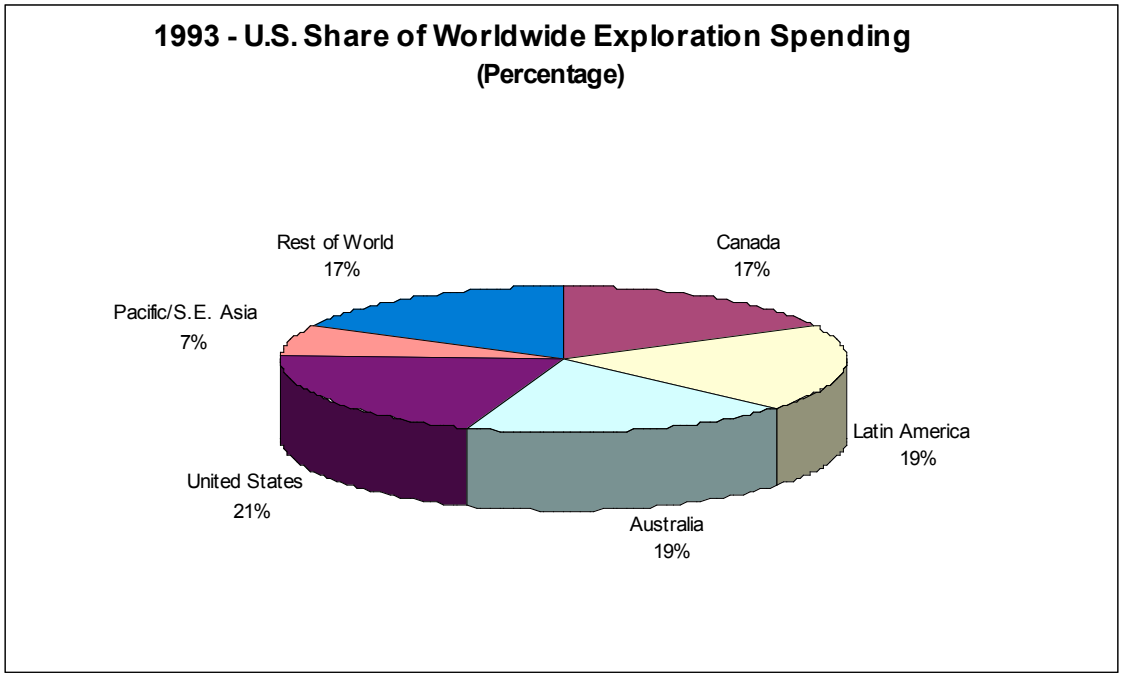
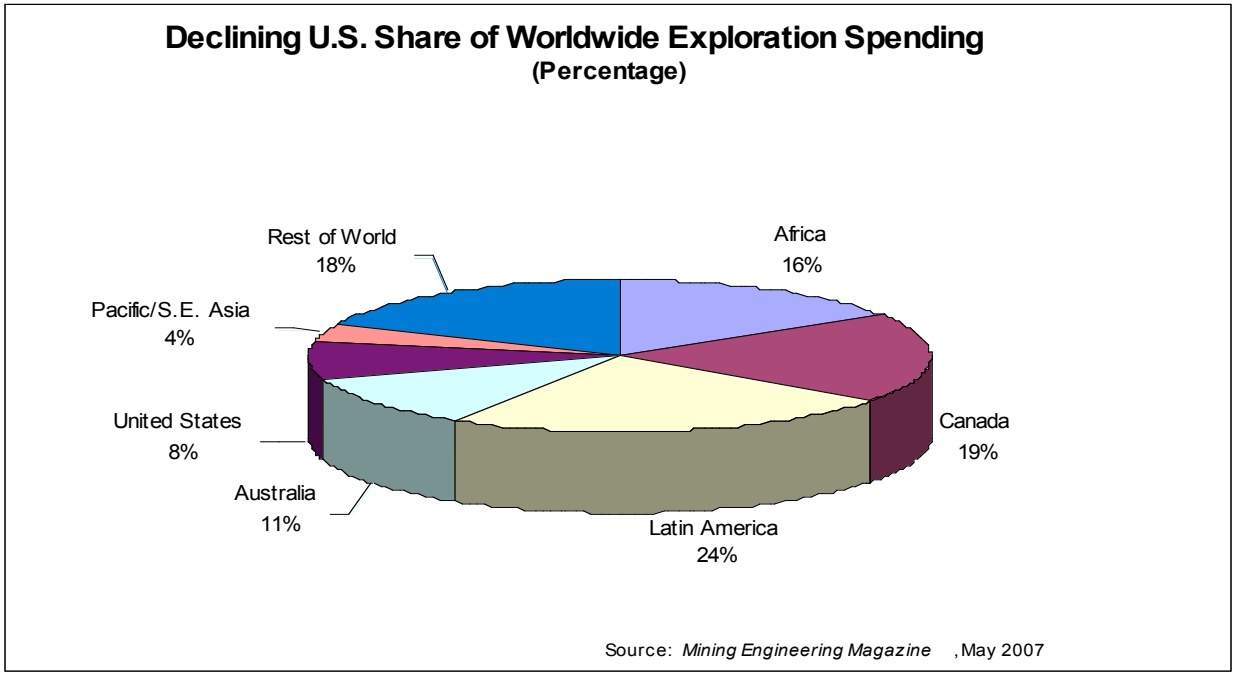


Investment in Mineral Development

1993 – The US held a 21% share of global exploration (R&D) investments in 1993.
2006 – By 2006 The US share of global exploration (R&D) investments had decreased to 8%.

Smaller investments in the United States for mineral development (R&D) translates into more investment overseas - off-shoring mineral development, jobs, and investments - increasing our reliance on foreign sources and resulting in economic and national security concerns



WATERS ADVOCACY COALITION

WAC

OPPOSE EXPANDING CLEAN WATER ACT JURISDICTION

Issue: The Waters Advocacy Coalition ("WAC") opposes efforts to expand federal jurisdiction of the Clean Water Act ("CWA") to allow federal agencies to regulate ditches, culverts and pipes, desert washes, sheet flow, erosional features, and farmland and treatment ponds as "waters of the United States," subjecting such waters to all of the requirements of the CWA.

Background: Since 1972, the CWA has been instrumental in dramatically improving the quality of the nation's waters. Fundamental to that progress has been the federal-state partnership which recognizes that not all waters need be subject to federal jurisdiction; the states should have the jurisdiction to regulate waters within their individual boundaries.

Key to establishing the boundary between state and federal jurisdiction has been the term "navigable waters." The term "navigable waters" is defined in the statute to mean "the waters of the United States." Any waters satisfying this definition are under federal jurisdiction. EPA and the Corps have provided varying regulatory definitions of "the waters of the United States" over the past 30 years. The United States Supreme Court has examined the scope of the CWA three times:

- ***Riverside Bayview*** (1985): Upheld the agencies' authority to regulate wetlands adjacent to navigable waters.
- ***SWANCC*** (2001): Rejected the agencies' authority to regulate isolated waters based upon the potential presence of migratory birds (the Migratory Bird Rule). The Court said that asserting jurisdiction over such waters raised "significant constitutional concerns."
- ***Rapanos*** (2006): Affirmed that CWA jurisdiction extends beyond strictly navigable waters, but does not extend to all areas with a mere "hydrological connection" to navigable waters. The unifying theme of the Justices was not that the CWA needed to be changed but rather that the Corps and EPA should issue new regulations. As Justice Breyer, who sided with the dissent, observed, the agencies should "write new regulations, and speedily so."

Legislation: The U.S. Supreme Court's decisions in *SWANCC* and *Rapanos*, coupled with the recent Army Corps of Engineers ("Corps") and Environmental Protection Agency ("EPA") guidance implementing *Rapanos,* have added a degree of uncertainty to the world of CWA jurisdiction. However, all three Supreme Court decisions, in addition to the earlier *Riverside Bayview* decision, highlight the importance of retaining a distinction between federal and state jurisdiction.

The leading legislative proposal deletes the term "navigable" from the CWA and proposes to regulate all "intrastate waters" and all "activities affecting these waters" to the furthest extent of Congress's authority. These amendments will inject uncertainty in the CWA to the detriment of the 44 states that administer the NPDES program and those whose operations must comply with the statute. They will not restore the original intent of the CWA and will not make it easier to protect truly important waters. In fact, the amendments will:

- Delete the word "navigable" from the CWA and consequently erase any distinction between state and federal waters.

- Conflict with CWA sections 101(b) and 101(g) which state Congressional intent to "recognize, preserve, and protect the primary responsibilities and rights of the States" to control the development and use of local land and water resources and to "allocate quantities of water within [State] jurisdiction."
- Eliminate the existing regulatory exemptions which were authorized by both Democratic and Republican administrations for prior converted cropland and waste treatment systems.
- Place critical regulatory decisions in the hands of constitutional lawyers and result in costly litigation regarding the scope of CWA jurisdiction, the extent of "activities affecting these waters," and the limit of Congress's authority under the Constitution.

Recommendation: Any legislative effort to clarify the scope of the CWA should, at a minimum, be based on the following principles:

- Maintain the distinction between federal and state waters by retaining the term "navigable waters."
- Adhere to the fundamental principle that states retain primary jurisdiction over water and land use within their individual boundaries.
- Clarify jurisdiction without expanding it. Jurisdiction should be clear, unambiguous, and practical.
- Define important terms used in the CWA. Since passage of the CWA in 1972, the regulated community, and even the Supreme Court, has requested definitions of key terms like "tributary," "adjacent," "impoundment," and "traditional navigable waters."
- Avoid creating more confusion.

About the Waters Advocacy Coalition: *Statement of Policy:* The members of WAC are committed to the protection and restoration of America's wetlands resources. WAC does not believe, however, that it is in the nation's interest to have federal agencies regulate ditches, culverts and pipes, desert washes, sheet flow, erosional features, and farmland and treatment ponds as "waters of the United States," subjecting such waters to all of the federal regulatory requirements of the CWA. *Members include:* American Farm Bureau Federation®; American Forest & Paper Association; American Iron and Steel Institute; American Road and Transportation Builders Association; Associated General Contractors of America; CropLife America; Edison Electric Institute; The Fertilizer Institute; Foundation for Environmental and Economic Progress; Industrial Minerals Association-North America; International Council of Shopping Centers; National Association of Flood and Stormwater Management Agencies; National Association of Home Builders; National Association of Industrial and Office Properties; National Association of Manufacturers; National Association of REALTORS®; National Association of State Departments of Agriculture; National Cattlemen's Beef Association; National Corn Growers Association; National Council of Farmer Cooperatives; National Mining Association; National Multi Housing Council; National Pork Producers Council; National Stone, Sand and Gravel Association; Public Lands Council; Responsible Industry for a Sound Environment; Southern Crop Production; United Egg Producers; and Western Business Roundtable.

For more information contact Virginia Albrecht or Deidre Duncan, Hunton & Williams LLP, 202-955-1943.

Coal: America's Power
Percent Coal Generation by State

States	Power Sector Generation from Coal	States	Power Sector Generation from Coal
Alabama	55.5%	Missouri	82.4%
Alaska	6.1%	Montana	64.2%
Arizona	36.4%	Nebraska	59.8%
Arkansas	48.3%	Nevada	22.4%
California	0.9%	New Hampshire	17.0%
Colorado	68.2%	New Jersey	16.5%
Connecticut	11.3%	New Mexico	77.0%
Delaware	74.3%	New York	14.5%
District of Columbia	0.0%	North Carolina	62.4%
Florida	30.8%	North Dakota	93.7%
Georgia	63.9%	Ohio	86.1%
Hawaii	14.0%	Oklahoma	47.1%
Idaho	0.0%	Oregon	8.3%
Illinois	47.2%	Pennsylvania	54.8%
Indiana	96.4%	Rhode Island	0.0%
Iowa	75.9%	South Carolina	40.8%
Kansas	72.8%	South Dakota	47.0%
Kentucky	93.6%	Tennessee	63.8%
Louisiana	35.2%	Texas	40.1%
Maine	1.4%	Utah	85.0%
Maryland	59.6%	Vermont	0.0%
Massachusetts	25.4%	Virginia	46.0%
Michigan	59.6%	Washington	8.1%
Minnesota	60.1%	West Virginia	98.4%
Mississippi	36.3%	Wisconsin	64.0%
		Wyoming	96.4%

A Pragmatic Approach To Coal As An Energy Supply

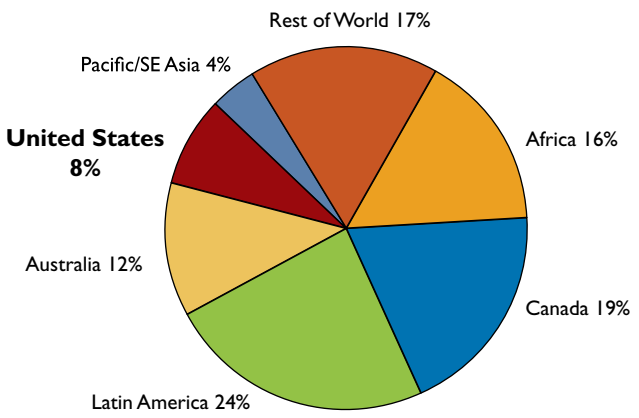
Energy Secretary Steven Chu endorses 'clean coal' technology and research, supporting investment in technology to reduce the carbon produced by burning coal. The United States has the world's largest reserves of coal; and currently over 50% of our electrical energy comes from coal. According to Secretary Chu, the US needs "… to develop technologies that can get a large fraction of the carbon dioxide out of coal."

For additional information on the economic contributions of coal, see
www.nma.org/pdf/pubs/mining_economic_report.pdf.

wmc
womensminingcoalition

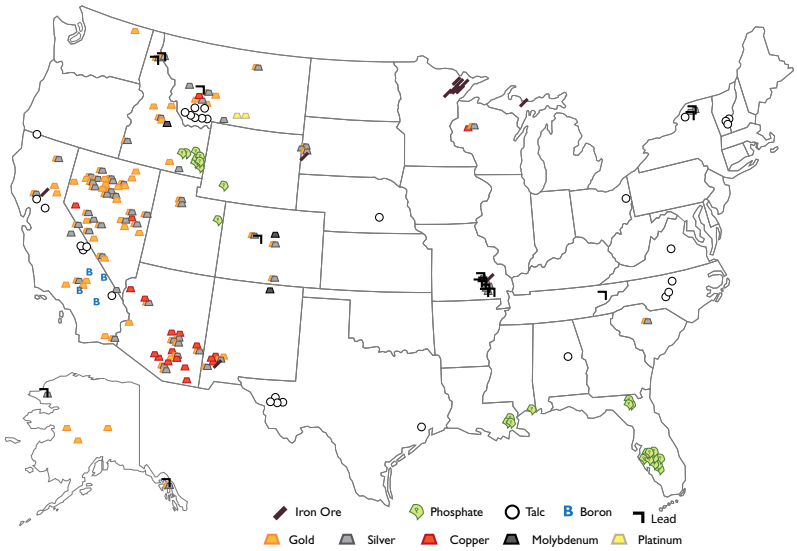
Minerals: America's Strength

Declining U.S. Share of Worldwide Exploration Spending, 2007



source: SME *Mining Engineering Magazine*, May 2008

Major U.S. Minerals Mines



source: U.S. Geological Survey (USGS)

The basics of our well-being—our homes, workplaces, schools, hospitals and transportation systems—are all possible because of America's vast mineral wealth. We also rely on metals and minerals to meet our electronic, telecommunications and national security needs.

The contributions to America's well-being that have been made by minerals and minerals mining are unprecedented. Not only is the United States among the world's largest minerals users, we also rank as one of the world's largest producers.

Mineral Facts

- **MINERALS** The domestic mining industry provides nearly 50 percent of the metals American manufacturers need to operate, including iron ore, copper, gold, phosphate, zinc, silver and molybdenum.
- **JOBS** More than 250,000 people work directly in U.S. metals and non-metals mining throughout the United States, and an additional 650,000 jobs are created elsewhere in the economy to support metals and non-metals mining. Industries, such as machinery and computers and electronics, that are dependent upon metals and minerals to produce their products, employ nearly 17 million people, with more than $900 billion in earnings, and contribute $1.8 trillion in annual gross domestic product according to the Bureau of Economic Analysis and the Bureau of Labor Statistics. For additional information see www.nma.org/pdf/pubs/mining_economic_report.pdf.
- **WAGES** The average annual wage for mining jobs is the highest of any industrial category—33 percent higher than the combined average for all industrial jobs.
- **VALUE** The $68.3 billion worth of metals and non-metals produced at U.S. mines in 2007 generated more than $161 billion in direct and indirect economic output.
- **GOVERNMENT REVENUE** Metals and non-metals mining generated $13.6 billion in payroll and income taxes in 2007.

Metal Used in a Fighter Jet Engine - 2008

Metal	Amount (tons)	Import Dependence
Titanium (Sponge)	2.7	**54%**
Nickel	2.7	**33%**
Chromium	0.9	**54%**
Cobalt	0.6	**81%**
Aluminum*	0.5	**44%**
Niobium	0.1	**100%**
Tantalum	1.2 kg	**100%**

sources: USGS *Mineral Commodity Summaries 2008;* British Geological Survey. * Estimate based on 2007 data.

Despite the benefits provided by domestic minerals mining, the United States has witnessed a prolonged period of underinvestment in exploration. In turn, this has caused America to become increasingly dependent on foreign sources for minerals vital to our economic and national security—including minerals for which we have proven reserves.

Consider:

- The U.S. accounts for a meager 8 percent of worldwide exploration budgets.
- American now depends on imports for 100 percent of 19 mineral commodities, including yttrium, which is essential to the manufacture of microwave communications equipment, and vanadium, essential to the manufacture of superconductors.

America is 50 percent import reliant on 44 commodities to meet domestic demand including silver, for which the U.S. has one of the world's largest reserves, an integral component of catalytic converters, cell phones and medical diagnostics.

To further jobs creation and to meet our domestic need for infrastructure development, military equipment and consumer products, we should further develop America's domestic resource base to capitalize on the advantages of America's stable government, economic strength, educated workforce and technologically advanced and environmentally aware mining industry.

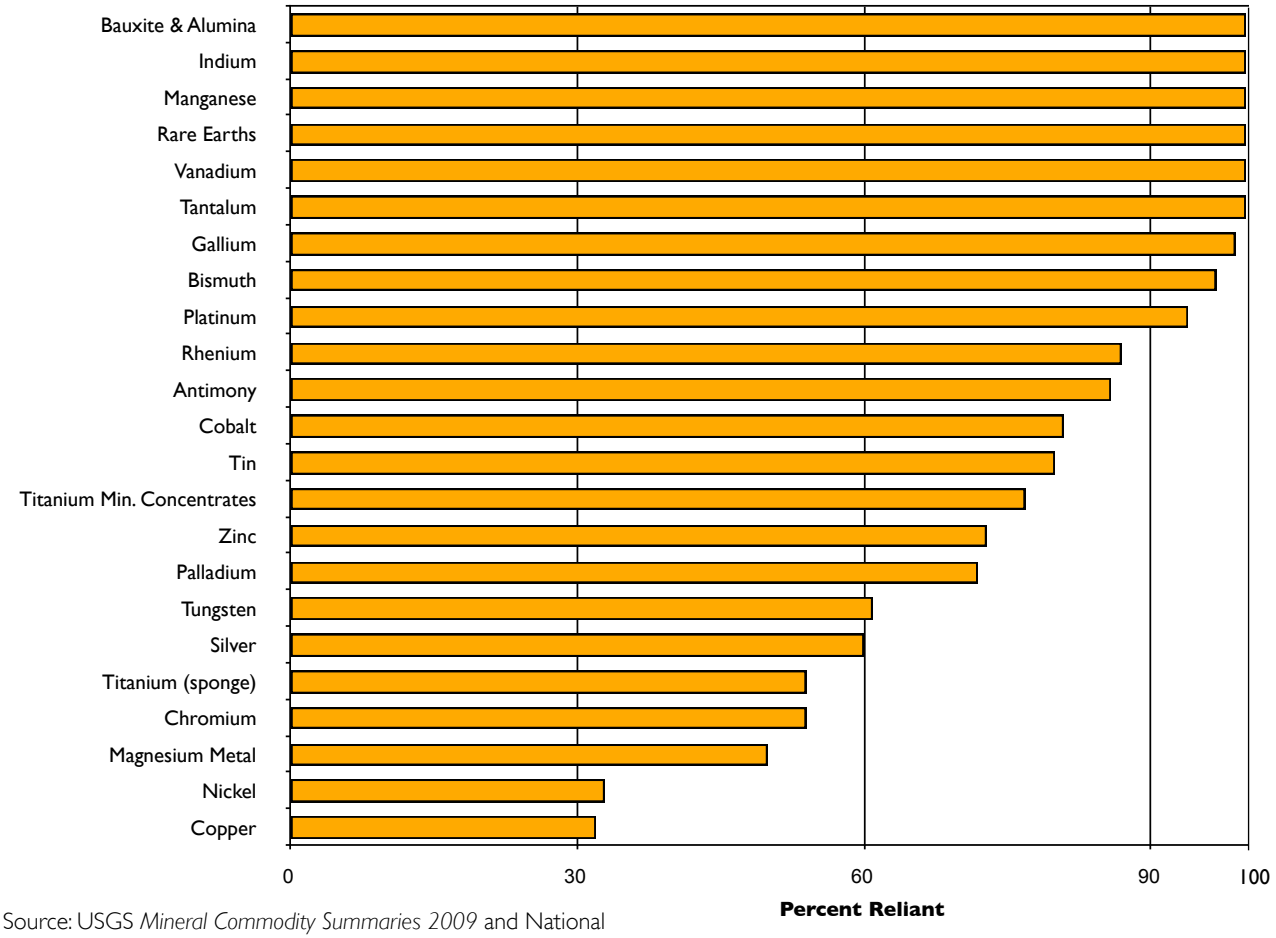
Environmental Stewardship

U.S. minerals mining complies with numerous state and federal laws including the:

- National Environmental Policy Act
- Clean Air Act
- Clean Water Act
- Solid Waste Disposal Act
- Resource Conservation and Recovery Act
- Superfund
- Safe Drinking Water Act
- Toxic Substances Control Act

A congressionally mandated National Academy of Sciences study has found that the existing laws and regulations government hardrock mining are effective in protecting the environment.

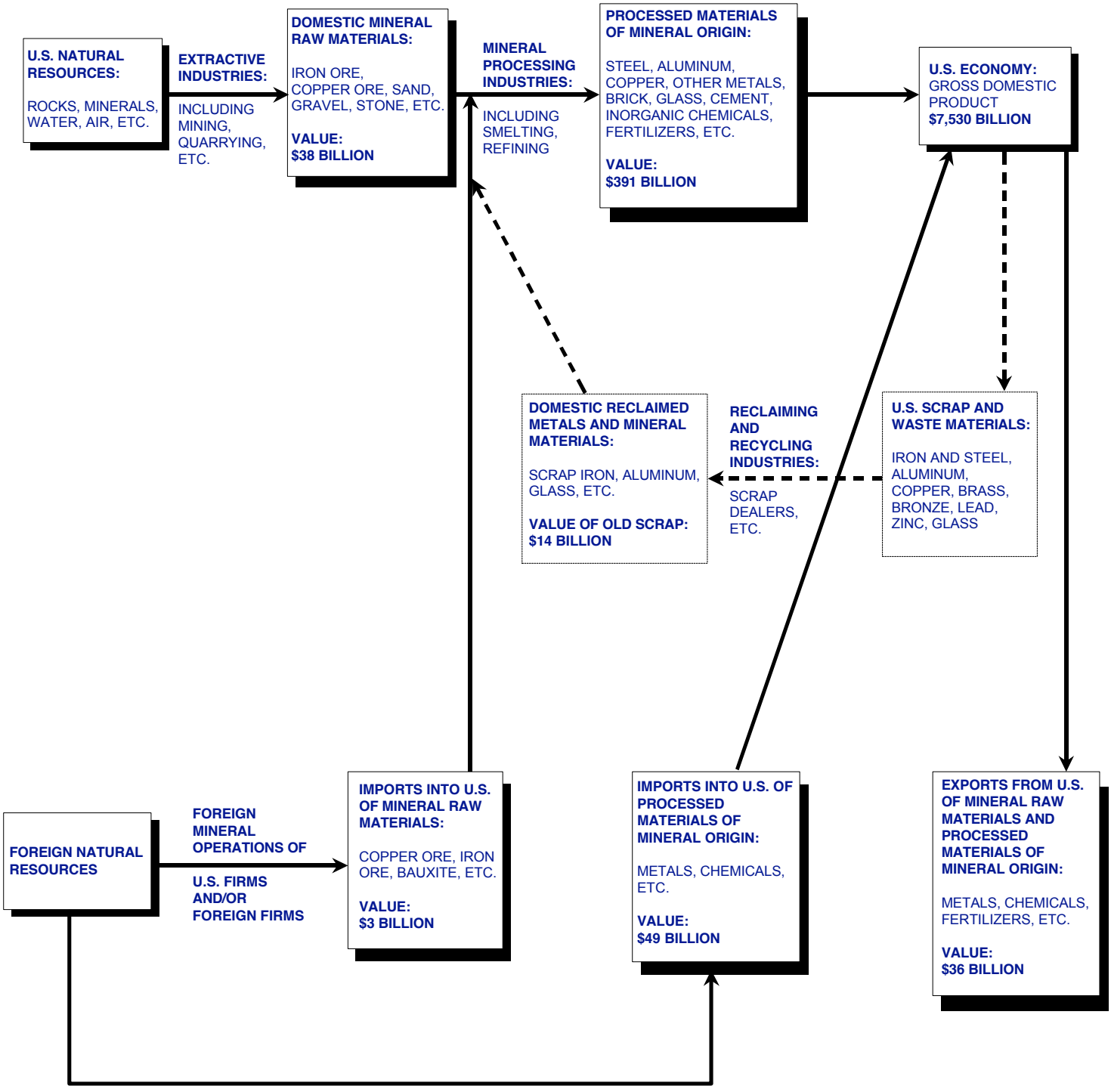
Selected Critical Minerals U.S. Net Import Reliance 2008



Source: USGS *Mineral Commodity Summaries 2009* and National Research Council, *Minerals, Critical Minerals, and the U.S. Economy*

THE ROLE OF NONFUEL MINERALS IN THE U.S. ECONOMY

(ESTIMATED VALUES IN 1996)



1996 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS

Commodity	Percent	Major Sources (1992-95)[1]
ARSENIC	100	China, Chile, Mexico
BAUXITE and ALUMINA	100	Australia, Jamaica, Guinea, Brazil
COLOMBIUM (niobium)	100	Brazil, Canada, Germany
GRAPHITE (natural)	100	Canada, Mexico, China, Madagascar, Brazil
MANGANESE	100	South Africa, Gabon, Australia, France
MICA, sheet (natural)	100	India, Belgium, Brazil, China, Argentina
STRONTIUM	100	Mexico, Germany
THALLIUM	100	Belgium, Canada, Mexico
THORIUM	100	France
FLUORSPAR	99	China, South Africa, Mexico
GEMSTONES	98	Israel, Belgium, India, United Kingdom
COBALT	83	Zambia, Norway, Canada, Finland, Russia
TIN	83	Brazil, Bolivia, Indonesia, China
TUNGSTEN	82	China, Russia, Germany, Bolivia, United Kingdom
TANTALUM	80	Australia, Germany, Thailand, Brazil
CHROMIUM	79	South Africa, Turkey, Russia, Kazakstan, Zimbabwe
POTASH	76	Canada, Belarus, Russia, Israel, Germany
BARITE	66	China, India, Mexico, Morocco, Canada
STONE (dimension)	64	Italy, Spain, India, Canada
NICKEL	63	Canada, Norway, Australia, Russia
IODINE	62	Japan, Chile
PEAT	58	Canada
DIAMOND (dust, grit, and powder)	40	Ireland, China, Russia
SELENIUM	38	Canada, Philippines, Japan, Belgium
CADMIUM	33	Canada, Belgium, Mexico, Germany
ZINC	33	Canada, Mexico, Spain
RARE EARTHS	32	France, China, India, Japan, United Kingdom
SILICON	31	Norway, Brazil, Russia, Canada
ASBESTOS	30	Canada
GYPSUM	30	Canada, Mexico, Spain
MAGNESIUM COMPOUNDS	30	China, Canada, Austria, Mexico, Greece
PUMICE	28	Greece, Ecuador, Turkey
ALUMINUM	21	Canada, Russia, Venezuela, Brazil
NITROGEN (fixed), AMMONIA	18	Trinidad and Tobago, Canada, Former Soviet Union
SALT	18	Canada, Mexico, Bahamas, Chile
IRON and STEEL	17	European Union, Canada, Japan, Brazil, Mexico
IRON ORE	17	Canada, Brazil, Venezuela, Australia, Mauritania
LEAD	17	Canada, Mexico, Peru, Australia
COPPER	13	Canada, Chile, Mexico
SODIUM SULFATE	13	Canada, Mexico
CEMENT	12	Canada, Spain, Mexico, Greece, Colombia
SULFUR	11	Canada, Mexico, Germany, Japan
MICA, scrap and flake (natural)	8	Canada, India, Finland, Japan, Germany
PERLITE	6	Greece
IRON and STEEL SLAG	1	Canada, South Africa
LIME	1	Canada, Mexico

[1] In descending order of importance

Additional commodities for which there is some import dependency include:

Antimony	China, Bolivia, Mexico, South Africa
Bismuth	Mexico, Belgium, China, United Kingdom
Gallium	France, Russia, Germany, Hungary
Germanium	China, United Kingdom, Ukraine, Russia, Belgium
Ilmenite	South Africa, Australia, Canada
Indium	Canada, France, Russia, Italy
Kyanite	South Africa
Mercury	Russia, Canada, Kyrgyzstan, Germany
Platinum	South Africa, United Kingdom, Russia, Germany, Belgium
Rhenium	Chile, Germany, Sweden
Rutile	Australia, South Africa, Sierra Leone
Silver	Mexico, Canada, Peru, Chile
Titanium (sponge)	Russia, Japan, China, Ukraine
Vanadium	South Africa, Canada, Russia, Mexico
Vermiculite	South Africa
Zirconium	Australia, South Africa

SIGNIFICANT EVENTS, TRENDS, AND ISSUES

The Mineral Sector of the U.S. Economy

The U.S. economy and, consequently, the demand for minerals grew at a moderate rate in 1996. Demand for metals, such as steel and copper, was relatively stable or increased compared with 1995. For example, the decline in steel consumed in motor vehicle manufacturing (reflecting lower vehicle sales) during the first three quarters was offset by an increase in steel consumed in construction during the same period. Demand for industrial minerals, especially crushed stone and cement, generally increased compared with the previous year. More detailed information on events, trends, and issues in the mineral and material sector is presented below and in the commodity sections that follow.

Overall Performance

The value of processed materials of mineral origin produced in the United States during 1996 was estimated to be $391 billion, a slight increase (1.2%) compared with 1995. The estimated value of U.S. raw nonfuel minerals production in 1996 was $38 billion, a slight decrease (0.9%) compared with 1995. The value of U.S. minerals production has increased in 30 of the last 36 years.

Total U.S. trade in raw minerals and processed materials of mineral origin was valued at $88 billion in 1996. Imports of processed mineral materials were valued at an estimated $49 billion, while exports of these materials were valued at an estimated $33 billion. Imports of metal ores and concentrates and of raw industrial minerals increased almost 8% to $2.6 billion. Raw minerals exports increased slightly to $3.1 billion. Demand for metals and other mineral-based materials used extensively in motor vehicle manufacturing declined slightly in 1996 because of the estimated 4% decline in automobile manufacture. The motor vehicle manufacturing sector is a major consumer of other mineral-based materials, chiefly aluminum, copper, lead, platinum-group metals, zinc, glass, plastics, and steel.

The domestic construction industry provided for modest growth in minerals demand. The construction sector is the largest consumer of brick clay, cement, sand and gravel, and stone. Road construction expenditures in 1996 maintained the high levels of the last few years as a result of the 6-year Federal highway and mass transit program reauthorized in 1991. Large amounts of asphalt, cement, crushed stone, and sand and gravel are used in road-building. Apartment building construction and new home construction increased in 1996, which had a salutary effect on the consumption of brick clay, cement, sand and gravel, steel, and stone.

Responding to domestic and world demand for fertilizer nutrients, the domestic mineral fertilizer manufacturing sector operated at full capacity, which resulted in a strong demand for fixed nitrogen, phosphate rock, and sulfur. Although global fertilizer nutrient consumption increased substantially, U.S. demand at the farm level, where fertilizers are consumed, was lower because of adverse weather conditions.

The Uruguay Round of the General Agreements on Tariffs and Trade (GATT) became effective January 1, 1995. GATT rules, such as those that address market access affected by tariff and nontariff market barriers, are significant to U.S. minerals producers. For example, Uruguay Round GATT agreements eliminate tariffs (during a 10-year period) on steel imposed by the United States and its trading partners, including the European Union and Japan.

Legislation to reform the Mining Law of 1872 has been considered by the Congress and the Administration for the past several years; however, legislation to reform the Mining Law was not enacted in 1996. The Mining Law gives U.S. citizens and corporations the right to prospect for certain minerals on particular Federal lands and confers the right to file claims that permit the claimants to mine and sell minerals found. The Mining Law does not provide for a royalty payment to the Federal Government for minerals that are mined. Under the Mining Law, claimants also may apply for a patent that transfers ownership of minerals and mineral lands to the claimant.

In fiscal year 1996 the Defense Logistics Agency sold excess mineral materials valued at $391 billion (see “Government Stockpile” in the commodity sections that follow). The Defense Production Act, which provides authority for priorities, allocations, and defense-related supply expansions, is expected to continue.

Outlook

The U.S. economy is expected to continue to grow at a moderate rate for the near term, providing a mild stimulus to the Nation's materials-consuming industries. Inflation is expected to remain low, thus permitting a continuance of low interest rates conducive to an expanding economy. Although motor vehicle sales have declined slightly from their 1994 peak, relatively strong sales are expected to continue because of moderate auto loan interest rates and advantageous monetary exchange rates. The 6-year Federal highway and mass transit program reauthorized

TABLE 1.—U.S. MINERAL INDUSTRY TRENDS

	1992	1993	1994	1995	1996[e]
Total mine production:[1]					
Metals	11,547	10,819	12,111	14,064	12,654
Industrial minerals	20,574	21,177	23,085	24,421	25,510
Coal	20,978	18,767	20,060	19,451	19,289
Employment:[2]					
Coal mining	103	86	90	85	81
Metal mining	42	40	39	41	41
Industrial minerals, except fuels	76	76	78	80	83
Chemicals and allied products	567	573	578	578	567
Stone, clay, and glass products	396	399	411	417	418
Primary metal industries	525	520	537	552	549
Average weekly earnings of production workers:[3]					
Coal mining	755	767	803	828	854
Metal mining	655	659	699	735	759
Industrial minerals, except fuels	550	585	610	624	657
Chemicals and allied products	625	639	654	675	700
Stone, clay, and glass products	490	506	526	534	555
Primary metal industries	587	611	641	643	662

[e]Estimated.

[1]Million dollars.

[2]Thousands of production workers.

[3]Dollars.

Sources: U.S. Geological Survey; U.S. Department of Energy, Energy Information Administration; U.S. Department of Labor, Bureau of Labor Statistics.

at yearend 1991 will continue to provide an impetus for consumption of stone, sand and gravel, and steel through 1997. The demand prospect for mineral fertilizer materials (i.e., fixed nitrogen, phosphate rock, potash, and sulfur) is expected to be robust in the coming year because low world stocks of grains and oilseeds should stimulate increased planting.

Significant International Events[1]

In addition to the further delineation of the world class resource base and development potential of the Voisey's Bay nickel deposit in Labrador, Canada, and the Busang gold deposit in Kalimantan, Indonesia, 1996 was marked by the ongoing capacity of Canadian equity capital markets to generate investments for worldwide exploration and mining development. Canadian capital markets contributed a significant share of more than $3.5 billion (U.S.) in corporate exploration expenditures in 1996 as reported by the Metals Economics Group (MEG) of Halifax, Nova Scotia. The MEG study which, covers the exploration budgets of 223 companies, captures about 76% of total worldwide expenditures. Exploration budgets were distributed regionally as follows: Latin America (27.3%), Australia (18.9%), Canada (13.1%), Africa (11.9%), Asia and the Pacific (11.8%), United States (9.7%), and the rest of the world (7.3%). The areas most benefitting from increased exploration expenditures in 1996, compared with 1995, were Asia and the Pacific, Canada, and Africa.

Global commodity priorities were focused on gold, diamonds, nickel, steel, aluminum, cobalt, and base-metals, the latter despite the effect of the copper trading

TABLE 2.—U.S. MINERAL-RELATED ECONOMIC TRENDS

	1992	1993	1994	1995	1996[e]
Gross domestic product (billion dollars)	6,240	6,550	6,940	7,250	7,530
Capital expenditures (billion dollars):					
All industries	546 [1]	490	550 [p]	594 [p]	603
Manufacturing	174 [1]	134	153 [p]	172 [p]	185
Mining and construction	9 [2]	31	36 [p]	36 [p]	34
Industrial production (1987=100):					
Total index	108	112	118	122	126
Manufacturing	108	112	120	124	128
Stone, clay, and glass products	95	98	102	104	106
Primary metals	102	108	117	119	120
Iron and steel	105	112	119	122	124
Nonferrous metals	98	102	112	115	115
Chemicals and chemical products	114	115	121	125	129
Mining	99	98	100	100	101
Metals	164	162	163	169	165
Coal	108	103	113	113	114
Oil and gas extraction	93	93	93	92	93
Stone and earth minerals	99	101	107	112	116
Capacity utilization (percent):[3]					
Total industry	80	81	84	84	83
Mining	87	87	90	89	90
Metals	87	84	85	87	84
Stone and earth minerals	84	85	89	91	91
Housing starts (thousands)	1,200	1,290	1,460	1,350	1,500
Automobile production (thousands)	5,660	5,980	6,610	6,350	6,050
Highway construction, all public, expenditures (billion dollars)	29	31	33 [p]	35 [e]	36

[e]Estimated. [p]Preliminary.

[1]From survey of new plant equipment and expenditures.

[2]From survey of new plant equipment and expenditures, mining industry only.

[3]1996 estimates based on seasonally adjusted figures.

Sources: U.S. Department of Commerce, Federal Reserve Board, American Automobile Manufacturers' Association, and U.S. Department of Transportation.

scandal on copper markets. The demand for industrial minerals and construction materials was fueled by new economic growth in Asia and Latin America, along with the need to rebuild aging infrastructure in North America and Europe. Trends in privatization of state-owned mining and processing enterprises in Europe, Asia, Africa, and Latin America continued with more willingness of governments to take on private joint-venture partners in countries where the national sentiment was to maintain ownership of natural resources.

Africa

Africa witnessed a major resurgence in mineral exploration and mineral project planning in 1996. Diamond exploration and development continued in South Africa, Botswana, Namibia, Angola, and Zaire, while the gold rush continued in Africa, especially in Burkina Faso, Eritrea, Ethiopia, Ghana, Mali, Niger, Tanzania, and Zaire. Canadian, South African, and Australian companies were leading the current exploration activity in Africa. The Central African Republic, Côte d'Ivoire, Guinea, and Senegal were also experiencing increased interest by international investors in their gold resources. Gold output continued to surpass old production records in Ghana and Zimbabwe. Other new activity in Africa's mineral industry included rutile exploration at Akonolinga in Cameroon, the investigation of the Biankouma-Touba nickel deposit in Côte d'Ivoire, and the development of new bauxite deposits and the resumption of diamond exploration in Guinea. In Kenya, the only fluorspar producer was privatized and a Canadian firm was evaluating coastal ilmenite sands. Processing operations to recover cobalt from stockpiled pyrite concentrates at Kilembe in Uganda were underway. Mining began at the Hartley platinum mine in Zimbabwe during March 1996. Offshore Africa showed significant petroleum exploration activity. New development occurred off Cameroon, Côte d'Ivoire, Equatorial Guinea, Guinea-Bissau, Nigeria, and Senegal. The development of Chad's Doba Basin and the utilization of flared natural gas in Nigeria were progressing rapidly.

At approximately 490 tons, gold production in South Africa in 1996 was the lowest in 40 years. The depreciating value of the South African rand helped offset higher internal gold production costs and lower dollar export earnings. The six major South African mining houses continued both their corporate “unbundling” and their diversification of investments outside of South Africa, with a particular eye to new exploration and development opportunities elsewhere in Africa. As part of Black Economic Empowerment initiatives in South Africa, two African-owned mining-related commercial firms were established in 1996, stimulated by offers to purchase unbundled Anglo-American assets. In the policy arena, the South African Government was expected to release its Green Paper on Mining by yearend. Expectations were that it would promote a positive environment for growth and employment in the mining sector.

The Zambia Privatization Agency issued an international tender to prospective investors to buy the mining and electricity distribution assets of the national mining corporation. A company formed by former employees of the corporation acquired 100% ownership of the closed Kabwe lead-zinc mine and announced plans to restart production initially from old tailings.

Civil war adversely affected mining in Liberia, Rwanda, Somalia, and Sudan; however, in the Central African Republic, diamond production continued despite repeated attempted coups. In Sierra Leone, the rutile mine remained closed in 1996 but reported little external damage to major equipment resulting from insurgent actions at the site in January 1995. Despite political uncertainties, most of 1996 saw increased interest by foreign investors in the minerals sector of Zaire. A Canadian firm acquired a 72% interest in the gold mines and properties of a Zairian firm and had announced plans for a $20 million development program. However, the Mobale gold mine near Kamituga in eastern Zaire was heavily damaged, and normal supply routes through Bukavu were disrupted during fighting between the Zaire army and local insurgents late in the year.

In north Africa, private investment has contributed significantly to the mining and metallurgical segments of the Egyptian and Moroccan economies. A number of major new industrial projects in cement, fertilizers, metals, and petrochemicals attracted private investment capital. In Egypt, the sole aluminum producer reduced Government equity in favor of private capital by 20%, while continuing its expansion program to raise annual smelter capacity by 60,000 tons in 1997 to a total annual capacity of 240,000 tons. The country’s iron and steel producer has embarked on an expansion and modernization program costing $350 million. The expansion is scheduled for completion in 1997. Morocco and Western Sahara host over 50% of the world's phosphate rock reserves and are the world's largest phosphate rock exporters. The Sidi Chennane mine became operational in 1996 and should have an annual capacity of 5 million tons by 1998.

Middle East

In the Middle East, aluminum smelter expansion activities have progressed on schedule in Bahrain and in Dubai, United Arab Emirates. The expansion of Bahrain’s aluminum smelter is expected to be operational by May 1997, and additional capacity at Dubai’s aluminum smelter is scheduled for completion by September 1997. A U.S.-based firm began commercial exploitation of the Al Masane polymetallic deposit in Saudi Arabia. The deposit is estimated by ASDC to total 7.2 million tons containing 5.3% zinc, 1.42% copper, 40 grams per ton silver, and 1.19 grams per ton gold.

Asia and the Pacific

In October 1996, the Australian Government proposed legislative amendments to its 3-year-old Native Title Act

TABLE 3.—VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 1996 [1]

State	Value (thousands)	Rank	Percent of U.S. total	Principal minerals, in order of value
Alabama	$735,000	17	1.93	Cement (portland), stone (crushed), lime, sand and gravel (construction), clays.
Alaska[2]	523,000	25	1.37	Zinc, lead, gold, sand and gravel (construction), stone.
Arizona	3,530,000	1	9.25	Copper, sand and gravel (construction), cement (portland), molybdenum, lime.
Arkansas	453,000	29	1.19	Stone (crushed), bromine, cement (portland), sand and gravel (construction), gemstones.
California	2,840,000	3	7.43	Sand and gravel (construction), cement (portland), boron minerals, gold, stone (crushed).
Colorado	528,000	23	1.38	Sand and gravel (construction), cement (portland), molybdenum, stone (crushed), gold.
Connecticut	103,000	44	0.27	Stone (crushed), sand and gravel (construction), stone (dimension), clays, gemstones.
Delaware[2]	10,700	50	0.03	Sand and gravel (construction), magnesium compounds, gemstones.
Florida	1,540,000	8	4.03	Phosphate rock, stone (crushed), cement (portland), sand and gravel (construction), clays.
Georgia	1,720,000	6	4.51	Clays, stone (crushed), cement (portland), stone (dimension), sand and gravel (construction).
Hawaii[2]	112,000	43	0.29	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), gemstones.
Idaho	411,000	32	1.08	Gold, phosphate rock, molybdenum, sand and gravel (construction), silver.
Illinois	777,000	16	2.04	Stone (crushed), cement (portland), sand and gravel (construction), sand and gravel (industrial), clays.
Indiana	617,000	21	1.62	Stone (crushed), cement (portland), sand and gravel (construction), lime, cement (masonry).
Iowa	490,000	28	1.28	Stone (crushed), cement (portland), sand and gravel (construction), gypsum, lime.
Kansas	524,000	24	1.37	Cement (portland), helium (Grade-A), stone (crushed), salt, sand and gravel (construction).
Kentucky	452,000	30	1.19	Stone (crushed), lime, cement (portland), sand and gravel (construction), clays.
Louisiana	428,000	31	1.12	Salt, sulfur (Frasch), sand and gravel (construction), stone (crushed), sand and gravel (industrial).
Maine	73,100	45	0.19	Sand and gravel (construction), cement (portland), stone (crushed), cement (masonry), peat.
Maryland[2]	324,000	36	0.85	Stone (crushed), cement (portland), sand and gravel (construction), cement (masonry), stone (dimension).
Massachusetts	191,000	39	0.50	Sand and gravel (construction), stone (crushed), stone (dimension), lime, clays.
Michigan	1,510,000	9	3.95	Iron ore (usable), cement (portland), sand and gravel (construction), magnesium compounds, stone (crushed), salt.

See footnotes at end of table.

TABLE 3.—VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 1996 [1]—Continued

State	Value (thousands)	Rank	Percent of U.S. total	Principal minerals, in order of value
Minnesota	$1,800,000	4	4.72	Iron ore (usable), sand and gravel (construction), stone (crushed), sand and gravel (industrial), stone (dimension).
Mississippi	140,000	42	0.37	Sand and gravel (construction), clays, cement (portland), stone (crushed), sand and gravel (industrial).
Missouri	1,250,000	10	3.28	Lead, stone (crushed), cement (portland), lime, zinc.
Montana	523,000	26	1.37	Gold, copper, cement (portland), zinc, sand and gravel (construction).
Nebraska	147,000	41	0.39	Cement (portland), sand and gravel (construction), stone (crushed), clays, cement (masonry).
Nevada	3,200,000	2	8.37	Gold, silver, sand and gravel (construction), copper, diatomite.
New Hampshire[2]	43,900	47	0.11	Sand and gravel (construction), stone (crushed), stone (dimension), clays, gemstones.
New Jersey[2]	222,000	38	0.58	Stone (crushed), sand and gravel (construction), sand and gravel (industrial), greensand marl, peat.
New Mexico	963,000	12	2.52	Copper, potash, sand and gravel (construction), cement (portland), stone (crushed).
New York	891,000	15	2.33	Stone (crushed), cement (portland), salt, sand and gravel (construction), zinc.
North Carolina	731,000	18	1.92	Stone (crushed), phosphate rock, lithium minerals, sand and gravel (construction), sand and gravel (industrial).
North Dakota	30,300	49	0.08	Sand and gravel (construction), lime, clays, sand and gravel (industrial), gemstones.
Ohio	934,000	13	2.45	Stone (crushed), salt, sand and gravel (construction), lime, cement (portland).
Oklahoma	372,000	34	0.98	Stone (crushed), cement (portland), sand and gravel (construction), sand and gravel (industrial), gypsum.
Oregon	251,000	37	0.66	Stone (crushed), sand and gravel (construction), cement (portland), lime, diatomite.
Pennsylvania[2]	1,040,000	11	2.72	Stone (crushed), cement (portland), lime, sand and gravel (construction), cement (masonry).
Rhode Island[2]	31,900	48	0.08	Sand and gravel (construction), stone (crushed), sand and gravel (industrial), gemstones.
South Carolina	495,000	27	1.30	Cement (portland), stone (crushed), gold, sand and gravel (construction), cement (masonry).
South Dakota	353,000	35	0.93	Gold, cement, (portland), sand and gravel (construction), stone (crushed), stone (dimension).
Tennessee	648,000	19	1.70	Stone (crushed), zinc, cement (portland), sand and gravel (construction), clays.
Texas	1,780,000	5	4.67	Cement (portland), sand and gravel (construction), stone (crushed), magnesium metal, lime.
Utah	1,560,000	7	4.09	Copper, gold, magnesium metal, sand and gravel (construction), molybdenum.
Vermont[2]	66,800	46	0.17	Sand and gravel (construction), stone (dimension), stone (crushed), talc and pyrophyllite, gemstones.

See footnotes at end of table.

TABLE 3.—VALUE OF NONFUEL MINERAL PRODUCTION IN THE UNITED STATES AND PRINCIPAL NONFUEL MINERALS PRODUCED IN 1996 [1]—Continued

State	Value (thousands)	Rank	Percent of U.S. total	Principal minerals, in order of value
Virginia	$529,000	22	1.39	Stone (crushed), cement (portland), sand and gravel (construction), lime, kyanite.
Washington	626,000	20	1.64	Sand and gravel (construction), magnesium metal, cement (portland), stone (crushed), gold.
West Virginia	191,000	40	0.50	Stone (crushed), cement (portland), sand and gravel (construction), lime, salt.
Wisconsin	399,000	33	1.04	Stone (crushed), sand and gravel (construction), copper, sand and gravel (industrial), lime.
Wyoming	918,000	14	2.41	Soda ash, clays, helium (Grade-A), cement (portland), stone (crushed).
Undistributed	145,000	XX	0.38	
Total	38,200,000	XX	100.00	

XX Not applicable.

[1]Data are rounded to three significant digits; may not add to totals shown.

[2]Partial total, excludes values that must be concealed to avoid disclosing company proprietary data. Concealed values included with "Undistributed".

(NTA). Under the proposals, a Federal minister could override Aboriginal concerns if these threatened a project of major economic benefit to Australia. The manager-operator of the Argyle diamond mine in Western Australia, did not renew its marketing agreement with the Central Selling Organization upon the expiration of the contract. Argyle, the world's biggest single-mine producer of diamond with output equivalent to about 40% of world production, now sells all of its rough (uncut) production through its European Sales Office in Antwerp, Belgium. The Australian Government ended its 12-year-old policy of restricting uranium production to three sites following the Federal election in March 1996 and the installation of the Liberal-National Party Coalition Government. In China, the Standing Committee of the 8th National People's Congress approved the amendments to the Mineral Resources Law on August 29, 1996, taking effect on January 1, 1997. The amendments strengthen the State ownership of China's mineral resources and allow the local governments responsibility for guaranteeing exploration and exploitation of mineral resources. The amendments also allow private enterprises and Sino-foreign joint-venture companies to participate in the exploration and exploitation of mineral resources under the supervision of the State in China. Also, on August 29, 1996, the Committee approved the Coal Law that took effect on December 1, 1996. The Coal Law stated that all coal resources in China continued to be the property of the State and will remain so regardless of any changes in the surface land ownership or the right of use of the land where the coal is located. The State protects lawful exploration rights and mining rights from any encroachment and ensures against any interference and disruption of operations in mining areas and exploration sites. The Coal Law also confirms that mining rights cannot be sold or leased. The Ministry of Coal Industry is responsible for administrating and enforcing the Coal Law. The Indian Government announced in October 1996 that applications for foreign investment of up to of 50% in a particular project or company in the minerals industry would be given automatic approval. However, in the case of diamonds and other precious stones, gold, and silver, the Foreign Investment Promotion Board will continue to consider each application on a case-by-case basis. India's largest private aluminum company began boosting capacity at its Renukoot Smelter in Uttar Pradesh State.

Daily ore throughput and copper and gold production at the Grasberg mine in Irian, Jaya, Indonesia was planned to be increased; a prefeasibility study supported mine expansion. The construction of Indonesia's first copper smelter at Gresik near Surabaya, Java began in July. Reserve increases were announced at the major Busang gold find in East Kalimantan, Indonesia. In December 1996, measured and indicated reserves of 23 million ounces of gold and an additional inferred resource of 34 million ounces of gold were reported, making this one of the world's larger gold deposits.

In Japan, on June 13, 1996, a major Japanese trading company, announced that it incurred a $1.8 billion loss

during the past 10 years as a result of unauthorized copper trading activity by a senior official in its nonferrous metals division. The huge copper trading loss was raised to $2.6 billion in August 1996. The news occupied the world's financial headlines and caused the price of copper to drop to its 2-year low in mid-1996. In December, three major copper producers announced plans to expand their domestic smelting capacity by 10% to 20% by the year 2000 to meet the growing demand for copper in the Southeast Asian region. In 1996, several major Japanese copper producers also increased their investment in overseas mine development in Canada and Chile to secure the raw materials required for their domestic smelters.

In the Philippines, an agreement was approved in March 1996 for a 50-year lease agreement covering the Carmen copper mine and concentrator in the central island of Cebu. An investment of $65 million to rehabilitate and reopen the mine within 2 years was provided. The Philippine Government's Asset Privatization Trust announced on May 7, 1996, that it was selling its Nonoc nickel mine, smelter, and refinery on Nonoc Island in the southern Philippines to a consortium of Australian, British, Filipino, and Hong Kong investors, for $333 million. In addition to rehabilitating the nickel smelter and refinery, the consortium was planning to construct, within 16 months, a 1,360-ton-per-year cobalt refinery. The final agreement between the Government, landowners, and the Australian firm that will operate the mine, for the mining of the Gold Ridge gold deposits on Guadalcanal Island, Solomon Islands, was signed in October 1996, in the National Parliament in Honiara.

Europe and Central Eurasia

The European Union (EU) increased from 12 to 15 countries, when Austria, Finland, and Sweden formally became members. After a period of low growth and recession in most areas, Western Europe's economic development was moving ahead. There continued to be an increase in investment flows in 1996. The modest economic growth in major EU countries resulted in increased consumption of minerals, allowing prices to rise to profitable levels for producers of some commodities. Efforts were continuing by various EU nations toward (1) privatization of nationalized mining companies and State-owned mineral enterprises, (2) liberalization of investment laws allowing foreign ownership of mining companies, and (3) increased repatriation of profits. Government support for high-cost production was withdrawn or significantly reduced. Various incentives, including tax relief, revised regulations, and less government involvement have also been offered to encourage exploration.

In Western Europe, exploration for gold, bauxite, copper, lead, and zinc continued. Discoveries of gold mineralization in southwest Greenland; southern Sardinia, Italy; east-central Portugal; and the West Central Highlands of Scotland, United Kingdom, encouraged further exploration efforts. Also, the discovery of diamondiferous kimberlites in West Greenland has increased exploration in that area. Exploration for copper in France and Portugal and lead and zinc in Ireland and Spain continued. Zinc production began at the Mulikkorame mine near Pyhajarvi Finland in mid-1996.

In 1996, the countries of Eastern Europe and Central Europe developed market economy systems through the denationalization of state-owned and -operated commercial enterprises. The rapid decline of industrial production that occurred in this region from 1990-94, following the dissolution of central economic planning and attendant organizations, such as the Council for Mutual Economic Assistance, largely had abated by yearend 1994. In both 1995 and 1996, the production of some sectors of the minerals industries in these countries stabilized and in some cases displayed growth (crude steel generally and refined copper in Poland). In 1996, a marked degree of stability was discernible in the republics of the former Yugoslavia, owing chiefly to the effective implementation of the current peace accords. Foreign investment in Eastern and Central Europe continued to focus on two principal areas: gold exploration and mine development and acquisition of cement plants and construction materials enterprises. Cement plants and associated limestone and gypsum quarries in the Czech Republic, Hungary, Poland, and Slovakia continued to attract Western European investors.

In the countries of the former Soviet Union (FSU), 1996 saw a continuation of the trend for the recovery of mineral production and the reversal of the steep decline in mineral output that followed the breakup of the FSU. In 1996, net increases or decreases in mineral production in the FSU occurred at a slower rate than from 1992 to 1994 when the decrease was often precipitous. The rate of recovery for mineral production varied from country to country and sector to sector. Again, in 1996, operation of mining enterprises continued to be driven by the need to generate hard currency through exports, irrespective of other operating or market considerations. There has been no significant increase in domestic FSU mineral consumption, which had fallen dramatically after the breakup. Some of the worst performing mineral industry sectors were those that produced mineral products mainly for domestic consumption and those that had limited export markets.

Processes to convert the mineral industries of the FSU countries to a market economy continued in the form of

privatization, foreign investment, and foreign participation in the management of mineral industries. The FSU countries continued to try to attract foreign investment in their mineral sectors. As in previous years, Western participation took a number of forms with the most prominent being investment in the development of gold and oil deposits; metals trading; toll smelting; supplying equipment and raw materials to enterprises in return for output; purchasing shares of enterprises; and providing managerial and technical expertise. Kazakstan took the lead in soliciting the aid of foreign management, having turned over the majority of its major mining and metallurgical industries to foreign managers for a limited number of years. A number of other FSU countries followed suit on a more limited scale. In addition to increased reliance on expatriate managers, the FSU countries continued reorganizing domestic governmental structures involved in managing and directing the mineral sector and related activities. For example Russia went through a major reorganization of its governmental departments. The majority of Russian government agencies involved in mineral exploration, nonfuel mineral production, and environmental issues were abolished. Their functions were transferred to the newly created Russian Ministries for Industry and Natural Resources and the State Committee for the Protection of the Environment.

Latin America and Canada

Privatization of state-owned mineral firms, and joint ventures between foreign investors and domestic private and public sectors in Latin America, created new and changing capital investment flows. According to the United Nations Economic Commission for Latin America and the Caribbean, private capital flows to the region in 1996 approached $55 billion. From 0.7% growth in 1995, the combined regional gross domestic product (GDP) grew about 3% in 1996 and was projected to increase about 4.3% in 1997. According to the Metals Economic Group, $963 million was spent on mineral exploration in Latin America in 1996 with Chile and Peru being the most actively explored. During 1996, more than 60 junior exploration and mining companies were active throughout the length of the Andean chain. As a result of changes to the petroleum laws of Argentina, Bolivia, Chile, and Peru, there was increased interest in exploration by international oil firms.

Despite a plunge of 50% in the value of the peso versus the dollar and an overall sag in the economy and the GDP, Mexico's mineral industry continued to maintain a position of prominence in production and exports, particularly in the metals sector. A combination of improvement of world metals prices and the peso devaluation enabled Mexican companies to sell into the world markets at enhanced prices and significantly reduced mining and processing costs, thus increasing export revenues and net income. Production of industrial minerals, mainly construction materials, suffered somewhat because of lowered demand caused by the economic recession. Although privatization in the mining sector with increased foreign investment continued, the Government unexpectedly canceled the proposed sale of several petrochemical plants it had offered to foreign buyers.

The signing of the Cuban Liberty and Solidarity (Libertad) Act, also known as the Helms-Burton Law, by the U.S. President in March, affected the minerals industry directly because of the importance of nickel production and trade to the Cuban economy and because of the increased interest by foreign exploration companies in Cuba, which resulted from its changes in foreign investment laws and mining regulations. Elements of the U.S. law, which allows U.S. citizens whose properties were expropriated by the Cuban Government the right to sue in U.S. courts any foreign company presently using such properties and which denies foreign company officials entry into U.S. territory, generated criticism from other nations. In November, the World Trade Organization agreed to hear the European Union's complaint that the law violates open trade rules. Also in November, Canada passed legislation that allows Canadian companies sued in U.S. courts to counter-sue in Canadian courts to recover damages resulting from the Helms-Burton Act. The President of the United States suspended the implementation of the right to sue in U.S. courts at yearend.

Central American countries wrestled with problems ranging from the restoration of political stability to the establishment of workable mining laws and privatization. The interest of foreign mining companies in each Central American country increased almost as fast as the respective countries promulgated workable mining laws. Unusually large copper deposits were further delineated in Panama, and exploration for gold was on the increase in most of the countries of the region.

In 1996, the South American trading bloc MERCOSUR (Argentina, Brazil, Paraguay, and Uruguay) aggressively sought Chile's accession to MERCOSUR. Currently, the two economic blocs, MERCOSUR and the ANDEAN PACT (Bolivia, Colombia, Ecuador, Peru, and Venezuela) are negotiating a free trade accord.

In Argentina, privatization of business ownership and operations continued. New investments in Argentina, aided by Federal and provincial investment laws that encouraged mineral exploration and development, were directed toward copper, gold, crude oil, natural gas, petrochemicals, and gas pipelines. By yearend

construction was completed on more than one-half of the $903 million Bajo de la Alumbrera project. A slurry pipeline is being built to help export 800,000 tons of copper concentrates a year.

Bolivia has recently undertaken significant legal and regulatory reforms, including the enactment of a single corporate income tax rate of 25%. A new environmental law was put in place to balance the need for improved environmental protection with the imperative of sustainable economic development. Bolivia is also nearing the completion of a revised mining code ensuring equal treatment of foreign and domestic investors; providing maximum legal and technical protection to holders of mineral rights; and facilitating and motivating exploration, mineral development, and profitable mineral production. The Bolivian Government has established two programs to encourage domestic and foreign entrepreneurs to invest in the mining sector. The first allows for the transfer of ownership and management of state-owned corporations to private shareholders, via a 50/50 joint venture, referred to as "capitalization" between investors and Bolivian citizens. The second is aimed at attracting foreign investment into the mineral fuels sector, via the Bolivia-Brazil energy integration agreement.

The state-owned steel industry of Brazil was privatized in 1996 and the petrochemical and mining sectors proceeded toward privatization. New projects in the petroleum sector, however, will be open to joint ventures. The state-owned mining giant is scheduled for privatization in early 1997.

The Chilean state-owned copper mining corporation was proceeding with the materialization of its principal projects in its 1994-2000 6-year-plan including the Radomiro Tomic mine and the expansion of the Andina and El Teniente's Esmeralda project. Radomiro Tomic is expected to be in full production by the start of 1998, adding 150,000 tons of copper cathodes to the company's total production. Andina required an investment of $322 million to increase production by 111,000 tons annually, and the Esmeralda project required a $205 million investment to allow the El Teniente Division to maintain a production level of 350,000 tons per year.

During 1996, Peru continued with its privatization, capitalization, and joint-venture programs. Peru's largest and world's fourth largest zinc producer, sold its Casapalca polymetallic unit for $12.7 million to a Brazilian company, which offered to commit an additional $100 million to upgrade the existing mine and concentrating plant.

Since the early 1990's, Venezuela has taken steps to open petroleum investment to the private sector. In January 1996, the Government awarded eight new exploration and production concessions of light to medium crude to foreign private companies. The concessions and other opportunities for foreign investment in the sector, such as awards of additional marginal fields and participation in the petrochemical and heavy oil projects, are tied to the state-owned petroleum company's plans to double its petroleum, condensate, and natural gas output by 2005 through joint ventures and other associations. Venezuela has embarked on privatization efforts with limited success in the past, but continued with divestment plans in sectors such as steel and ferroalloys.

A positive year for the Canadian economy saw some uneven spots in Quebec and the Maritime Provinces, where unemployment remained unacceptably high. However, all expectations were for a strong 1997 with foreign investment continuing to support the boom in mining and resource sectors. With interest rates the lowest they have been since World War II and the Federal deficit almost gone, Canada seemed poised for what various international studies have predicted would be the best economic performance of any developed nation in 1997. Benefits from the North American Free Trade Agreement (NAFTA) plus the general expansion of world trade are pointing toward earnings abroad exceeding expenditures for the first time since the mid-1980's. Late in 1996, Canada signed a trade treaty with Chile, eliminating tariffs on the greater part of the $0.5 billion yearly trade between the two countries and paving the way for Chile to join Canada, the United States, and Mexico in the NAFTA. Overall, total 1996 exploration expenditures in Canada ($461.8 million) were second only to those in Australia ($665.9 million).

Many Canadian mining companies, however, continued to turn to Latin America for exploration and development because of less restrictive laws and legal challenges than in their own country. Nonetheless, the mining industry within Canada was spurred by higher prices for base metals, and also by some conspicuous exploration successes, such as the Voisey's Bay nickel-copper-cobalt deposit. Argentia, Newfoundland, was selected as the site for the smelter/refinery complex to process the nickel and cobalt concentrates produced at Voisey's Bay.

The Government of Quebec reported that its own geologists found gossans near Sept-Iles grading in the ranges of 1.4% to 2.2% nickel, 1.5% to 5.9% copper, and 0.12% cobalt in an 800-square-kilometer area. In British

Columbia, development of the new Huckleberry open pit copper-molybdenum-gold-silver mine continued. Elsewhere, near Gander, Newfoundland, development of what is thought to be the largest antimony mine outside China also continued. A milestone was passed when the Canadian Government's cabinet gave full approval and support to the Lac de Gras diamond project in the Northwest Territories near the Arctic Circle. In Manitoba, the country's largest nickel-producing firm continued its expansion of mines and facilities at the Thompson Nickel Belt.

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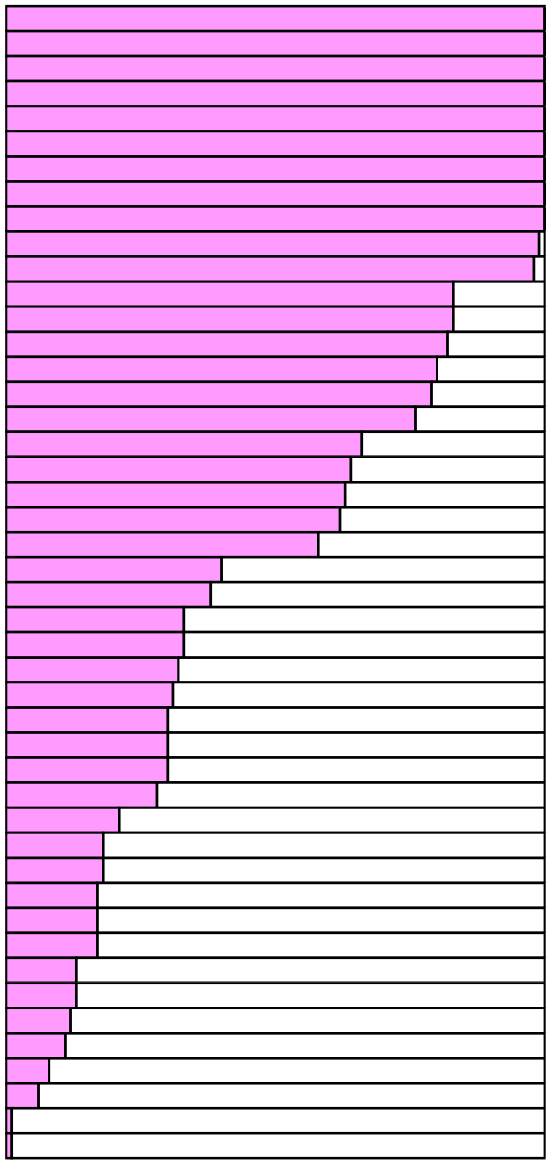
[1]The regimes of some countries mentioned in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical and is not to be construed as conflicting with or contradictory to U.S. foreign policy.

1996 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS



Commodity	Percent	Major Sources (1992-95)[1]
ARSENIC	100	China, Chile, Mexico
BAUXITE and ALUMINA	100	Australia, Jamaica, Guinea, Brazil
COLOMBIUM (niobium)	100	Brazil, Canada, Germany
GRAPHITE (natural)	100	Canada, Mexico, China, Madagascar, Brazil
MANGANESE	100	South Africa, Gabon, Australia, France
MICA, sheet (natural)	100	India, Belgium, Brazil, China, Argentina
STRONTIUM	100	Mexico, Germany
THALLIUM	100	Belgium, Canada, Mexico
THORIUM	100	France
FLUORSPAR	99	China, South Africa, Mexico
GEMSTONES	98	Israel, Belgium, India, United Kingdom
COBALT	83	Zambia, Norway, Canada, Finland, Russia
TIN	83	Brazil, Bolivia, Indonesia, China
TUNGSTEN	82	China, Russia, Germany, Bolivia, United Kingdom
TANTALUM	80	Australia, Germany, Thailand, Brazil
CHROMIUM	79	South Africa, Turkey, Russia, Kazakstan, Zimbabwe
POTASH	76	Canada, Belarus, Russia, Israel, Germany
BARITE	66	China, India, Mexico, Morocco, Canada
STONE (dimension)	64	Italy, Spain, India, Canada
NICKEL	63	Canada, Norway, Australia, Russia
IODINE	62	Japan, Chile
PEAT	58	Canada
DIAMOND (dust, grit, and powder)	40	Ireland, China, Russia
SELENIUM	38	Canada, Philippines, Japan, Belgium
CADMIUM	33	Canada, Belgium, Mexico, Germany
ZINC	33	Canada, Mexico, Spain
RARE EARTHS	32	France, China, India, Japan, United Kingdom
SILICON	31	Norway, Brazil, Russia, Canada
ASBESTOS	30	Canada
GYPSUM	30	Canada, Mexico, Spain
MAGNESIUM COMPOUNDS	30	China, Canada, Austria, Mexico, Greece
PUMICE	28	Greece, Ecuador, Turkey
ALUMINUM	21	Canada, Russia, Venezuela, Brazil
NITROGEN (fixed), AMMONIA	18	Trinidad and Tobago, Canada, Former Soviet Union
SALT	18	Canada, Mexico, Bahamas, Chile
IRON and STEEL	17	European Union, Canada, Japan, Brazil, Mexico
IRON ORE	17	Canada, Brazil, Venezuela, Australia, Mauritania
LEAD	17	Canada, Mexico, Peru, Australia
COPPER	13	Canada, Chile, Mexico
SODIUM SULFATE	13	Canada, Mexico
CEMENT	12	Canada, Spain, Mexico, Greece, Colombia
SULFUR	11	Canada, Mexico, Germany, Japan
MICA, scrap and flake (natural)	8	Canada, India, Finland, Japan, Germany
PERLITE	6	Greece
IRON and STEEL SLAG	1	Canada, South Africa
LIME	1	Canada, Mexico

[1] In descending order of importance

Additional commodities for which there is some import dependency include:

Antimony	China, Bolivia, Mexico, South Africa
Bismuth	Mexico, Belgium, China, United Kingdom
Gallium	France, Russia, Germany, Hungary
Germanium	China, United Kingdom, Ukraine, Russia, Belgium
Ilmenite	South Africa, Australia, Canada
Indium	Canada, France, Russia, Italy
Kyanite	South Africa
Mercury	Russia, Canada, Kyrgyzstan, Germany
Platinum	South Africa, United Kingdom, Russia, Germany, Belgium
Rhenium	Chile, Germany, Sweden
Rutile	Australia, South Africa, Sierra Leone
Silver	Mexico, Canada, Peru, Chile
Titanium (sponge)	Russia, Japan, China, Ukraine
Vanadium	South Africa, Canada, Russia, Mexico
Vermiculite	South Africa
Zirconium	Australia, South Africa

A Doubling of Dependence : From 1996 to 1998 the number of minerals we import from foreign sources to supply 50% or more of our needs has increased 100% (22 to 44 minerals). This results in loss of jobs and creates national security issues.

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2008 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS

Commodity	Percent	Major Import Sources (2004-07)[1]
ARSENIC (trioxide)	100	China, Morocco, Hong Kong, Mexico
ASBESTOS	100	Canada
BAUXITE and ALUMINA	100	Jamaica, Guinea, Brazil, Australia
CESIUM	100	Canada
FLUORSPAR	100	China, Mexico, South Africa, Mongolia
GRAPHITE (natural)	100	China, Mexico, Canada, Brazil
INDIUM	100	China, Japan, Canada, Belgium
MANGANESE	100	South Africa, Gabon, China, Australia
NIOBIUM (columbium)	100	Brazil, Canada, Estonia
QUARTZ CRYSTAL (industrial)	100	China, Japan, Russia
RARE EARTHS	100	China, France, Japan, Russia
RUBIDIUM	100	Canada
STRONTIUM	100	Mexico, Germany
TANTALUM	100	Australia, China, Brazil, Japan
THALLIUM	100	Russia, Netherlands, Belgium
THORIUM	100	United Kingdom, France
VANADIUM	100	Czech Republic, Swaziland, Canada, Rep. of Korea
YTTRIUM	100	China, Japan, France
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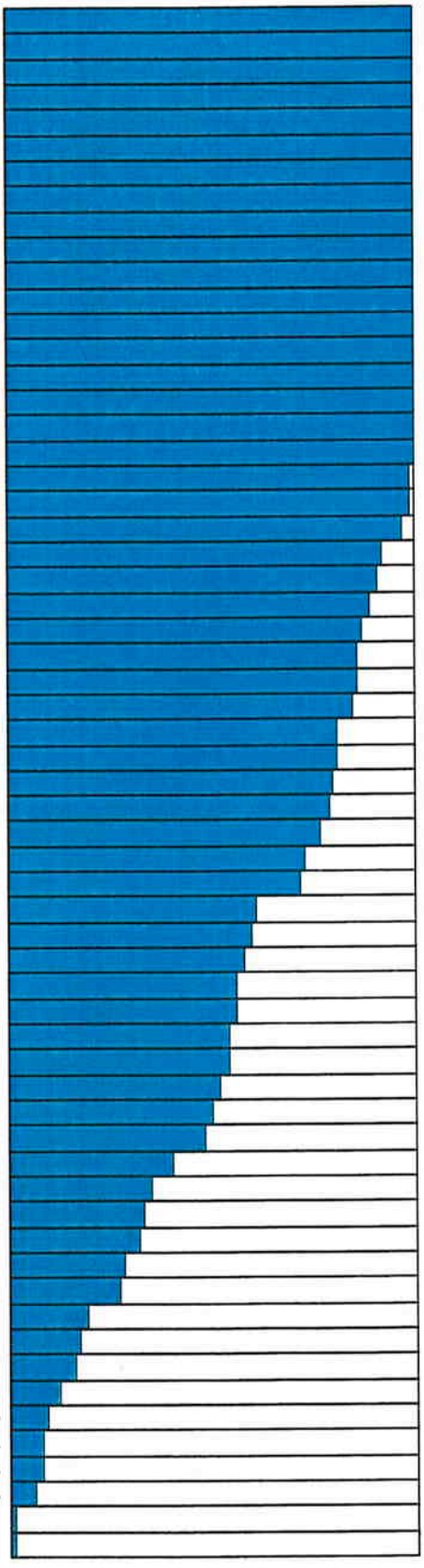
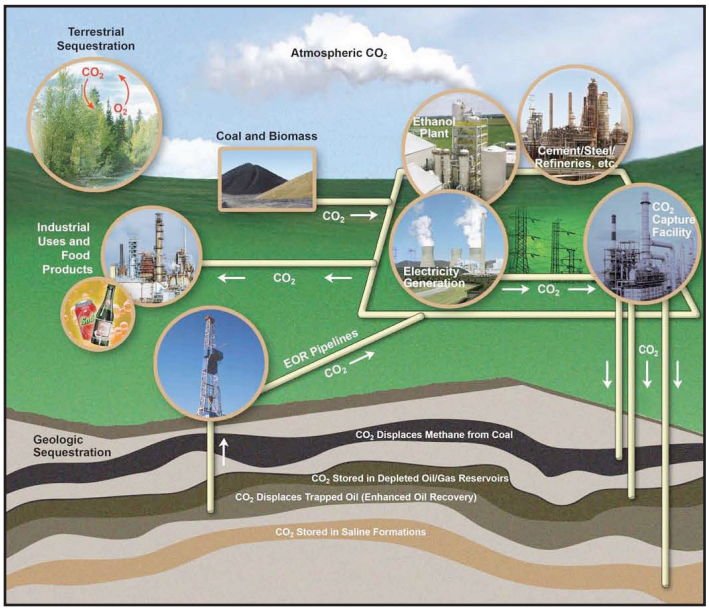


[1]In descending order of import share.

Carbon Capture and Storage

Carbon capture and storage (CCS) technologies capture carbon dioxide (CO_2) at industrial point sources, such as fossil-fuel combustion, natural gas refining, ethanol production and cement manufacturing plants. Once captured, the CO_2 gas is compressed and transported to a suitable location for injection and storage in deep geologic formations, such as saline reservoirs, mature oil and gas fields, and potentially unmineable coal seams, basalts or other formations. Once stored, the CO_2 is isolated from drinking water supplies and prevented from release into the atmosphere by a confining zone that includes a dense layer of rock, which acts as a seal, and through additional trapping mechanisms. Monitoring devices are also installed to ensure process integrity. CCS applied to a modern conventional coal-based power plant could reduce CO_2 emissions to the atmosphere by approximately 80-90 percent compared to a plant without CCS.



CO2 storage and uses schematic from the National Energy Technology Laboratory (NETL)

Globally, CCS technologies have the potential to reduce overall climate change mitigation costs and increase flexibility in reducing greenhouse gas emissions. According to the 2005 report, Carbon Dioxide Capture and Storage by the Intergovernmental Panel on Climate Change, application of carbon sequestration technologies could reduce the costs of stabilizing CO_2 concentrations in the atmosphere by 30 percent or more compared to scenarios where such technologies are not deployed.

Economic growth is closely tied to energy availability and consumption, particularly lower-cost fuels such as coal. While the use of coal and other fossil fuels results in the release of carbon dioxide, CCS technologies balance economic value and environmental concern – retaining coal as an affordable source of electricity in a carbon constrained world.

There are three large-scale projects demonstrating CO_2 storage in operation today (large-scale is defined as storing one million tons per year of CO_2). CCS has not yet been applied to large-scale electricity generation due to a number of technological, infrastructure, cost and legal challenges. Public policy measures and sustained funding to support continued CCS research, development and demonstration will be necessary to accelerate large-scale commercial deployment of this critical technology.

Status of CCS Development

In addition to the three large-scale demonstration projects, several pilot projects are in operation in six countries (none are in the U.S.). Of these, only one project captures CO_2 at a coal-based plant. The other current projects demonstrate carbon storage or reuse at enhanced coal bed methane. Additionally, more than 20 capture and storage projects are proposed in the U.S. and five other countries between now and 2020. (See below for a list of current and proposed CCS projects.)

CCS Deployment Timeline and Cost

A substantial amount of continued research, development and demonstration of CCS technologies will be required before CCS can be applied to large-scale commercial power plants. Analysis from the Massachusetts Institute of Technology Future of Coal report estimates that a 10-year RD&D funding commitment of $8-8.5 billion will be required to advance the technology to a stage where it is ready for commercial deployment. Similarly, the Electric Power Research Institute (EPRI) estimates that approximately $10 billion will be required through 2017. EPRI also notes that over the next 20 years, it is expected that a total RD&D investment of roughly $19 billion will be required to develop and deploy advanced coal power and CCS technologies needed to achieve major, affordable CO_2 emissions reductions. In sum, both organizations find that CCS technologies will not be available for commercial deployment until approximately 2020 or 2025.

Barriers to CCS

At present, uncertainty over siting requirements and long-term liability issues associated with the underground storage of CO_2 have deterred project developers, financiers and insurers from moving forward with CCS. However, CCS as a tool for mitigating CO_2 emissions and ensuring a secure and affordable energy supply for America represents a vital public interest that merits a federal-level program to clarify and resolve these long-term liability issues and to clear the way for the rapid and widespread commercialization of the technology. Some of the key issues that must be resolved in order to foster widespread commercialization of CCS include:

- Determining responsibility for post-closure monitoring;
- Avoiding application of the federal Superfund program to injections of CO_2;
- Avoiding characterization of CO_2 as a waste and CCS activi-

ties as waste disposal to avoid triggering expensive "cradle to grave" regulations of the Resource Conservation and Recovery Act (RCRA); and

- Resolving property rights issues, including pore space ownership, trespass and interstate issues relating to CO_2 transportation and placement.

Current Worldwide CCS Projects

Demonstration Projects

- Sleipner West (Norway). Statoil and IEA began injecting CO_2 from the natural gas field into a saline formation under the North Sea in 1996. Currently, they store one million tons of CO_2 per year with no leakage. The projected cost is more than €350 million. (Storage)
- Weyburn CO_2 Flood Project (Canada). EnCana and the International Energy Agency (IEA) began storing CO_2 from enhanced oil recovery (EOR) in 2000. During Phase I (2000-2004), more than seven million tons of CO_2 were stored, and the geology has been found suitable for long-term storage. The site will be maintained in order to study long-term sequestration. The second phase will include site characterization, leakage risks, monitoring and verification and a performance assessment. (Storage)

Weyburn CO2 project. (photo: NETL)

- In Salah (Algeria). Sonatrach, BP and Statoil began capturing CO_2 from natural gas production in 2004 and storing it in depleted gas reservoirs. They store about one million tons of CO_2 per year, and the projected cost for the project is $1.7 billion. This is the world's first full-scale CO_2 capture and storage project at a gas field. (Storage)
- K12B (Netherlands). Gaz de France is investigating the feasibility of CO_2 storage in depleted natural gas reservoirs on the Dutch continental shelf. The CO_2 is injected in the same place from which it came. Injection started in 2004. (Storage)
- Snøhvit (Norway). Statoil began storing CO_2 from gas production beneath the seabed in April 2008. At full capacity, they plan to store 700,000 tons of CO_2 a year. The projected cost is $110 million. (Storage)

Pilot Projects

- Fenn Big Valley (Canada). The Alberta Research Council began injecting CO_2 into deep coal beds for enhanced coal bed methane in 1999, with a project cost of C$3.4 million. Thus far, all testing has been successful, and they are assessing the economics of the project. (Enhanced coal bed methane)
- Ketzin (Germany). GFZ Potsdam, as part of the European research project, CO2SINK, began storing CO_2 in aquifers at a depth of 600 meters on June 30, 2008. They plan to store up to 60,000 tons of CO_2 over two years, at a cost of €15 million. (Storage)
- Schwarze Pumpe (Germany). Vattenfall opened their pilot 30Mw coal oxyfuel combustion plant with CO_2 capture on Sept. 9, 2008. (Coal plant with capture)
- Otway (Australia). CO2CRC has begun injecting CO_2 from natural gas wells in hydrocarbon reserves; eventually, 100,000 tons will be stored. The object is to provide technical information on CO_2 storage and monitoring and verification. The project's budget is A$40 million. (Storage)

Proposed Projects

Domestic

- Mountaineer Power Plant (West Virginia). Beginning in 2009, American Electric Power (AEP) will capture about 100,000 tons of CO_2 per year from a portion of the coal-based plant's emissions using chilled ammonia and store it in a deep saline aquifer injection well. In 2012, the project would be increased to capture and store 1.5 million tons of CO_2 per year. (Coal CCS)
- Antelope Valley Station (North Dakota). About one million tons of CO_2 per year will be captured and stored from this 120MW slipstream project at a coal-based plant. Announced by Basin Electric Power Cooperative and Powerspan Corporation, this project is expected to begin in 2009 and be operational in 2012. (Coal CCS)
- Northeastern Plant (Oklahoma). At a 450MW coal-fired unit, AEP plans to capture up to 1.5 million tons of CO_2 per year beginning in 2011. This CO_2 will be used in EOR. (Coal capture, EOR)
- Carson Project (California). A 500MW power plant will be powered by hydrogen, and CO_2 will be stored beginning in 2011. (CCS)

U.S. Department of Energy (DOE) Regional Carbon Sequestration Partnerships

- The West Coast Regional Carbon Sequestration Partnership will conduct a large-scale test in which they will inject one million tons of CO_2 over four years into deep geologic formations in the San Joaquin Valley of California. This project will cost $90.6 million (the DOE share, subject to annual appropriations, is $65.6 million). (Storage)
- The Southwest Regional Partnership on Carbon Sequestration will inject two million tons of CO_2 over four years from a natural CO_2 deposit into Jurassic-age sandstone. This project will cost $88.8 million (the DOE share, subject to annual appropriations, is $65.4 million). (Storage)

Carbon Capture and Storage

- The Plains CO_2 Reduction Partnership will inject one million tons of CO_2 (from coal-based plants and gas processing plants) per year into a deep carbonate saline formation in the Williston Basin in North Dakota. It will also inject 1.8 million tons of CO_2 into a deep saline sandstone formation in the Alberta Basin in British Columbia. Together, these projects will cost $135.6 million (the DOE share, subject to annual appropriations, is $67.0 million). (Storage)
- The Midwest Geological Sequestration Consortium will inject one million tons of CO_2 from an ethanol plant over three years into the Mount Simon sandstone formation in central Illinois. This project will cost $84.3 million (the DOE share, subject to annual appropriations, is $66.7 million). (Storage)
- The Midwest Regional Carbon Sequestration Partnership will inject one million tons of CO^2 from an ethanol plant into the Mount Simon sandstone formation in Ohio. This project will cost $92.8 million (the DOE share, subject to annual appropriation, is $61.1 million). (Storage)
- The Southeast Regional Carbon Sequestration Partnership will inject one million tons of CO_2 from natural deposits per year into the Tuscaloosa Massive Sandstone in Mississippi and Louisiana. Phase Two of this test will involve constructing a post-combustion CO_2 capture plant, below which CO_2 will be inject for up to six years. This project will cost $93.7 million (the DOE share, subject to annual appropriations, is $64.9 million). (Storage and eventually coal CCS)

Saline aquifers in the U.S. being studied by the DOE Regional Carbon Sequestration Partnerships for potential CO_2 storage.

International

- Tjeldbergodden (Norway). Shell and Statoil will store 2.5 million tons of CO_2 per year, beginning 2010-2011, captured from a 700MW gas-fired power plant. (CCS)
- ZeroGen (Australia). An IGCC power plant (120MW) at which CO_2 will be captured and stored in a saline formation beginning in 2012. (Coal CCS)
- Gorgon (Australia). CO_2 captured from gas production will be injected into deep formations off the coast beginning in 2011. (CCS)
- Progressive Energy (UK). An IGCC plant (800MW) at which CO_2 will be captured for EOR beginning in 2011. (Capture from coal for EOR)
- Powerfuel (UK). An IGCC plant (900MW) that will use CCS technology after 2012.
- E.On (UK). An IGCC plant (450MW) that will add CCS after 2012. (Coal CCS)
- RWE (Germany). IGCC technology (400-450MW) at which CO_2 will be captured and stored in a saline formation or gas reservoir beginning in 2014. (Coal CCS)
- Hydrogen Energy-BP and Rio Tinto (Australia). A hydrogen-fueled power plant (500MW) at which CO_2 would be captured and stored under the seabed, likely beginning around 2014. (CCS)
- E.On (UK). Two supercritical units (800MW each) at a power station at which CCS will begin in 2015. (Coal CCS)
- RWE nPower (UK). Supercritical technology and post-combustion CCS (1000MW) will be used beginning in 2016). (Coal CCS)
- GreenGen (China). An IGCC plant (650MW) will have CCS in 2018. (Peabody is a partner in this project.) (Coal CCS)
- Vattenfall (Germany). A large-scale commercial plant (1000MW) will have CCS in 2020. (Coal CCS)

USGS
science for a changing world

2008 U.S. NET IMPORT RELIANCE FOR SELECTED NONFUEL MINERAL MATERIALS

Commodity	Percent	Major Import Sources (2004-07)[1]
ARSENIC (trioxide)	100	China, Morocco, Hong Kong, Mexico
ASBESTOS	100	Canada
BAUXITE and ALUMINA	100	Jamaica, Guinea, Brazil, Australia
CESIUM	100	Canada
FLUORSPAR	100	China, Mexico, South Africa, Mongolia
GRAPHITE (natural)	100	China, Mexico, Canada, Brazil
INDIUM	100	China, Japan, Canada, Belgium
MANGANESE	100	South Africa, Gabon, China, Australia
NIOBIUM (columbium)	100	Brazil, Canada, Estonia
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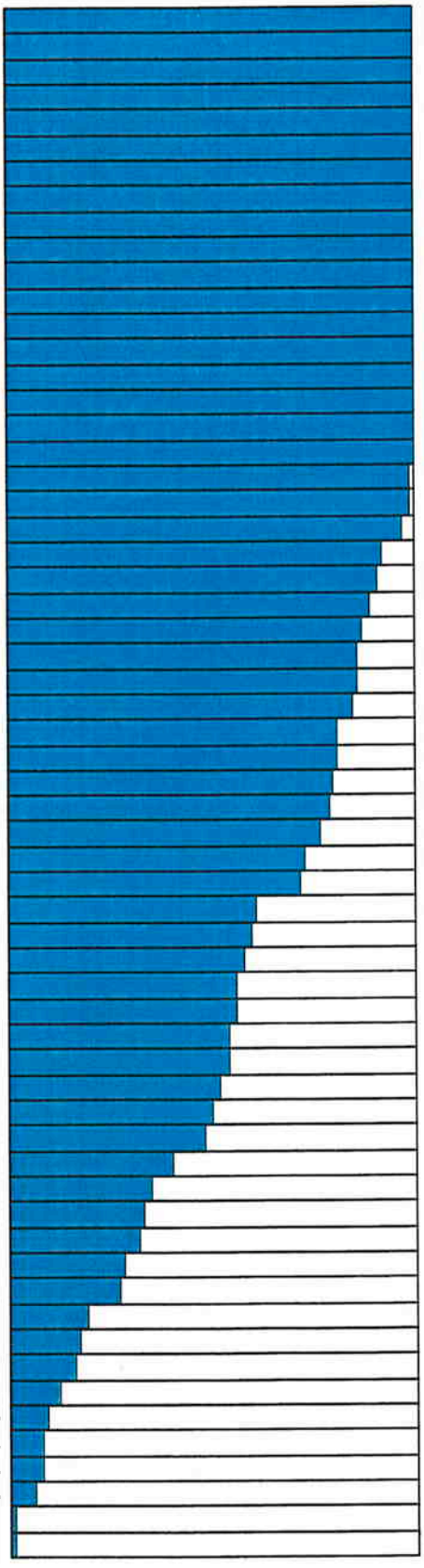

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