>Total</b>	<b>903,794.42</b>	<b>1,036,820.61</b>	<b>1,940,615.03</b>

Sector	MCF (1000 cubic feet)	Therms	Rate/MCF	Estimated cost
Commercial	903,794.42	9,281,968.70	\$ 5.5225	\$ 4,991,204.69
Residential	1,036,820.61	10,648,147.69	\$ 5.8768	\$ 6,093,163.79

## Source Gas

**Table 4: Gas Consumption in Pagosa Springs (Archuleta) and Bayfield (La Plata County) from Sep 2009 to August 2010<sup>8</sup>**

City/County	Commercial	Residential	Industrial	Total Therms
Bayfield/LaPlata	261659.34	512851.34	27811.00	802321.68
Pagosa Springs/Archuleta	617646.27	440166.03	51035.00	1108847.30
<b>Total</b>	<b>879305.61</b>	<b>953017.36</b>	<b>78846.00</b>	<b>1911168.98</b>

Sector	MCF (1000 Cubic Feet)	Therms	Rate/Therm	Estimated Cost
Commercial	85,618.85	879,305.61	\$0.5919	\$520,462.05
Residential	92,796.24	953,017.36	\$0.6638	\$632,602.76
Industrial	7,677.31	78,846.00	\$0.5921	\$46,682.06

*Note: Data for the complete year of 2009 was not available from Source Gas because they switched to a new data tracking system in September of 2009. The data that was available for one complete year was used, with as many months from 2009 used as possible.*

<sup>7</sup> Source: Brian Martens, Atmos Energy

<sup>8</sup> Source: Gordon Tarola, Source Gas, Energy Analyst II

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## All Counties

Sector	MCF (1000 Cubic Feet)	Therms	Estimated Cost
Commercial	997,090.272	10,240,117.098	\$ 5,558,348.80
Residential	1,129,616.851	11,601,165.057	\$ 6,725,766.55
<b>Total</b>	<b>2,126,707.123</b>	<b>21,841,282.156</b>	<b>\$ 12,284,115.35</b>

Note: No industrial sector data was provided by Atmos. Therefore, the industrial data from Source Gas was combined into the Commercial category and totaled above.

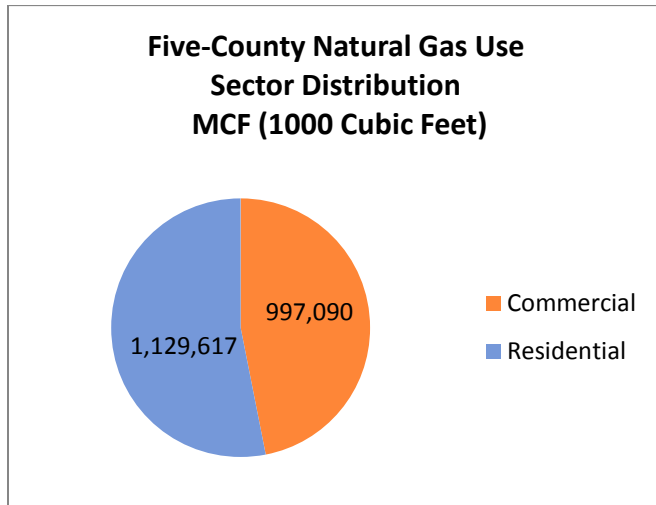


Figure 5: Five-County Natural Gas Use, Annual Sector Distribution MCF (1000 Cubic Feet)

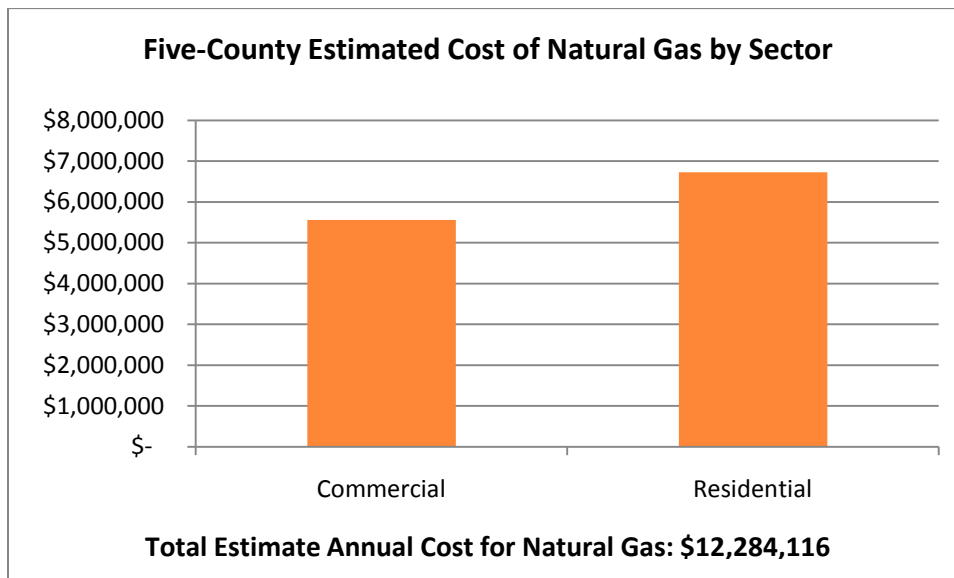


Figure 6: Total Cost of Natural Gas by Sector for five-counties over one year

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## Propane

Propane use for the region is estimated at 12.8 Million, costing \$23 Million. This data was gathered from individual propane companies serving the region. Some companies gave no data, and others used “ball park” estimates of the quantities sold in 2009. In addition, a \$1.80/gallon average price was used to calculate cost for all companies. For this reason, this data should be used with the knowledge that it is not comprehensive, nor exact in price.

**Table 5: Propane providers in Southwest Colorado include the following list of eleven private companies<sup>9</sup>**

Propane Company	# Gallons sold per year	# KBTU	Cost	County	Location
AAA Propane, Inc	940,000	86,148,744	\$ 1,692,000	Archuleta	Pagosa Springs
Amerigas	6,000,000	549,885,600	\$ 10,800,000	La Plata	Bayfield
Basin Co-op, Inc	2,300,000	210,789,480	\$ 4,140,000	La Plata	Durango
Bob's LP Gas	Not available	Not available		Archuleta	Pagosa Springs
Country Gas	Not available	Not available		Montezuma	Cortez
Fraley & Co, Inc	350,000	32,076,660	\$ 630,000	Montezuma	Cortez
High Country Fuel	100,000	9,164,760	\$ 180,000	Dolores	Dove Creek
Mesa Propane, Inc	1,700,000	155,800,920	\$ 3,060,000	La Plata	Durango
Navajo Butane Co	1,050,000	96,229,980	\$ 1,890,000	Montezuma	Cortez
Selph Propane, Inc	Not available	Not available		Archuleta	Pagosa Springs
Silverton LP Gas	349,546	32,035,052	\$ 629,183	San Juan	Silverton
<b>Total</b>	<b>12,789,546</b>	<b>1,172,131,196</b>	<b>\$ 23,021,183</b>		

*Note: Costs were estimated based on a December 2010 rate of \$1.80/gallon*

Though each company has been polled individually, there was no consistent information available about energy used per sector.

<sup>9</sup> Source: Phone research by Beverly McAllister, 4CORE

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## Other fuels

### Coal

Table 6: Stoker and Lump Coal as a primary fuel source in Silverton and San Juan County<sup>10</sup>

Coal Type	Source	Sector	tons/yr	Cost
Stoker Coal	Paonia, CO Oxbow Mine (Premium Pile)	Municipal/ Residential	160	\$150/ton
Lump Coal	Hesperus, CO	Residential	40	\$150/ton (10 tons donated/yr)
<b>Total</b>			<b>200</b>	<b>\$30,000</b>

Coal is trucked from the source in Paonia, Colorado at Oxbow mine’s “Premium Pile,” usually over winter mountain passes, delivered, and fed into a hopper in the basement of (usually sealed) coal-heated buildings and homes. From there it is then fed into a boiler manually.

The stoker coal from Paonia is lightly oiled, but low in sulfur, decreasing some of the sulfur emissions usually associated with burning coal. Hesperus coal is also trucked over passes to Silverton, though a shorter distance than Paonia.

### Biomass

San Juan County and Silverton have experimented with supplementing and replacing coal with sunflower biomass. Though the fuel has proven to be somewhat cheaper than coal, there were issues that prevented the town from completely switching over. These include increased mold since sunflower biomass is more moist than coal (older basements in Silverton are often damp due to the extremely high water table), which creates the need to feed the boiler more frequently (increasing the labor cost) since sunflower biomass burns at a lower temperature than pure coal.

### Geothermal

The Town of Pagosa Springs has owned and operated a geothermal heating system since December 1982 to provide geothermal heating during the fall, winter, and spring. The geothermal heating system was funded by the U.S. Department of Energy with additional funds provided by Archuleta County and the town itself. The total cost to complete the system was over \$1.4 million. Currently, the system has 31 customers with an average annual operating budget of \$40,000. Two production wells (PS-3 and PS-5) 300 and 274 feet deep at 131°F and 149°F have artesian flow rates of 600 gallons per minute (gpm) and 800 gpm, respectively. Only well PS-5 is currently used with PS-3 serving as a backup well. In addition to the Town district heating system, two resorts use geothermal springs to heat pools adjacent to the San Juan River – The Springs Resort and Spa, and The Spa at Pagosa Springs.

<sup>10</sup> Source: Pete Maisel, Maisel Excavation, LLC, Silverton, CO

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At this time, with the available data, it is not possible to accurately quantify either the volume of the geothermal reservoir or the actual usage of the Pagosa Springs thermal waters. Industrial applications and electric power generation are not economically feasible using the geothermal resource due to the high temperature requirements. Raising the temperature (peaking) of the geothermal fluids with fossil fuel may be feasible, however, this needs to be investigated in more detail.<sup>11</sup>

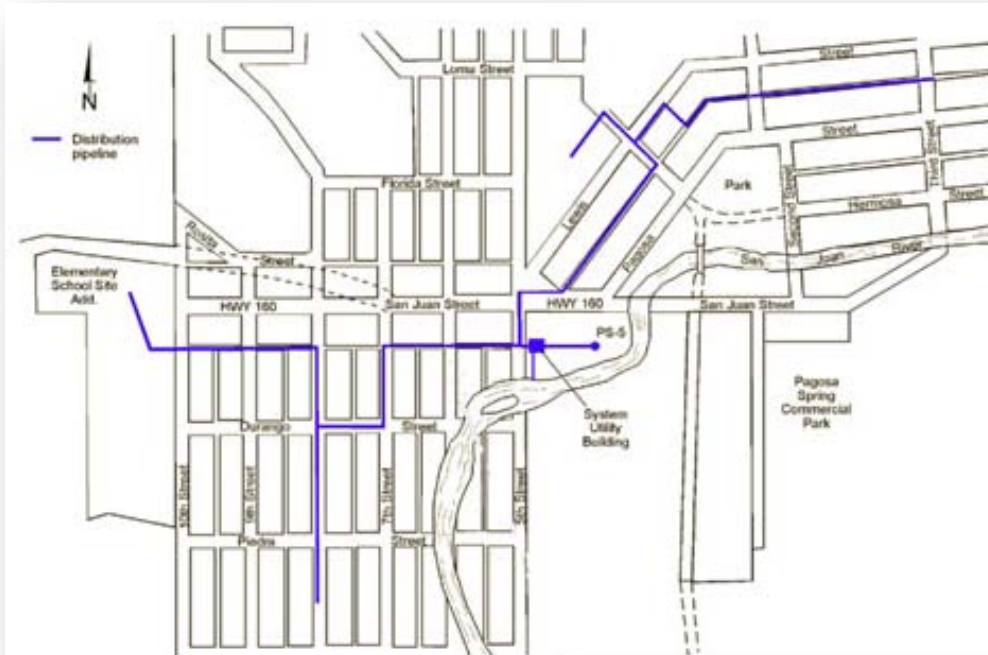


Figure 7: Pagosa Springs Town Geothermal District Heating System<sup>12</sup>

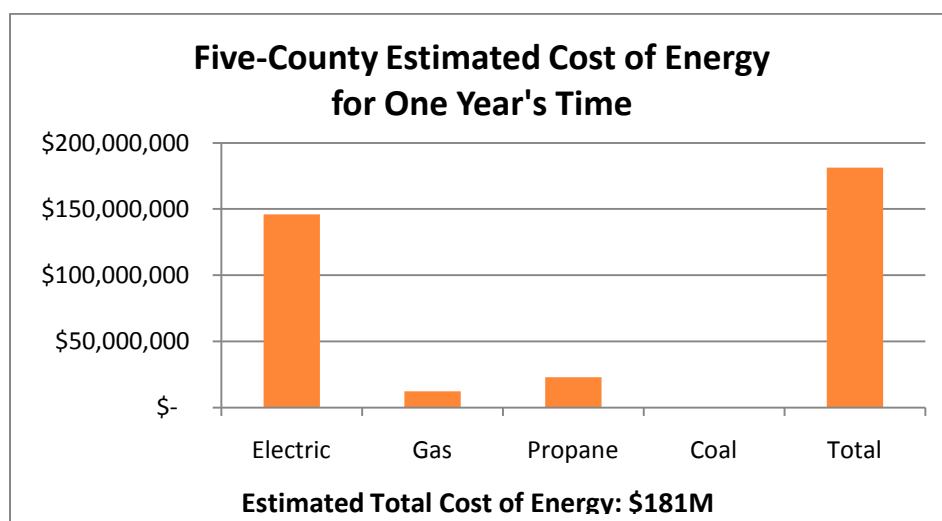
<sup>11</sup> Source: *Observations and Recommendations Regarding Geothermal Use in Pagosa Springs, Colorado* by John Lund, National Renewable Energy Laboratory and Gerald Huttner, Geothermal Management Company, Inc.

<sup>12</sup> Source: *Observations and Recommendations Regarding Geothermal Use in Pagosa Springs, Colorado* by John Lund, National Renewable Energy Laboratory and Gerald Huttner, Geothermal Management Company, Inc.

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## Energy Economics: Money Leaving Southwest Colorado to Pay for Energy



Note: Renewable electricity, Biomass, and Geothermal are not included in this graph.

Figure 8: Five-County Estimate Cost of Energy for One Year

Much of the power used locally is generated from non-local companies and locations. Tri-State's owned and contracted portfolio of electric energy is derived from coal, natural gas and oil-fired and combustion turbine generation facilities located throughout its four-state member service territory. Tri-State owns and operates plants in Colorado and New Mexico, and it receives a share of power from plants in Arizona, New Mexico and Wyoming<sup>13</sup>. Some of the natural gas used locally may be produced locally, but the companies who generate the majority of this gas are not locally-owned. Finally, even the renewable energy in the Green Block and Power programs ultimately comes from out-of-state and non-local sources. Decreasing energy use and demand will ultimately decrease the money leaving this region.

### Next steps: Where to focus energy efforts

Energy goals for Southwest Colorado will be determined by the REAP Advisory Board in early 2011. Some projects coordinated by Community Energy Coordinators in other parts of Colorado have goals as high as a 20% decrease in energy by 2020. Possible objectives for energy goals included in the REAP document could include:

- Increase the number of energy audits (commercial, industrial, agricultural and residential)
- Increase the number of energy efficiency retrofits for homes and buildings
- Increase the number of "energy-educated" homeowners and building managers
- Increase the number of renewable small-scale installations and large-scale projects
- Increase the number of educated businesses and employees

<sup>13</sup> Source: <http://www.tristategt.org/AboutUs/generation.cfm>