



ENERGY

Metro Denver Industry Cluster Profile

Metro Denver is a leader in bringing energy to the marketplace with access to the bountiful fossil fuel and renewable energy resources of the American West. The Rocky Mountain region has traditionally been known as the fossil fuel production corridor of the United States due to large concentrations of coal, oil and natural gas resources. In addition, the seven-county* Metro Denver region is rich in both renewable energy and energy research resources.

The energy industry in Metro Denver is leveraging the region's rich technological and natural resources to overcome the many energy challenges facing the world. Affordable, reliable and clean energy produced from diverse, domestic sources is critical to America's prosperity and security. Ever increasing energy demands require new energy efficiency, fossil energy and renewable energy technologies. Meanwhile, increased focus on the environment is changing how energy is produced and used. The integration of energy technology development and the western region's rich resource base place Metro Denver at the forefront of energy development.

Metro Denver is a leader in enabling technologies, including biotechnology, nanotechnology and materials science, which will drive the next generation of energy technologies and products. The region's renowned energy and natural resources research institutions, including the Colorado School of Mines and the National Renewable Energy Laboratory, work to maximize the value of fossil fuels while investing in cutting edge research to develop sustainable renewable resources.

The National Renewable Energy Laboratory (NREL) is the U.S. Department of Energy's primary national laboratory for renewable energy and energy efficiency research and development. NREL develops renewable energy and energy efficiency technologies and practices, advances related science and engineering, and transfers knowledge and innovations to address the nation's energy and environmental goals.

The Colorado School of Mines (CSM) is a public research university that has distinguished itself by developing a curriculum and research program that is geared towards responsible stewardship of the earth and its resources. In addition to strong education and research programs in traditional fields of science and engineering, CSM is one of a very few institutions in the world having broad expertise in resource exploration, extraction, production and utilization.

The Colorado Energy Research Institute (CERI) is located at the Colorado School of Mines. CERI has a legislative mandate to coordinate and integrate energy-related research and education throughout the State of Colorado. While hosted at CSM, CERI is responsible for working with all of Colorado's institutions of higher learning on research initiatives and programs that advance Colorado's capabilities with respect to regional, national and global energy industry needs.

The energy industry cluster in Metro Denver includes about 24,300 people employed in three energy sub-sectors: 1) Fossil Energy; 2) Renewable Energy; and 3) Energy Research. The following sections describe these three sub-sectors in detail.

*Metro Denver includes seven counties: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas and Jefferson counties.

Fossil Energy

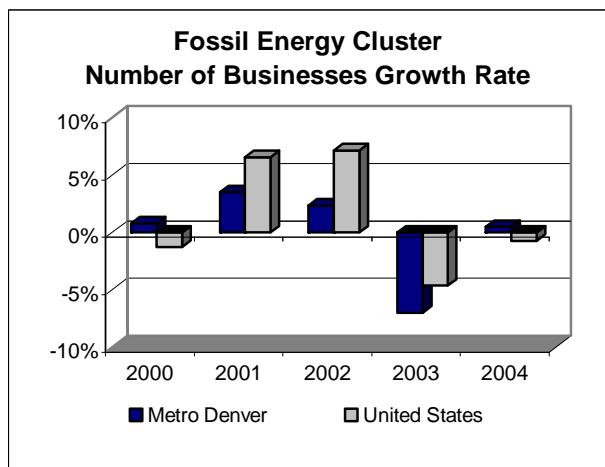
The fossil energy sector includes companies that extract naturally occurring mineral liquids and solids used to produce energy. The fossil energy industry sector also includes companies that provide mining and exploration services, mining support activities ranging from engineering to refining, and the manufacture of mining machinery and equipment. In addition, this sector includes companies involved in the generation, transmission and distribution of energy resources. The fossil energy industry cluster is defined by 29 six-digit North American Industry Classification System (NAICS) codes.

Metro Denver ranks 3rd out of the 50 largest metro areas in fossil energy employment concentration in 2004. With direct employment in fossil energy of about 12,750 workers, Metro Denver has the 8th highest number of people employed in the fossil energy sector compared to the 50 largest metro areas.

	Metro Denver	U.S.
Direct Employment 2004	12,746	1,177,066
Total Direct Employment Growth 1999-2004	1.8%	-2.5%
Avg. Annual Direct Employment Growth 1999-2004	0.4%	-0.5%
Number of Direct Industry Cluster Companies 2004	1,017	49,815
Direct Employment Concentration	1.2%	1.0%

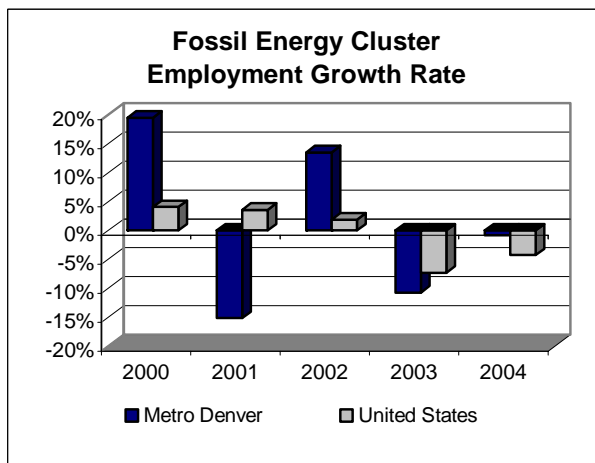
Fossil Energy Companies

- About 1,017 fossil energy companies were located in Metro Denver in 2004.
- About 79% of the fossil energy companies employ less than 10 people while less than 1% of the companies employ more than 250 employees.
- The number of fossil energy companies has remained roughly the same from 1999 to 2004 in Metro Denver compared to a 6.7% national increase.
- Most fossil energy companies are involved in oil and gas exploration, crude petroleum and natural gas operations and oil and gas field services.



Fossil Energy Employment

- The fossil energy sector employment concentration is 1.2% in Metro Denver compared to 1.0% nationally.
- The fossil energy industry cluster directly employs 12,746 people in the seven-county Metro Denver area.
- Fossil energy industry cluster employment grew 1.8% from 1999 to 2004 compared to a 2.5% decline nationally.
- About two-thirds of the employment in the fossil energy industry cluster is located in the City & County of Denver. Adams and Arapahoe counties each have about 11% of the fossil fuel energy employment.



Fossil Energy Wages

The total payroll in the fossil energy industry in Metro Denver reached an estimated \$910.1 million in 2003. The 2003 average annual salary for a fossil energy worker was \$70,800 in Metro Denver compared to the national average of \$68,850.

Major Fossil Energy Companies

- BP American Production Co.
www.bp.com
- Cimarex Energy Co.
www.cimarex.com
- Conoco Pipeline Company
www.conocophillips.com
- Duke Energy Field Services
www.defieldservices.com
- EnCana Corporation
www.encana.com
- Forest Oil
www.forestoil.com
- Intermountain Rural Electric Assoc.
www.intermountain-rea.com
- Kerr McGee Corporation
www.kerr-mcgee.com
- Noble Energy, Inc.
www.nobleenergyinc.com
- Petro Canada
www.petro-canada.ca
- Pioneer Natural Resources Company
www.pioneernc.com
- St. Mary Land & Exploration Company
www.stmaryland.com
- Suncor Energy Inc.
www.suncor.com
- Transmontaigne Inc.
www.transmontaigne.com
- Western Gas Resources, Inc.
www.westerngas.com
- Xcel Energy Inc.
www.xcelenergy.com

Renewable Energy

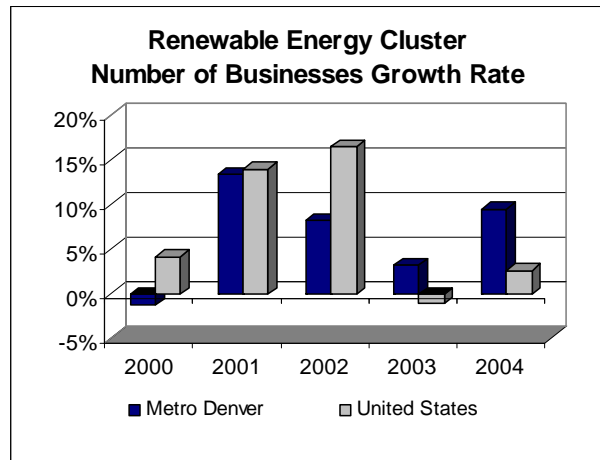
The renewable energy sector includes companies that produce energy using wind, solar, biomass, fuel cells and hydro resources. This sector also includes companies that provide support activities ranging from engineering to the manufacture of renewable energy machinery and equipment. The renewable energy industry cluster is defined by 20 six-digit North American Industry Classification System (NAICS) codes.

Metro Denver ranks 6th out of the 50 largest metro areas in renewable energy employment concentration in 2004. With direct employment in renewable energy of about 5,760 workers, Metro Denver has the 6th highest number of people employed in the renewable energy sector compared to the 50 largest metro areas.

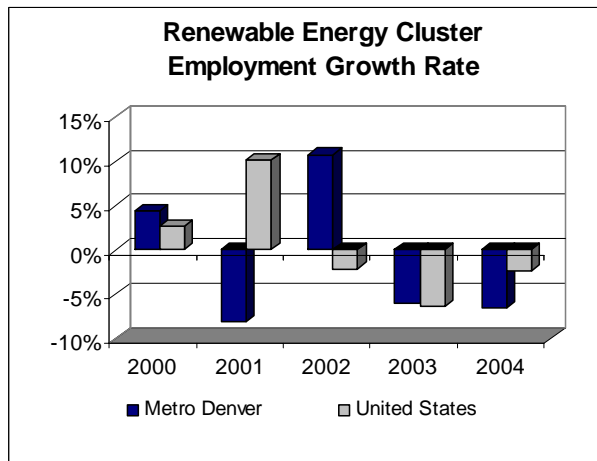
	<u>Metro Denver</u>	<u>U.S.</u>
Direct Employment 2004	5,760	225,047
Total Direct Employment Growth 1999-2004	-6.7%	1.1%
Avg. Annual Direct Employment Growth 1999-2004	-1.4%	0.2%
Number of Direct Industry Cluster Companies 2004	104	6,813
Direct Employment Concentration	0.6%	0.2%

Renewable Energy Companies

- In 2004, there were about 104 renewable energy companies located in the seven-county Metro Denver region.
- About 39% of the renewable energy companies employ less than 10 people while 2% of the companies employ more than 250 employees.
- The number of renewable energy companies has grown 36.8% from 1999 through 2004 compared to a 40.1% increase nationally.
- Most companies in the renewable energy industry cluster are public organizations involved in air, water and solid waste management.



Renewable Energy Employment



- The renewable energy sector employment concentration is 0.6% in Metro Denver compared to 0.2% nationally.
- The renewable energy industry cluster directly employs 5,760 people in the seven-county Metro Denver area.
- Renewable energy industry cluster employment fell 6.7% from 1999 to 2004 compared to a 1.1% increase nationally.
- About two-thirds of renewable employment is located in Jefferson County while 22% is located in Boulder County.

Renewable Energy Wages

The total payroll in the renewable energy industry in Metro Denver reached an estimated \$340.4 million in 2003. The 2003 average annual salary for a renewable energy worker was \$59,100 in Metro Denver compared to the national average of \$78,400.

Major Renewable Energy Companies and Government Facilities

- Altair Energy Inc.
www.altairenergy.com
- Colorado Department of Natural Resources
www.dnr.state.co.us
- Colorado Department of Public Health and Environment
www.cdphe.state.co.us
- ImaginIt Inc.
www.imaginit.cc
- Industrial Solar Technology Corp.
www.industrialsolartech.com
- Isonics Corp.
www.isonics.com
- National Oceanic & Atmospheric Administration
www.noaa.gov
- U.S. Bureau of Reclamation
www.usbr.gov
- U.S. Environmental Protection Agency
www.epa.gov
- U.S. Geological Survey
www.usgs.gov

Energy Research

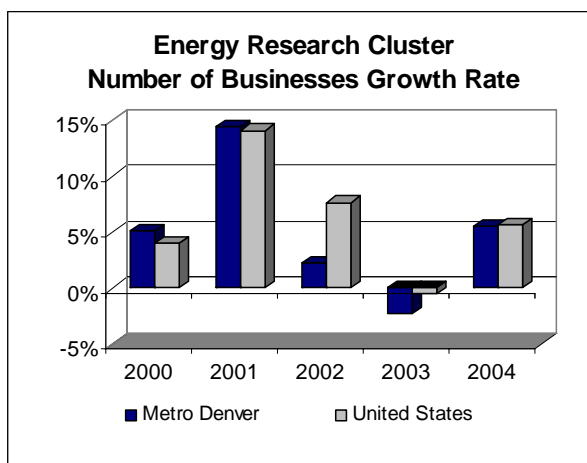
The energy research sector includes companies involved in laboratory testing, scientific and technical consulting services and environmental, natural resource, energy and institutional research. The energy research industry cluster is defined by five six-digit North American Industry Classification System (NAICS) codes.

Metro Denver ranks 4th out of the 50 largest metro areas in energy research employment concentration in 2004. With direct employment in energy research of over 5,750 workers, Metro Denver has the 7th highest number of people employed in the energy research sector compared to the 50 largest metro areas.

	Metro Denver	U.S.
Direct Employment 2004	5,756	298,775
Total Direct Employment Growth 1999-2004	-4.5%	-2.9%
Avg. Annual Direct Employment Growth 1999-2004	-0.9%	-0.6%
Number of Direct Industry Cluster Companies 2004	710	29,250
Direct Employment Concentration	0.6%	0.2%

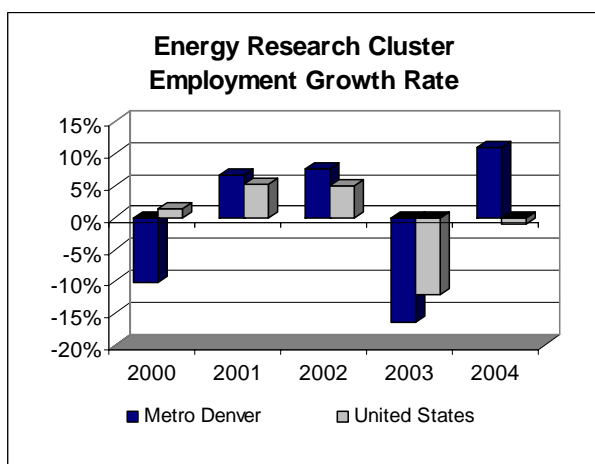
Energy Research Companies

- About 710 energy research companies were located in Metro Denver in 2004.
- About 84% of the energy research companies employ less than 10 people while less than 1% of the companies employ more than 250 employees.
- The number of energy research companies has grown 26.8% from 1999 through 2004 compared to a 34.5% increase in companies nationally.
- The majority of energy research companies are environmental consultants and testing laboratories.



Energy Research Employment

- The energy research sector employment concentration is 0.6% in Metro Denver compared to 0.2% nationally.



- The energy research sector directly employs 5,756 people in Metro Denver.
- Energy research industry cluster employment declined 4.5% from 1999 to 2004 compared to a 2.9% decline nationally.
- About 44% of the employment in the energy research industry cluster is located in Jefferson County. About 20% of the employment is located in Boulder County while Arapahoe County has about 15% of the energy research employment base.

Energy Research Wages

The total payroll in the energy research industry in Metro Denver reached an estimated \$370.9 million in 2003. The 2003 average annual salary for an energy research worker was \$64,430 in Metro Denver compared to the national average of \$64,500.

Major Energy Research Institutions

- Arcadis G&M, Inc.
www.arcadis-us.com/index.htm
- Greystone Environmental
www.greystone.us
- Gustavson Associates
www.gustavson.com
- JILA - University of Colorado
<http://jilawww.colorado.edu/>
- National Center for Atmospheric Research
www.ucar.edu/
- National Renewable Energy Laboratory
www.nrel.gov/
- Severn Trent Laboratories Inc.
www.stl-inc.com
- URS Corp.
www.urscorp.com
- U.S. Department of Energy, Golden Field Office
www.go.doe.gov
- Western Area Power Administration
www.wapa.gov

Energy Occupational Salaries Metro Denver, 2004**

Natural Sciences Managers	\$94,920
Petroleum Engineers	\$92,890
Environmental Engineers	\$72,470
Cartographers and Photogrammetrists	\$58,270
Power Plant Operators	\$53,920
Petroleum Pump System Operators, Refinery Operators and Gaugers	\$50,830
Geological and Petroleum Technicians	\$53,000
Surveyors	\$45,580
Derrick Operators, Oil and Gas	\$42,960
Extraction Workers/Helpers	\$27,660

**Salary data is for the six-county Denver Metropolitan Statistical Area (MSA), which does not include Boulder County. May 2004 mean annual salary data for additional occupations and geographical areas are available from the U.S. Bureau of Labor Statistics, www.bls.gov.

Key Reasons for Energy Companies to Locate in Metro Denver

Metro Denver is a top three fossil energy location offering access to one of the most energy rich regions in the United States.

- Oil – Colorado produced 22 million barrels of crude oil in 2004, ranking the state 12th in the country in the production of crude oil. As of 2003, Colorado had the 13th highest proved reserves in the nation with 217 million barrels. (*U.S. Department of Energy, Energy Information Administration, 2004*)
- Coal – Colorado produced nearly 40 million short tons of coal in 2004. Colorado has the seventh highest coal production of any state and is in close proximity to Wyoming, the largest producer of coal in nation. (*U.S. Department of Energy, Energy Information Administration, 2004*)
- Natural Gas – Colorado is home to over 395 million barrels of Natural Gas liquids in reserve. Colorado has the fifth highest reserves in the nation and offers improved transport capability coming on line with new pipelines. (*U.S. Department of Energy, Energy Information Administration, 2004*)
- Colorado is strategically located along the Canada to Mexico “energy corridor.”

Metro Denver is a top ten renewable energy location offering newly enacted requirements for renewable energy generation and access to renewable energy resources.

- Colorado is one of 18 states with a renewable energy portfolio standard (RPS). Only 2.68% of Colorado’s total energy is currently generated from renewable sources. Amendment 37, passed in November 2004, requires that Colorado achieve a RPS of 10% by 2015.
- Solar Energy - Colorado and the southwest portion of the country offer solar quality of between 5000 and 7000 watt hours per square meter per day. (*U.S. Department of Energy, 2004*)
- Wind – Colorado ranks 11th in the U.S. for wind energy potential in 2004. (*American Wind Energy Association, 2004*)
- Water – Colorado is the headwaters for five major U.S. rivers. Colorado has the potential to produce up to 4.4 million megawatt hours of electricity from hydropower. (*U.S. Department of Energy, 2004*)
- Biomass – Colorado could produce an estimated 5.2 billion Kwh from biomass fuels. (*U.S. Department of Energy, 2004*)

Metro Denver is at the forefront of energy development, with a location that offers:

1. The ability to recruit and retain senior management and scientific talent.

- With 33.7% of the adult population having completed a bachelor’s degree or higher, Colorado ranks as the fourth most educated state in the country, behind Massachusetts, Maryland and Connecticut. (*American Community Survey, 2004*)
- Metro Denver boasts direct employment of nearly 24,300 people in the three subsectors of the energy industry cluster. (*Development Research Partners, 2005*)
- Colorado residents enjoy an active, outdoor lifestyle contributing to our Mountain West quality of life. Metro Denver ranked as the fifth fittest U.S. city. (*Men’s Fitness, 2005*)

2. Proximity to energy-related higher education programs.

- The Colorado School of Mines in Golden is the only university in the U.S. with programs from the baccalaureate through the doctorate in all of the key fields related to energy: geological engineering, geophysical engineering, mining engineering, petroleum engineering, chemical and petroleum-refining engineering, energy economics, materials, engineering physics, and others. (*Colorado School of Mines, 2004*)
- The Colorado School of Mines is the home of the Colorado Energy Research Institute, funded through a partnership with the Colorado Governor’s Office of Energy Management and Conservation. The institute promotes research and educational activities through networking among all constituencies in the Colorado energy industries

and universities. The Colorado School of Mines was recently selected to develop the Petroleum Institute in the United Arab Emirates. (*Colorado School of Mines, 2004*)

- The Colorado Governor's Office of Energy Management and Conservation awarded the Colorado School of Mines the lead role in fulfilling the State's goal to expand fuel cell-related research, development, education and commercial application through the proposed Colorado Fuel Cell Research Center.
- University of Colorado at Boulder researchers were recently awarded \$1.2 million from the U.S. Department of Energy to produce clean hydrogen fuel by using concentrated sunlight to split water molecules. The project will be funded over four years. (*CU-Boulder Chemical & Biological Engineering Department, October 2004*)
- Colorado ranks 4th in the number of science and engineering graduate students enrolled in doctorate-granting institutions. (*Corporation for Enterprise Development, 2004*)
- Over 13% of all graduate students enrolled in higher education in Colorado were enrolled in energy-related disciplines. This represented about 1,400 graduate students in energy-related programs in Colorado in 2002. (*National Science Foundation, 2002*)

3. Access to the research of a broad collection of federal labs and private R&D activities.

- Golden is home to the National Renewable Energy Laboratory (NREL), one of 11 U.S. Department of Energy national laboratories in the country. NREL is a leader in the U.S. Department of Energy's effort to secure an energy future for the nation that is environmentally and economically sustainable.
- Other key federal offices located in Metro Denver include the Western Area Power Administration, U.S. Geological Survey, the U.S. Bureau of Reclamation, the National Center for Atmospheric Research and the U.S. Environmental Protection Agency.
- Firms with fossil fuel energy R&D programs include Patina Oil & Gas Corp., Western Gas Resources, Inc. and KFx, to name a few.

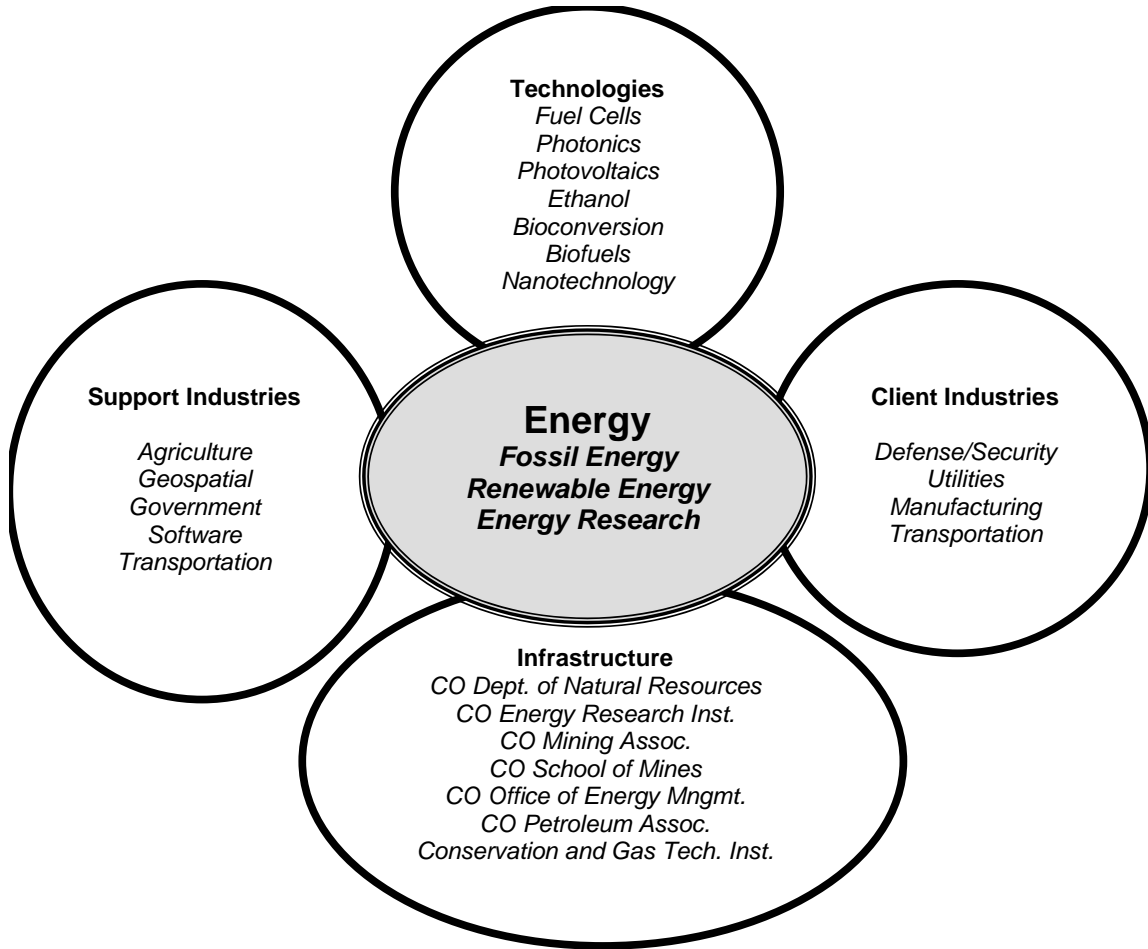
Energy Industry Cluster Definition

NAICS	NAICS Description	SIC	SIC Description
Renewable Energy			
238220	Plumbing, Heating & Air-Conditioning Contractors	1711-0403	Solar energy contractor
238310	Drywall and Insulation Contractors	1742-0204	Solar reflecting insulation film
	Water and Sewer Line and Related Structures		
237110	Construction	1781-9901	Geothermal drilling
322299	All Other Converted Paper Product Manufacturing	2679-0902	Fuel cell forms, cardboard
211112	Natural Gas Liquid Extraction	2819-06	Fuels and radioactive compounds
325191	Gum and Wood Chemical Manufacturing	2861-01	Wood distillation products
	Heating Equipment (except Warm Air Furnaces)		
333414	Manufacturing	3433-9904	Solar heaters and collectors
	Turbine and Turbine Generator Set Units		
333611	Manufacturing	3511	Turbines and turbine generator sets
335312	Motor and Generator Manufacturing	3621-9909	Windmills, electric generating
	All Other Miscellaneous Electrical Equipment and		
335999	Component Manufacturing	3629-0102	Electrochemical generators (fuel cells)
334413	Semiconductor and Related Device Manufacturing	3674-0305	Photovoltaic devices, solid state
334413	Semiconductor and Related Device Manufacturing	3674-0306	Solar cells
334413	Semiconductor and Related Device Manufacturing	3674-9901	Fuel cells, solid state
	Other Measuring and Controlling Device		
334519	Manufacturing	3829-0218	Solarimeters
221111	Hydroelectric Power Generation	4911	Electric services
221119	Other Electric Power Generation	4911	Electric services
221330	Steam and Air-Conditioning Supply	4961-9904	Steam supply systems, including geothermal
	Plumbing and Heating Equipment and Supplies		
423720	(Hydronics) Merchant Wholesalers	5074-0208	Heating equipment and panels, solar
444110	Home Centers	5211-0303	Solar heating equipment
444190	Other Building Material Dealers	5211-0303	Solar heating equipment
	Administration of Air and Water Resource and		
924110	Solid Waste Management Programs	9511-00	Air, water, and solid waste management
	Administration of Air and Water Resource and		
924110	Solid Waste Management Programs	9511-01	Environmental Agencies
	Regulation and Administration of Communications,		
926130	Electric, Gas, and Other Utilities	9631-9905	Nuclear energy inspection & reg. office, govt.

Energy Industry Cluster Definition (continued)

NAICS	NAICS Description	SIC	SIC Description
Fossil Energy			
212291	Uranium-Radium-Vanadium Ore Mining	1094	Uranium-radium-vanadium ores
212111	Bituminous Coal and Lignite Surface Mining	1221	Bituminous Coal and Lignite-surface Mining
212112	Bituminous Coal Underground Mining	1222	Bituminous Coal-underground Mining
213113	Support Activities for Coal Mining	1241	Coal Mining Services
211111	Crude Petroleum and Natural Gas Extraction	1311	Crude petroleum and natural gas
211112	Natural Gas Liquid Extraction	1321	Natural gas liquids
213111	Drilling Oil and Gas Wells	1381	Drilling oil and gas wells
213112	Support Activities for Oil and Gas Operations	1382	Oil and gas exploration services
237120	Construction Oil and Gas Pipeline and Related Structures	1389	Oil and gas field services, nec
237120	Construction Power & Communication Line & Related Structures	1623-01	Oil, gas line & compressor station construction
237130	Construction	1629-0503	Oil refinery construction
325110	Petrochemical Manufacturing	2869-04	Fuels
325193	Ethyl Alcohol Manufacturing	2869-04	Fuels
324110	Petroleum Refineries	2911	Petroleum refining
333131	Mining Machinery and Equipment Manufacturing Oil and Gas Field Machinery and Equipment	3532	Mining Machinery
333132	Manufacturing	3533	Oil and gas field machinery
486110	Pipeline Transportation of Crude Oil Pipeline Transportation of Refined Petroleum Products	4612	Crude Petroleum Pipelines
486910	Products	4613	Refined Petroleum Pipelines
221112	Fossil Fuel Electric Power Generation	4911	Electric services
221113	Nuclear Electric Power Generation	4911	Electric services
221121	Electric Bulk Power Transmission and Control	4911	Electric services
221122	Electric Power Distribution	4911	Electric services
486210	Pipeline Transportation of Natural Gas	4922	Natural gas transmission
221210	Natural Gas Distribution	4923	Gas transmission and distribution
221210	Natural Gas Distribution	4924	Natural gas distribution
221210	Natural Gas Distribution	4925	Gas production and/or distribution
221112	Fossil Fuel Electric Power Generation	4931	Electric & other services combined
221210	Natural Gas Distribution	4932	Gas and other services combined
423520	Wholesalers	5052	Coal and other minerals and ores
523999	Miscellaneous Financial Investment Activities	6211-0303	Oil and gas lease brokers
523999	Miscellaneous Financial Investment Activities	6211-0304	Oil royalties dealers
523910	Miscellaneous Intermediation	6792	Oil royalty traders
533110	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	6792	Oil royalty traders
541360	Geophysical Surveying & Mapping Services	7389-0208	Petroleum refinery inspection service
541330	Engineering Services	8711-03	Petroleum, mining, and chemical engineers
Energy Research			
541710	Research and Development in the Physical, Engineering, and Life Sciences	8731-0300	Natural resource research
541710	Research and Development in the Physical, Engineering, and Life Sciences	8731-0301	Energy research
541710	Research and Development in the Physical, Engineering, and Life Sciences	8731-0302	Environmental research
541710	Research and Development in the Physical, Engineering, and Life Sciences	8733-9902	Research institute
541380	Testing Laboratories	8734-00	Testing laboratories
541690	Other Scientific and Technical Consulting Services	8748-9904	Energy conservation consultant
541620	Environmental Consulting Services	8748-9905	Environmental consultant
541620	Environmental Consulting Services	8999-07	Earth Science Services
541620	Environmental Consulting Services	8999-09	Scientific Consulting
926110	Administration of General Economic Programs	9611-9903	Energy development and conservation agency, gov't

Energy Industry Cluster Relationships



For additional information, contact us:



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Economic Development Corporation

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