

8 EXTRACTIVE RESOURCES & RENEWABLE ENERGY



OVERVIEW

Resource extraction is the removal of natural resources from their place of discovery. Extractive resources are considered non-renewable resources. The primary extractive resource in La Plata County is natural gas, along with some oil. Sand, gravel, coal, gold, and silver are also mined in the County. Extractive natural resources play a major role in the County, both in terms of fiscal impacts as well as impacts upon the physical environment and local residents. The State Legislature has adopted Title 34 Mineral Resources to acknowledge the importance of commercial mineral deposits for the State's economy (C.R.S. § 34-1-301 et seq.). As a result of La Plata County's expanding rural population (See *Growth Trends*, Element 2 of this Plan), increasing conflicts have occurred between the private rural population and extractive industries. The challenge is to find a balance between accommodating extractive resource development with an increasing population and to develop ways for mitigating potential conflicts between extractive resource development activities and other land uses.

There is a significant regulatory network in place for extractive resources in the County which involves multiple agencies at the federal, state, and local levels. Each agency involved with the various extractive resources industry has their prescribed roles. Therefore, local coordination with the various agencies is a primary interest of the County. It is important for La Plata County to be aware of the activities under its jurisdiction and to further coordinate with other regulatory agencies as well as local residents to ensure areas of concern are addressed. The State of Colorado provides legislation for local regulation that could be used to address various subjects of this Element, such as hard mineral extraction and renewable solar power generation on a large scale. That legislation is termed "1041 Powers", which the County does not currently utilize, however may wish to pursue in the future.

Renewable energy is an emerging part of the County's energy portfolio. Renewable energy is energy generated from natural processes that are continuously replenished rather than from fossil fuels. An increase in renewable energy production has the benefits of reducing the community's dependency on fossil fuels, reducing the need to bring in electricity from outside the area, as well as the associated costs; and providing a more efficient usage of the commodity. One important goal of supporting and promoting local projects is the positive economic impact to a variety of local businesses, companies and contractors. There is considerable support in the County for additional local renewable energy projects. Although there are many positive aspects of developing renewable energy resources, each of the potential sources of renewable energy has its own drawbacks. The technology associated with many renewable energy projects is fairly new and the impacts from these endeavors may not be fully realized. Although there are several regulatory agencies involved with the development of renewable energy, the regulatory framework for the industries involved has not yet been entirely established.

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BACKGROUND

OIL AND GAS

The southern portion of La Plata County lies within the northern extent of the San Juan Basin, a geologic structural basin. The San Juan Basin was the fourth largest gas basin in the United States as of 2013 (U.S. Energy Information Administration). Table 10-1 shows the number of oil and gas wells and related facilities in the County. There are currently 3,288 active wells in La Plata County, with 2,019 located on private lands. The location of these wells is shown on Table 10-1.

**Table 8-1
La Plata County Active Oil and Gas Wells and Facilities**

	Total	No. on Private Surface
Active oil and gas wells*	3,288	2,019
Injection wells	39	22
Compressor stations	7	6
Treatment facilities	4	3

*Includes wells with a status of active, drilling, producing, shut in, temporarily abandoned, and waiting on completion.

Source: Colorado Oil and Gas Conservation Commission, 2015

Exploration and development in the San Juan Basin is largely found in the Ignacio-Blanco field. This field was discovered in the 1940s, although oil and gas deposits were first discovered in La Plata County in the 1890s. The Ignacio Blanco field comprises the portion of the San Juan Basin within La Plata County. Production in the field is from the Dakota Sandstone, Fruitland Formation, Pictured Cliffs Sandstone, and the Mesaverde Group. Until the 1970s, most of the gas produced in the basin came from conventional wells completed in the Dakota Sandstone, Mesaverde Group, and Pictured Cliffs Sandstone, which includes the Fruitland Sand. These formations typically yield wet gas with small quantities of produced water and associated hydrocarbon liquids. Production from conventional wells in the Ignacio-Blanco field peaked in the 1990s, although there is still potential for limited development.

Coalbed methane (CBM) is currently the primary focus of natural gas development in the County. Production from CBM reservoirs in the San Juan Basin, primarily the coals of the Fruitland Formation, began in the late 1970s and accelerated in the 1980s up to the present time. The San Juan Basin has become the most productive coalbed methane basin in North America (EPA 2004). In 2012, La Plata County was the nation’s tenth largest natural gas producing county (DOLA 2015). CBM development in La Plata County is expected to continue in the future.

CBM wells are considered non-conventional wells since they must be dewatered by pumping water from the well. The decrease in water pressure allows methane to desorb from coal in the formation and flow as a gas up the well to the surface. Therefore, gas production increases over time instead of decreasing. The volume of water produced from most CBM wells is high compared to conventional natural gas wells. As a by-product of oil and gas development,

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produced water must be disposed. In La Plata County, produced water is typically treated and reused in drilling operations or injected back into an unproductive formation through an injection well.

The most common formations targeted for injection in La Plata County are the Mesaverde Formation, at an average depth of 5,000 feet below the ground surface, and the Entrada Formation, at an average depth of approximately 7,500 feet below the ground surface. The Colorado Oil and Gas Conservation Commission (COGCC) issues Class II Underground Injection Control permits on non-tribal lands, while the Environmental Protection Agency (EPA) regulates injection wells on tribal lands. There are currently 39 wells in La Plata County permitted under the Underground Injection Control program, although not all are actively injecting (Table 8-1). Twenty-two of these wells are located on private surface. The location of the injection wells in the County is shown on Map 8-1.

Another component of oil and gas development is the associated infrastructure needed to transport and process the oil and gas once it has been pumped from the ground. A network of pipelines leads from individual well pads to larger gathering lines that feed into processing facilities. Transmission pipelines transport processed natural gas and hydrocarbon liquids over long distances to customers and distribution facilities. Compressor stations are needed along natural gas pipelines depending on the distance and terrain to help move the gas through the pipeline. Pipelines for the transport of produced water to injection facilities are also common throughout the County.

The number of oil and gas related facilities permitted through the COGCC, and within La Plata County, is shown in Table 8-1.

Impacts

In 2002, a La Plata County Impact Report was prepared in response to proposed infill development within the County. The report assessed the potential impacts that result from and appropriate mitigation measures for CBM development. The County has already implemented a majority of the recommendations made in the report through changes to the La Plata County Land Use Code (LPLUC) Chapter 90 regulations.

The establishment of oil and gas facilities can have various impacts to the surrounding environment and local residents. The most noticeable impact is visual disturbances from the clearing of vegetation and the introduction of equipment on the natural landscape (as with any development activity). Noise during construction and operation, is also similar to other types of development activity, and considered a noticeable impact. Other land use impacts could potentially include the loss of otherwise usable land for other forms of active development or uses, and the potential convergence of residential and oil and gas development over time. Development in rural areas of the County might create an impact on sensitive wildlife habitat. Oil and gas development contributes to traffic volumes on public and private roads in the County. Heavy truck traffic associated with oil and gas activities increases the costs of road maintenance for the County. Construction and traffic associated with oil and gas also contributes to an increased potential for

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noxious weeds to become established along roadways.

Oil & gas development also must find a balance to other impacts such as health and safety within the community. These efforts usually surround ensuring quality of proximate surface water quality from surface disturbances, and potential erosion or sedimentation from surface run-off. Concerns regarding impacts to the water quality in water wells have been expressed by the general public. In 2000, the COGCC began requiring routine domestic water well sampling for operators drilling new CBM wells in the San Juan Basin. A data analysis report in 2011 identified 71 water wells out of 2,038 containing thermogenic (originating from the earth rather than biologic sources) methane, although a trend was not identified that directly related the occurrence of methane to oil and gas development activities (*San Juan Basin Water Quality Analysis Project, AMEC Geomatrix Inc.*). Methane, nitrous oxides, and volatile organic compound emissions from wells and associated equipment have the potential to impact air quality. Preventative measures for public safety risks are typically focused toward the presence of large equipment on well pads during construction or operation, as well as, the potential for explosions due to the presence of volatile gases.

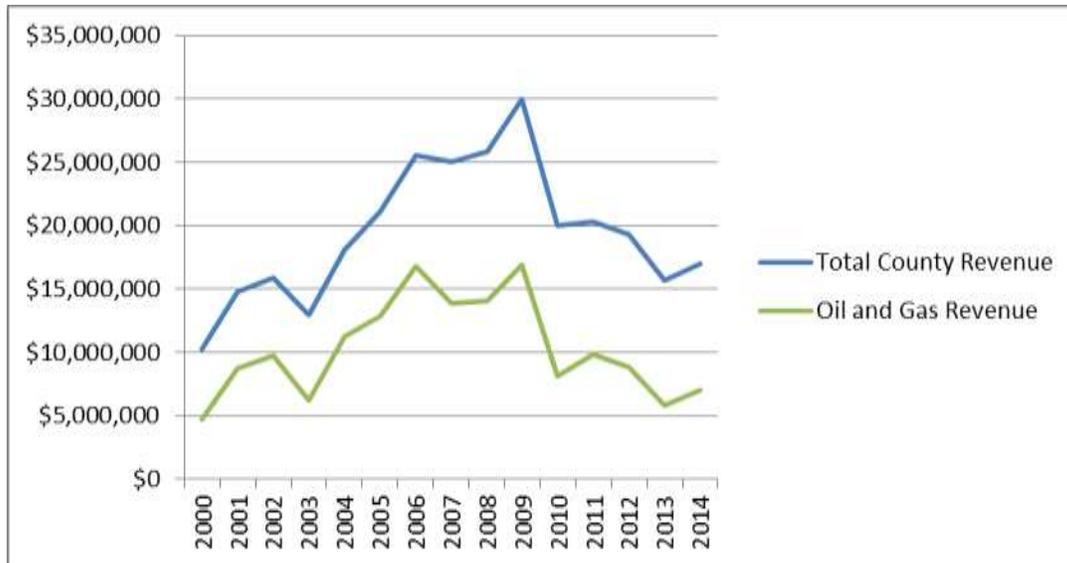
The presence of the oil and gas industry has facilitated rural development in many areas of the County through the construction and maintenance of roads, as well as, the extension of power lines to electrify well equipment. The La Plata Energy Council (LPEC) and local operators maintain approximately 165 miles of private roads within the County through cost sharing.

Oil and gas development represents a significant source of revenue for the County and community. In fact almost half of the County's tax base (Table 8-1) is derived from the oil and gas industry. The County also receives revenue from state severance taxes and federal mineral lease payments paid to the State. Severance tax is imposed on non-renewable natural resources that are removed from the earth in the State of Colorado. Federal mineral lease payments are the portion of the revenue from leasing federal minerals that is paid to each state under the Mineral Lands Leasing Act of 1920. The State of Colorado distributes a portion of these revenues to local governments. Chart 10-2 shows the severance tax and federal mineral lease distributions received by the County from 2009 through 2014. The municipalities of Durango, Bayfield, and Ignacio also receive severance tax and federal mineral lease distributions. The Durango, Bayfield, and Ignacio school districts benefit from property tax revenue and federal mineral lease distribution payments as well. Many residents also receive royalty payments for their mineral interests. Revenues to local governments, special districts, and royalty owners are based on commodity price and production rate and can fluctuate widely (Chart 10-1).

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**Chart 8-1
Total La Plata County and Oil and Gas Property Tax Revenue: 2000 - 2014**



Source: La Plata County Assessor's Office

The oil and gas industry directly accounts for approximately 1.6% of the jobs in the County (DOLA). Mineral and energy production constitutes an important base industry, which in turn produces indirect and induced jobs within La Plata County.

Regulation

Surface and mineral ownership within La Plata County includes private, federal, tribal, and state interests. The regulatory agencies involved with permitting and overseeing an individual well depends on the surface ownership and the ownership of the minerals being developed. Often, there is a difference in ownership between the surface land and the sub-surface minerals, a situation known as split-estate. In the case of directional wells, the minerals being developed may not be the minerals directly under the surface location. In such situations, there is an overlap in regulatory jurisdiction and multiple agencies may be involved in the permitting and oversight of a well.

In 1988, the County added oil and gas regulations to its land use system. The County derives the authority to regulate land use pertaining to oil and gas development under the Local Government Land Use Control Enabling Act (C.R.S. 29-20-101 et seq.). Specific requirements for oil and gas facilities in La Plata County are provided in Chapter 90 of the LPLUC. The Chapter 90 regulations have been revised multiple times since 1988 to address new issues and remain consistent with COGCC regulations. Chapter 90 regulations apply to oil and gas related surface development on private lands within the unincorporated area of the County. The County does not regulate any down-hole actions involved with the drilling, production, nor plugging of a well. The County has also agreed through a Memorandum of Understanding (MOU) with the Southern Ute Indian Tribe to refrain from regulating tribal-owned facilities on non-Indian fee lands within the boundaries of the Southern Ute Reservation.

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The main regulatory agency for oil and gas development in Colorado is the COGCC. The COGCC has developed rules for the oversight of the various aspects of oil and gas development within the State. The COGCC also has a Local Government Designee (LGD) program to promote communication and coordination between the COGCC and local county or municipal governments. La Plata County is an active participant in this program.

Federal and tribal trust minerals are administered by the Bureau of Land Management (BLM). The COGCC has a MOU with the Southern Ute Indian Tribe in which they have agreed to refrain from regulating tribal trust lands, minerals or the Southern Ute Indian Tribe within the boundaries of the reservation. Although the BLM has the primary regulatory authority for down-hole actions in tribal wells, their authority regarding surface disturbance is limited on private lands. In situations where a well is located on private surface and developing tribal minerals, unless the operator represents the Southern Ute Indian Tribe, the County is the main regulatory authority over surface disturbance.

The Office of Pipeline Safety under the Pipeline and Hazardous Materials Safety Administration, which is part of the U.S. Department of Transportation, oversees interstate pipelines. In Colorado, intrastate pipelines are regulated by the Colorado Public Utilities Commission (PUC) Gas Pipeline Safety Section. The PUC is charged with overseeing the safety of gathering, transmission, and distribution pipelines. COGCC pipeline jurisdiction generally pertains to flowlines (before entering the gathering system) along with regulating the reporting of spills, releases or leaks from flowlines and gathering lines. The La Plata County Office of Emergency Management (OEM) is also notified of any leaks or spills. The LPLUC requires an individual minor facility permit for any pipeline over 1,320 feet long. Major facility permits are required from the County for transmission lines.

In addition to the main regulatory agencies for oil and gas, operators are also required to obtain permits with several other agencies. The Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division issues stormwater permits for the construction of well pads greater than 1 acre. The U.S. Army Corps of Engineers (USACE) issues permits under Section 404 of the Clean Water Act for any activities that will result in the release of dredged or fill materials into Waters of the U.S., including jurisdictional wetlands. Projects that require an individual Clean Water Act-Section 404 permit will also require Clean Water Act-Section 401 certification by the CDPHE Water Quality Control Division. Section 401 certification is under the jurisdiction of the EPA on Southern Ute Tribe lands and the Ute Mountain Ute Tribe, on Ute Mountain Ute lands. As a result of the Colorado Supreme Court ruling in *Vance vs. Wolfe*, 205 P.3d 1165 (Colo. Sup. Ct. 2009), all CBM wells that produce groundwater are required to obtain a well permit from the Colorado Division of Water Resources. Air emissions are regulated by the CDPHE Air Pollution Control Division. The Southern Ute and Ute Mountain Ute Tribes administer their own air quality programs for major sources within reservation boundaries, while the EPA regulates minor sources on tribal lands.

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SOLID MINERALS

Coal

The Durango-Pagosa Springs coal field occurs along the northern margin of the San Juan Basin. Coal may be extracted by surface, subsurface, or in situ mining methods. Coal has been mined in La Plata County since the early 1880s. La Plata County's early coal mines were located around Durango and expanded to Wildcat Canyon, Hesperus, Hay Gulch and Bayfield in later years. The domestic market for coal provided a steady demand, which was later supplemented by the industrial needs of smelters and the railroads associated with hardrock mining in La Plata Canyon and Silverton. The smelters' demand for coal lasted until 1930. Small mines providing coal for domestic use operated in the Hay Gulch and Hesperus areas into the 1970s. These mines have largely been abandoned.

One large scale coal mine, the King Coal Mine, opened in Hay Gulch in 1936. Operations at the original mine ceased in 2009 and those portals have been sealed. The King Coal II Mine surface facilities were constructed in 2008 and are still active. The King Coal II Mine is a subsurface mine that develops federal minerals. The location of the lease is shown on Map 8-2. Coal is hauled from the site by truck, generally to a rail head located in Gallup, NM. The mine primarily supplies cement companies, but maintains a link to the past as the supplier for the Durango & Silverton and the Cumbres & Toltec railroads. Coal production in the County is expected to continue, although the distance to rail lines for the transport of materials may limit the potential for significant expansion.

Sand and Gravel

Sand, gravel, and stone are used for building materials, aggregate, bulk fill, riprap, road surfacing, decoration, and landscaping. Deposits of common variety mineral materials occur everywhere in the County, although common sites for natural concentrations include canyon walls, stream channels, talus slopes, landslides, ancient river terraces, glacial moraines, and floodplains. Sand and gravel are typically mined using open pit or quarrying methods.

There are a total of 40 active sand and gravel pits permitted by the Division of Reclamation Mining and Safety (DRMS) in La Plata County. Two of the pits are owned and operated by La Plata County for road construction projects, the Crader Pit and Marvel Pit. Map 8-2 shows the location of active sand and gravel mining permits in the County. Due to the consistent need for sand, gravel, and stone in building and construction, the presence of pits and quarries is expected to continue in the County. The location of these pits will likely change as resources are exhausted and new pits are developed.

Hardrock Mining

Historically, La Plata Canyon has been the location of primary interest for placer activity and hardrock mining. Mining of placer gold began along the La Plata River in 1873. Miners quickly graduated from panning for gold to hard rock mining for silver. The early 1900s and the 1930s saw the greatest production in the La Plata Mining District as output switched from silver to gold. The La Platas produced mostly gold, but the ores also contained silver, lead, and copper. When

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the federal government suspended gold mining in 1942 and called for mining only the minerals needed by the war effort, the La Plata production came to an end. Other historic mining districts in La Plata County never accounted for much mineral production.

There are currently four active gold mines in La Plata County (Map 8-2). Two of those mines are also permitted for silver mining. The high price of gold and other precious metals may motivate new small claims in the area of La Plata Canyon, but major mining operations are not expected to develop in the County. Minor recreational gold placer activity occurs in the Animas and La Plata rivers and major tributaries.

Limestone, valuable for certain chemical and industrial uses, occurs along the Animas River Valley. Currently, there is no active mining of limestone in the County, although the potential for future interest may exist. Historic proposals to mine in the area led to the withdrawal of deposits by the federal government to protect scenic values along the U.S. Highway 550 corridor.

Impacts

Generally, ground disturbance involved with surface mining, open pits, and quarries creates the potential for visual impacts, habitat loss, and exposed surface soils. The exposure of soils may result in erosion, dust, and sedimentation in surface water. Invasive species may be a concern in areas of disturbed and stockpiled soils and compacted areas. Mine subsidence can occur with subsurface mining, whereby the ground level lowers as a result of materials having been mined beneath. Mining operations also have the potential to cause air quality impacts through emissions from vehicles, large construction equipment, and generators used on a regular basis; particulates from blasting activities or crushing operations; possible releases of methane, hydrogen sulfide, and coal dust through the venting of underground coal mines; or fugitive dust from exposed soil surfaces. Noise impacts can also occur with the use of large equipment and blasting.

Mining alters the landscape and its natural hydrologic system. This can create a need to redirect surface water drainages. Acid mine drainage is caused when water flows over or through sulfur-bearing materials, exposed by mining activities, forming solutions of net acidity and can be an environmental challenge for some mines. Acidic runoff is not considered to be a problem at sand and gravel mining operations since the materials being mined do not have high concentrations of heavy metals. Some mining activity has the potential to affect the quantity and quality of groundwater supplies by cutting into aquifers. Blasting operations or subsidence may break up impermeable layers of rock underground, allowing or diverting the flow of groundwater. Aggregate and stone mines must use water to wash some materials on site and control dust, creating potential impacts to local water resource supplies. The most recognized health issues associated with surface mining involve airborne particulate emissions.

Subsurface mining poses different risks than surface mining, such as possible oxygen deficiency, potentially explosive gases, hydrogen sulfide, coal dust, collapse of walls or roofs in the mine, or the flooding of a mine if an aquifer is breached. There exists the potential for fires to erupt and burn in coal seams. Large volumes of mining waste could be generated because of the high waste-to-product ratios associated with producing most ores. Waste material may contain naturally

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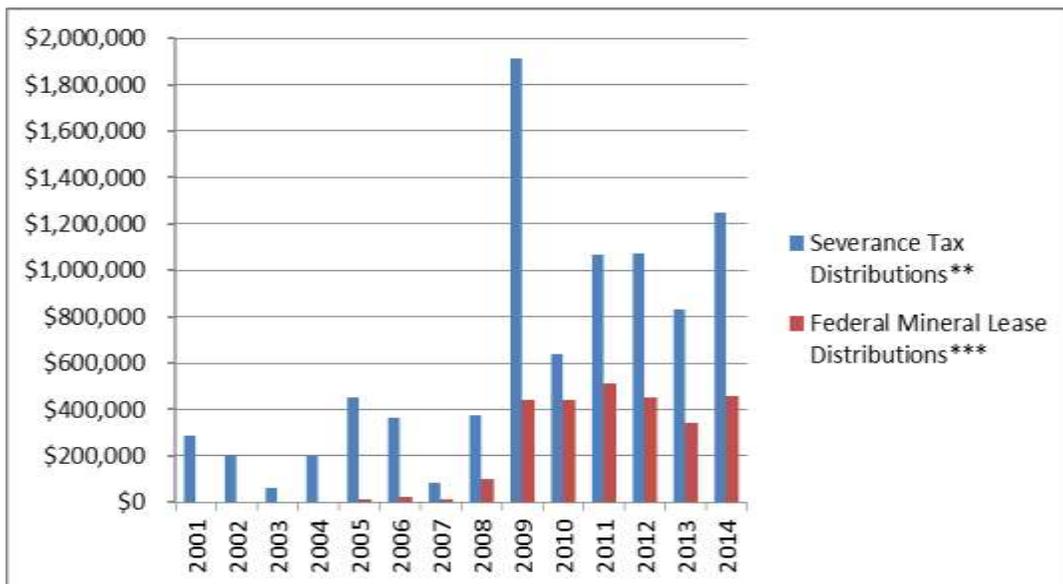
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occurring materials such as lead and mercury. Increases in heavy vehicle traffic on local roadways may occur during the transportation of the materials being mined. Road impacts could create several issues, including the potential to increase the cost of maintaining roads.

Positive economic impacts to the County result from severance tax distributions for coal and metal mining and federal mineral lease distributions for the leasing of federal coal minerals. The severance tax and federal mineral lease distributions shown in Chart 8-2 also include payments received by La Plata County for coal and metal mining in the County. These industries are also a significant source of jobs for County residents.

Chart 8-2
La Plata County Severance Tax and
Federal Mineral Lease Distributions Received: 2001 – 2014*



*Direct distribution data prior to 2009 was calculated differently than later data due to legislative changes (HB07-1139, HB08-1083, SB08-218)

**Includes amounts from coal, metal, and oil and gas severance taxes

***Includes coal and oil and gas federal mineral leases

Source: Colorado Department of Local Affairs

Regulation

Within the DRMS, a division under the Colorado Department of Natural Resources, the Office of Mined Land Reclamation administers rules and regulations for mining and reclamation through the Coal Regulatory Program and the Minerals Regulatory Program. The Coal Program issues permits for coal mining and reclamation, and approves notices of intent to conduct exploration. The Minerals Program does not grant permission to mine. Instead, the program issues four different types of reclamation permits based on the type of operation and characterization of the material being mined. The Mined Land Reclamation Board, a multi-interest citizen board, establishes and enforces the regulations, standards, and policies that guide the DRMS.

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The Mined Land Reclamation Board and the DRMS issue and enforce permits for all mines in Colorado on state, federal, and private lands. The La Plata County Public Works Department Environmental Specialist acts as a commenting agency on reclamation approval by DRMS. The federal Office of Surface Mining regulates mining for environmental and public impacts on tribal lands. The Mine Safety and Health Administration (MSHA) regulates all mining activities for the safety of mine workers. The BLM is responsible for the leasing of coal interests owned by the federal government. Recreational, small scale gold panning does not require a permit on state or federal lands.

The La Plata County Planning Department requires a Class II land use permit for all commercial mining operations on lands under the jurisdiction of the County. Mining operations in Colorado must also obtain industrial stormwater permits from the CDPHE Water Quality Control Division and report air emissions to the CDPHE Air Pollution Control Division. Clean Water Act-Section 404 permits must be obtained from the USACE if Waters of the U.S. will be impacted. Clean Water Act-Section 401 certification from the CDPHE Water Quality Control Division is required for any projects that require Section 404 permitting, but do not qualify for a nationwide permit. Gravel pits that expose groundwater must obtain permits from the Colorado Division of Water Resources. On tribal lands, stormwater permits are administered by the EPA or Ute Mountain Ute Tribe. Air quality is regulated by the Southern Ute and Ute Mountain Ute Indian Tribes' Air Quality Programs for major sources and the EPA for minor sources.

RENEWABLE ENERGY

There are prospects for small scale residential development of renewable energy throughout the County. La Plata Electric Association, Inc. (LPEA), a rural cooperative, provides electric to all of La Plata County. LPEA and Tri-State Generation and Transmission Association, Inc. (Tri-State) have a long-term wholesale power purchase agreement in which LPEA has agreed to purchase no less than 95 percent of its electric service needs from Tri-State until December 31, 2050. This leaves 5 percent that can be purchased by LPEA from local sources. As of 2012, LPEA purchased approximately 4 percent of its power from local sources, leaving 1 percent open for additional local renewable energy projects. The potential for utility scale development of renewable energy may be constrained by the purchase agreement between LPEA and Tri-State.

In 2012, LPEA developed a Long-term Alternative Energy Outlook with the goal of supplying 20 percent of the electricity from local sources by 2020. Options to achieve this goal within the constraints of the wholesale power purchase agreement include the direct purchase of renewable energy by Tri-State, as in the Vallecito Hydroelectric facility (referenced below), or small scale facilities that provide their own electricity, such as solar photovoltaic (PV) installations. Renewable energy produced locally and purchased by Tri-State may also help the company to meet renewable energy standards mandated by the State of Colorado. As of October 2013, approximately eight percent of energy consumed by LPEA members was produced locally.

Sources of renewable energy in La Plata County include hydroelectric generation facilities, waste heat recovery, methane capture, and solar. There are three hydroelectric facilities in the County. Xcel Energy operates the Tacoma Hydro Generating Station, originally built in 1906, along the

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Animas River between Durango and Silverton. The Tacoma facility is connected to LPEA's transmission system. The Vallecito Hydroelectric system at Vallecito Reservoir began producing power in 1989. The facility is connected to the LPEA transmission system and the power it generates is purchased directly by Tri-State. The third hydroelectric system, located at Lemon Reservoir, is connected to LPEA's distribution grid.

LPEA purchases electricity from a waste heat recovery facility located between Durango and Ignacio. Electrical energy that would otherwise be lost is captured at a natural gas treatment facility from turbine exhaust waste heat boilers, coupled with steam turbine generators. The City of Durango Wastewater Treatment Plant installed a Digester Gas Burning Micro Turbine in 2009 to capture methane gas. This methane capture cogeneration system offsets about 19 percent of the annual energy usage at the location.

A capstone micro turbine was installed in the Pine River Valley for the purposes of capturing fugitive methane gas emissions from specific locations along the Fruitland outcrop. The COGCC funded this project to evaluate the viability of combining mitigation of the gas seepage with the use of the potentially valuable resource. This system became operational in 2009 and provides energy to the local grid.

LPEA has offered interconnection and net metering to members since 2003. Customers who generate their own electricity, mostly through solar PV systems, are connected to the LPEA system and a bi-directional meter measures the amount of electricity produced and used by the consumer, offsetting their total cost. In 2012, local energy generation from net metered systems reduced LPEA's total energy purchase by about 0.28 percent. According to LPEA, there is also potential for micro hydro and small hydro systems to be installed in irrigation ditches throughout the County (LPEA Long-term Alternative Energy Outlook, 2013).

LPEA has contractual agreements with three subscriber organizations for purchasing electricity from community solar gardens. Solar gardens are large solar arrays from which community members can buy or lease shares. The energy produced by their share is then attributed to the electric meter at their home or business through virtual net metering. Four community solar gardens were built in La Plata County in 2014. Three already have full member capacity. The Armadillo Community Solar Garden is located on the roof of the Armadillo Storage facility on Highway 3. Living Solar runs the Sun Mesa Solar Garden in Durango. Shaw Solar has built two solar gardens, one in Ignacio and one on the roof of the Boys and Girls Club of La Plata County in Durango.

Biomass is a renewable fuel that is developed from organic materials, including forest debris, scrap lumber, mill residuals, certain crops, manure, and municipal solid wastes. In biomass power plants, wood waste or other waste is burned to produce steam that runs a turbine to make electricity, or that provides heat to industries and homes. Fuels reduction projects around the County could provide a material source for the development of biomass as a new local source of energy, although the potential for commercial development is limited.

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Despite the presence of Trimble Hot Springs, there is not high potential for the development of geothermal as a renewable energy resource. High temperature geothermal resources are required for electricity generation. The geothermal resources that occur in the County are of low or medium temperature and are therefore not a viable option for large scale electricity generation at this time. Ground source geothermal energy (using the earth's heat to heat water in underground pipes) may be a possibility for small scale residential heating.

Good wind resources for energy production have an average wind speed of at least 9 miles per hour for small wind electric turbines and 13 miles per hour for utility scale wind power plants. Primary locations in the West include exposed ridges and mountain summits, although icing is a concern at higher elevations. In some areas of the County there is potential for wind energy generation on a smaller, residential scale; but there is little prospect for utility scale development.

Impacts

Depending on the design of the facility, potential impacts associated with hydroelectric facilities include noise, altered hydrologic systems, and habitat loss and/or degradation for aquatic species. Sources of noise generally associated with a hydroelectric facility include powerhouse equipment (turbines, generators, transformers) and flowing water. The construction of intake structures, dams, or weirs to provide a water supply to a hydroelectric facility could affect a river ecosystem. The diversion of water from a natural stream has the potential to reduce the in-stream flows of the stream, potentially leaving aquatic species stressed. The presence of a dam or weir can also be a physical barrier to fish migration. River modifications could result in visual impacts from structures placed in or across the river or the creation of an impoundment.

Solar energy development projects, depending on the proposed number of panels and location, potentially have other environmental impacts. Solar installations are highly visible in rural or natural landscapes. Commercial solar arrays or community solar gardens may impact land use due to the possible loss of agricultural lands or wildlife habitat for the placement of solar panels that may consume vast land area values. The area under solar panels does not receive direct sunlight, making it difficult to establish and maintain vegetation and stabilize the exposed soils. These areas are subject to possible weed infestation, soil erosion, and subsequent sedimentation of nearby water bodies.

Solar panels may contain small amounts of hazardous materials such as lead, cadmium, selenium, and arsenic. There are several different types of PV cells that vary in the individual components. Toxic elements in end of life or broken PV panels may leach into groundwater if disposed of in landfills. The solar industry is developing programs for recycling solar panels, although not all suppliers have such programs. There is currently one known facility accepting solar panels for recycling in La Plata County. Current solar modules have an expected lifespan of approximately 20 to 30 years, so most have not yet reached the end of their useful lives. The need for a method to dispose of solar panels will become more important as solar installations age. Solar PV systems are subject to electrical faults like any other electrical installation.

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Burning biomass to produce electricity can potentially impact air quality, local water resources, and the fuel source habitat. The level of air emissions associated with biomass power plants varies depending on the organic material used and combustion technology, but the most common pollutants include nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide, and particulate matter. Biomass power plants require water for cooling, but actual water withdrawal and consumption depends on the facility's cooling technology. Cooling water is returned to its source much warmer than when it was withdrawn, which can have a negative impact on plant and animal life. Using agriculture and forest wastes for biomass power, could potentially lead to land or habitat degradation.

Impacts associated with transmission and distribution lines that connect renewable energy sources to the electrical grid include the potential for visual, static noise, habitat loss and fragmentation, and possible electrocution of birds.

The most apparent benefit of renewable energy is the reduction in greenhouse gas emissions. Electricity generated at or near its area of use, as opposed to large central facilities, is considered by some to be more sustainable, efficient, and of greater benefit to a community. Locally-produced energy can reduce system-line losses, or electricity lost in transit. Producing electricity locally also can provide support to the local economy and reduce monies leaving the region.

Regulation

Utility scale commercial renewable energy facilities would currently be required to obtain a Class II Land Use Permit from the County. The La Plata County Building Department is preparing to adopt standards for smaller scale residential solar installation safety listed in the 2015 International Residential Code when a new county building code is adopted (anticipated in 2016). Residential solar installations will then be verified for compliance with building code standards at the time of building inspection. The residential use of boilers that burn biomass also require inspections by the Building Department. The agency regulating electric utilities in Colorado is the Public Utilities Commission (PUC), under the Colorado Department of Regulatory Agencies (DORA). In December 2005, the PUC adopted standards for net metering and interconnection. Project interconnection approval requires inspection by an electrical inspector with the DORA Division of Professions and Occupations.

Stormwater permits are required from the CDPHE Water Quality Control Division for any renewable energy facility that disturbs more than one acre (construction permit) or generates electricity through the use of steam (industrial permit). An Air Pollutant Emission Notice or air permit may be required from the CDPHE Air Pollution Control Division for air emissions, depending on the volume and type of emissions. If a renewable energy facility will be located in or near a natural waterway or wetland, a USACE permit, under Section 404 of the Clean Water Act, may be required for the removal or deposition of any materials in the waterway. Any actions that require a federal permit, license, or approval that result in a discharge into waters of the State require Clean Water Act-Section 401 certification by the CDPHE Water Quality Control Division. Projects located on federal land are subject to the specific permitting requirements of the federal land management agency, including the removal of tree matter from U.S. Forest Service lands for

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biomass projects.

Hydropower projects typically require a license or exemption from the Federal Energy Regulatory Commission (FERC) or the Bureau of Reclamation (BOR). The FERC is the primary federal authority for permitting hydropower projects. For hydropower development on BOR facilities where hydropower development is explicitly mentioned in the authorizing legislation, permitting is handled by the BOR. For any individual project, determination whether FERC or the BOR is the relevant federal permitting authority is governed by a Memorandum of Understanding between FERC and BOR. A water right must also be obtained to divert water from a stream for generating hydroelectric power in Colorado. Water rights are obtained by applying to the water court and are allocated by the Colorado Division of Water Resources.

EXTRACTIVE RESOURCES AND RENEWABLE ENERGY GOALS

OIL AND GAS DEVELOPMENT

Goal 8.1: Promote responsible oil and gas development while minimizing potential impacts to the environment and local residents.

Objective 8.1.A: To maintain and enhance cooperation with Local, State and Federal agencies; the oil and gas industry; and property owners with regard to regulating activity and mitigating impacts.

Policy 8.1.A1: The County should maintain an active participant role in the COGCC LGD program.

Policy 8.1.A2: The County could consider developing a Memorandum of Understanding with the COGCC in order to ensure a mutual understanding regarding areas of potential for overlapping jurisdiction.

Policy 8.1.A3: The County could pursue more comprehensive regulation of areas with little regulatory oversight, such as flowlines between well meters and transmission line tie-ins.

Policy 8.1.A4: The County should continue to encourage communication with operators regarding future development plans in order to identify land use conflicts early.

Policy 8.1.A5: The County should continue to act as a facilitator for communication between the oil and gas industry and local residents.

Policy 8.1.A6: The County should continue to promote public understanding and awareness of oil and gas development activities through education and by making general development information accessible to the general population.

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Objective 8.1.B: To protect the public health, safety and welfare of citizens while coordinating with fluid mineral extraction projects, within the limitations of local government powers and resources.

Policy 8.1.B1: The County should continue to pursue the appropriate use of instruments and methods which ensure operators contribute proportionately and concurrently with proposed projects.

Policy 8.1.B2: The County could review long-term results of water well testing and air quality impacts to assist with identifying any potential need for additional protective measures to local residents.

SOLID MINERALS

Goal 8.2: Promote responsible mineral development while minimizing potential impacts to the environment and local residents.

Objective 8.2.A: To maintain and enhance cooperation with Local, State and Federal agencies, the mineral extraction industry, and property owners with regard to regulating activity and mitigating impacts.

Policy 8.2.A1: The County should continue to coordinate with lead regulatory agencies to assist with the mitigation and reclamation of projects.

Policy 8.2.A2: The County could explore the development of *1041 Powers* for known mineral resource areas.

Objective 8.2.B: To protect the public health, safety and welfare of citizens while coordinating with mineral development projects; within the limitations of local government powers and resources.

Policy 8.2.B1: The County should continue to pursue appropriate use of instruments and methods which ensure development contributes proportionately and concurrently with proposed projects.

RENEWABLE ENERGY

Goal 8.3: Promote responsible development of renewable energy while minimizing potential impacts to the environment and local residents.

Objective 8.3.A: To maintain and enhance cooperation with Local, State and Federal agencies; the renewable energy industry; and property owners with regard to regulating activity and mitigating impacts.

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Policy 8.3.A1: The County could develop a permitting program that addresses potential impacts of utility scale production to promote renewable energy development.

Policy 8.3.A2: The County could explore the development of *1041 Powers* to accommodate utility scale renewable energy systems.

Policy 8.3.A3: The County should recognize efforts with LPEA’s Long-term Alternative Energy Outlook goal of 20% electricity produced locally by 2020.

Objective 8.3.B: To protect the public health, safety and welfare of citizens while coordinating with renewable energy development projects; within the limitations of local government powers and resources.

Policy 8.3.B1: The County should encourage the recycling of solar panels and promote the development of recycling options within the County.

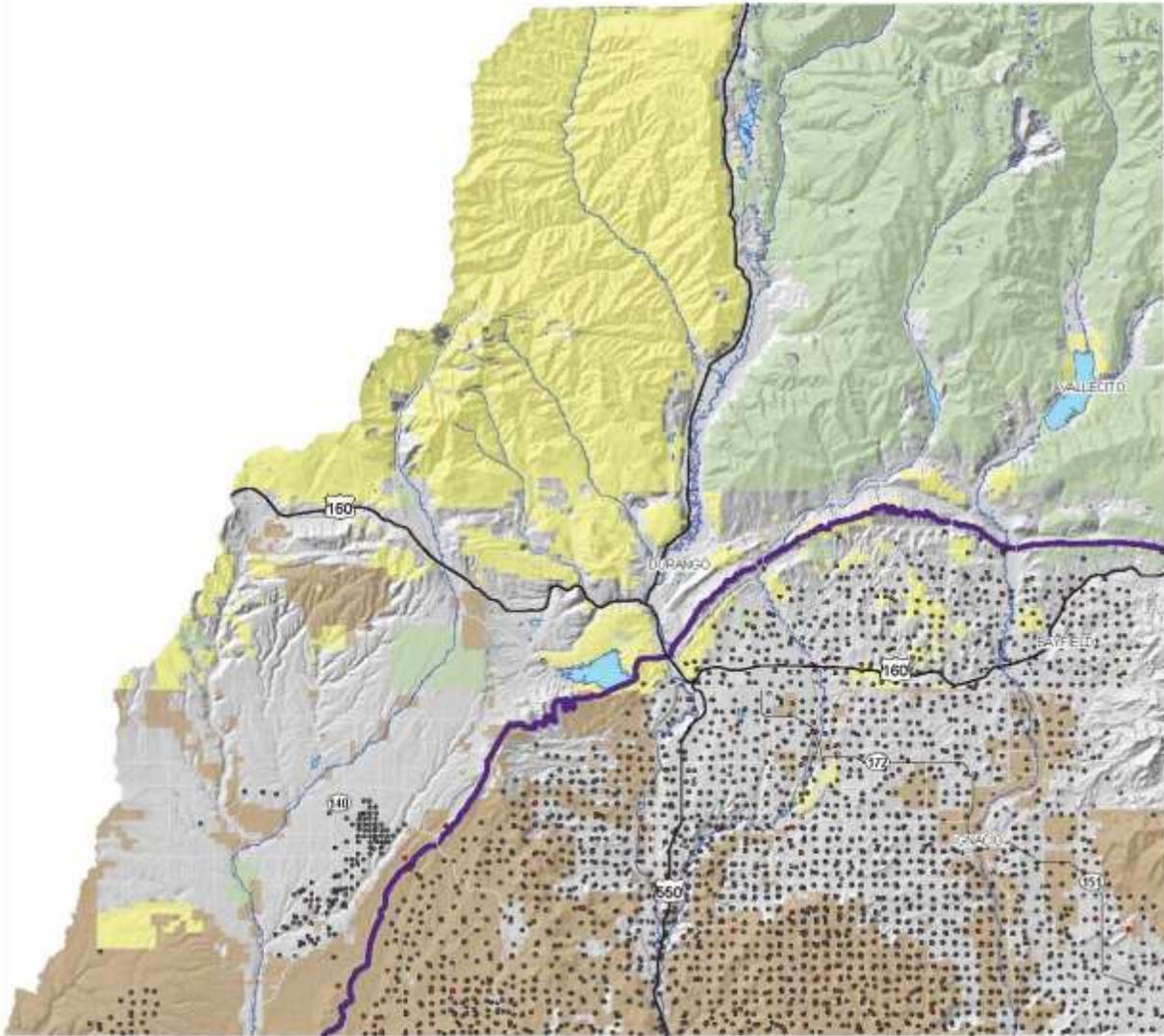
Policy 8.3.B2: The County should continue to pursue appropriate use of instruments and methods which ensure development contributes proportionately and concurrently with proposed projects.

Extractive Resources and Renewable Energy Maps
Map 8-1, La Plata County Oil and Gas Development
Map 8-2, DRMS Active Mining Permits in La Plata County

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Map 8-1

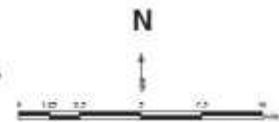


La Plata County Oil and Gas Development 2015

- Active Oil & Gas Wells
- Active Injection Wells
- San Juan Basin
- Federal Lands
- State Lands
- Tribal Lands
- Private Lands



Map 8-1: La Plata County Oil and Gas Development 2015

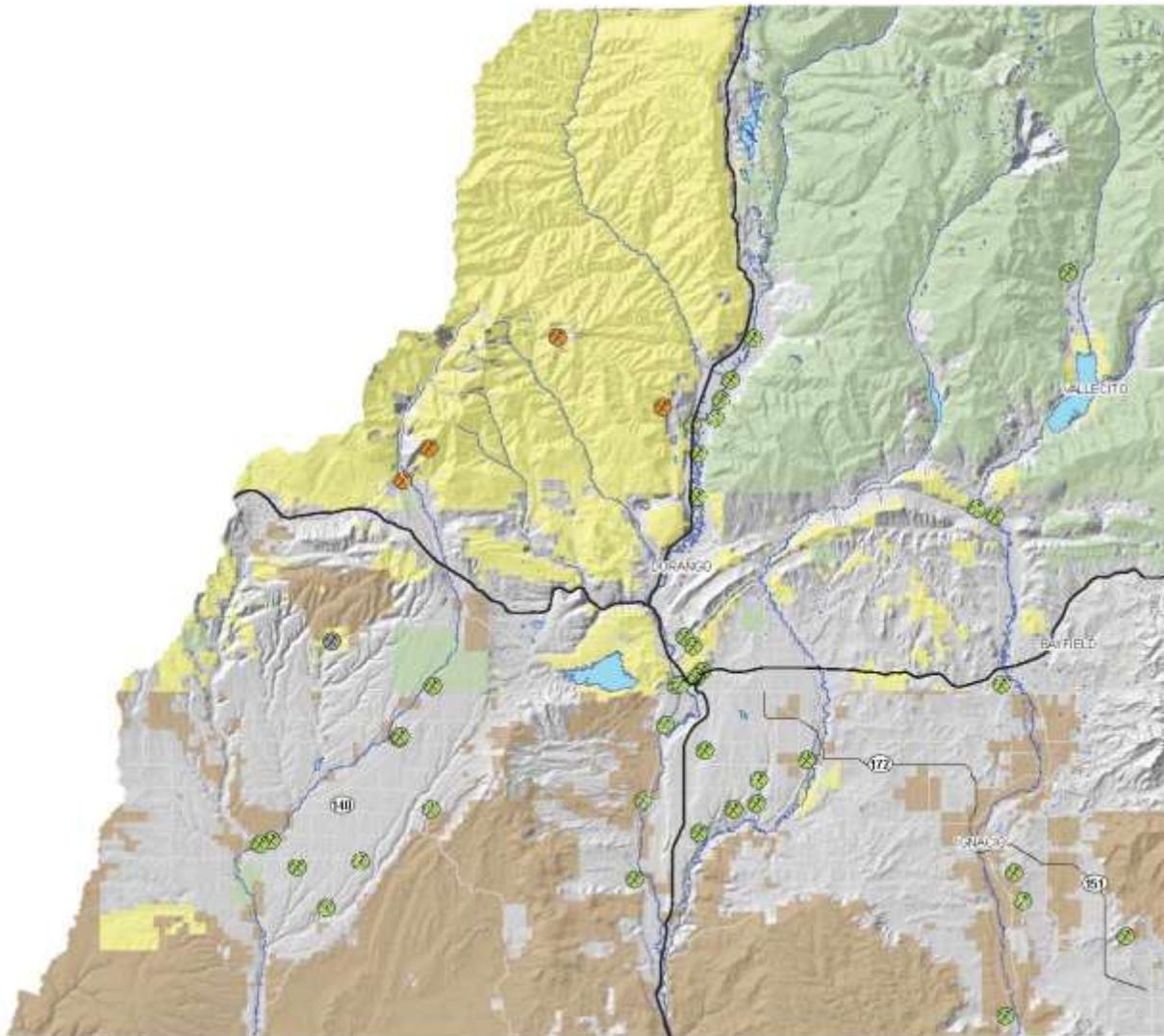


Drawn by: Jennie Bernard 03/22/2015

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Map 8-2



DRMS Permitted Mines in La Plata County 2015

- Coal (1)
- Gold & Silver (4)
- ⊗ Sand & Gravel (40)
- Federal Lands
- State Lands
- Tribal Lands
- Private Lands



All numbers in this report shall remain the property of the La Plata County GIS Department.

