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# Bolivia: Energy and Environment

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## Bolivia: Energy and Environment

In dry natural gas production in South America, Bolivia trails only Venezuela and Argentina. Approximately 35 percent of Bolivia's public sector revenue is generated by hydrocarbons. Production is centered in the departments of Santa Cruz, Cochabamba, and Chuquisaca. Economic, political, and social development has been shaped by petroleum markets since the mid-19<sup>th</sup> century. Use of revenues from the hydrocarbon industry to curb poverty and satisfy internal energy demands has been limited. Bolivia's development challenges include providing more energy to more Bolivians for agricultural, industrial, and domestic applications. Since the December 2005 election of Juan Evo Morales Ayma, the Movement for Socialism (MAS) party has enjoyed electoral success by using revenues from resource development to fund socioeconomic change. The 2009 Constitution makes access to gas and electricity a human right and provision of these basic services a responsibility of the state. Increasing attention is paid to adverse impacts of energy production on the environment and people, especially indigenous communities in Bolivia's rainforests. Since the 1990s, indigenous communities have organized to demand more participation in development, including mitigation of environmental impacts of projects such as pipeline construction. In 2010, the Bolivian legislature passed the "Law of the Rights of Mother Earth" recognizing inherent rights of the Earth and its natural systems. As Bolivia's energy economy diversifies, nuclear power, lithium mining, and battery production projects pose additional environmental and socioeconomic challenges. Renewable energy projects are increasingly important to the economy and environment in Bolivia.

Bolivia borders Brazil, Peru, Argentina, Chile, and Paraguay. It is the fifth largest South American country, stretching from the Andes Mountains and highland plateaus, down their eastern slopes and into Amazon rainforest. Its population is approximately 10.6 million. Approximately 67 percent live in urban areas. Bolivia's peoples and ecosystems have been impoverished by extraction of natural resources, most importantly silver, tin and other mineral resources, timber, natural gas, and petroleum through conquest and independence and into the present. In 2013, Bolivia's GDP at purchasing power parity was estimated at \$59,110,000,000 U.S. It is one of the poorest countries in Latin America.

Exploration for petroleum resources in Bolivia began in 1867. The state declared ownership of them in 1872 and petroleum companies based in the United States, Europe, the Middle East and Latin America sought concessions. The national oil company, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) and the Ministry of Mines and Petroleum were created in 1936 by the government of President David Toro. In 1937, ownership of concessions granted to Standard Oil reverted to the state. This was the first "nationalization" of the petroleum industry. During the Revolution of 1952, the government of President Víctor Paz Estensoro reorganized administration of the petroleum industry according to norms of state capitalism. In 1955, petroleum resources were "privatized" by the Davenport Petroleum Code, which set new tariffs, taxes, and rules for granting patents and concessions. The code became law in 1956 during the presidency of his successor, Hernán Siles Zuazo. Preparations to sell natural gas to Argentina were undertaken in 1967, and, in 1968 and 1969, the state again reorganized the industry. Ownership of concessions granted to Bolivian Gulf Oil Company reverted to the state. By 1972, a new legal system was in place to administer the hydrocarbon industry. Policy changes conditioned by World Bank and International Monetary Fund restructuring plans in the 1990s

ultimately resulted in 1996 in a new hydrocarbons law that reprivatized the industry. Protests over privatization and a plan to transport gas through Chile for export culminated in the 2003 “Bolivian gas war” and led to the resignation of President Gonzalo Sánchez de Lozada. A public referendum in 2004 ultimately forced his successor, Carlos Mesa, to enact a new hydrocarbons law (3058) in May 2005 that revoked the 1996 law.

Morales’ promise to continue the renationalization process helped the MAS win the presidency in 2005. In 2006, Morales issued a decree in conformity with the 2005 law that consolidated the state’s ownership, possession, and control of Bolivia’s hydrocarbon resources and required renegotiation of contacts with foreign companies operating in Bolivia. YPFB was made majority shareholder and exercised more control of operations, and the Ministry of Energy and Hydrocarbons and the Superintendency of Hydrocarbons set policy to adjust royalty payments, establish taxes on exports, and set prices for sales to internal markets. Contracts allow companies to own a percentage of their businesses, production, and reserves and require investment in infrastructure improvements. Export contracts with Argentina and Brazil were renegotiated.

Exports of natural gas via pipeline to Argentina and Brazil that began in 1972 and 1998, respectively, account for approximately 50 percent of Bolivia’s exports. Demand from Argentina continues to rise. Some crude oil is exported to Argentina and the Netherlands. Gasoline is produced for domestic consumption and the country has two oil refineries. Bolivia continues to be a net importer of liquid hydrocarbons.

Environmental consequences of production, transport, and use of hydrocarbons are universally recognized. In developing countries, these activities are often relatively under-regulated and wasteful. Carbon dioxide emissions, air and water pollution, and generation of hazardous wastes are relatively well regulated in Bolivia. Given its resource endowments, hydrocarbons continue to be central to its politics and energy economy. Increasing efficiency in mitigating environmental impacts is essential.

According to the World Bank, Bolivia’s electrification rate (2010-2014) was 80.2 percent. Electricity is generated primarily by gas-fired plants and hydropower, with some by wind and biomass. An estimated 98 percent of the urban population has access to electricity, while just over 50 percent of the rural population does. Burning biomass (wood, dung, charcoal and agricultural byproducts), mainly for cooking, accounts for approximately 70% of the energy consumption by rural households. Bolivia’s electric power industry was privatized in 1997. Renationalization of generation, transport, and distribution of electrical energy was ultimately accomplished in 2012 with the transfer of shares owned by the Spanish corporation Red Eléctrica Internacional SAU (that controlled transmission through its subsidiary Transportadora de Electricidad) to the state electric company, Empresa Nacional de Electricidad (ENDE). The agreement required ENDE to pay the cost of the shares.

Bolivia’s Andean salt flats, Salar de Uyuni, contain up to half of the world’s lithium deposits. This rare metal is used in the production of batteries to power phones, computers, and electric vehicles. Bolivia has built a lithium processing plant and, in November 2014, signed an agreement with France to further develop the industry. Bolivia aspires to control the chain of production through to the manufacture of batteries. Environmentalists have characterized this

technology as sustainable, and some assert that production can be managed carefully to minimize and recycle wastes.

A uranium deposit was discovered in 2014. Bolivia's Ministry of Mining and Metallurgy has signed an agreement with France to develop nuclear power, and Bolivian state representatives have discussed development and investment with Russia, Japan, and South Korea. The Bolivian state mining company Corporación Minera de Bolivia (COMIBOL) will work alongside investors. Bolivia and Argentina have agreed to cooperate in developing a nuclear medicine program. An irradiation plant would have applications related to agriculture. While President Morales has called attention to the importance of this development for the country's energy security, environmentalists opposed to construction of a nuclear reactor claim renewable energy projects can meet the country's needs.

Reducing carbon emissions, making energy production more efficient and sustainable, implementing more renewable energy projects, and engaging communities in sustainable energy production for their own needs are objectives of the Bolivian government. Investors continue to be interested in renewable electrical energy projects in Bolivia, given potential (especially for hydroelectric), but relatively limited installed capacity. Renewable energy projects include hydroelectric, geothermal, wind, solar, and biogas digestion.

Bi-lateral partnerships with other national governments and their international development and cooperation programs (including those of Germany, Switzerland, Finland, Japan, Spain, Belgium, the Netherlands, Norway, England, Australia, and the United States) and international aid and development programs (such as the United Nations Industrial Development Organization and the Organization of American States' Renewable Energy and Energy Efficiency Partnership) are important to these efforts, as are for-profit renewable energy projects with private Bolivian and multinational corporations. Programs with non-profits are also important. These endeavors are promoted by government ministries (including the Ministry of Energy and Hydrocarbons' Vice Ministry for Electricity and Alternative Energy), state companies, Bolivian NGOs, municipalities, communities, cooperatives, businesses, and electricity utilities. Low-cost "green loans" from both non-profit and for-profit lenders help finance projects. Some projects are designed to promote financial stability and community development by working with existing cooperatives and federations.

The United Nations Framework Convention on Climate Change encourages development and funding of renewable energy projects. Clean Development Mechanism (CDM) projects, defined by the Kyoto Protocol (to which Bolivia became a party in 1999), are designed to mitigate global climate change by facilitating the use of market-based mechanisms such as certified emission reduction credits for projects that displace carbon dioxide emissions. Examples of CDM projects in Bolivia are the Rio Taquesi hydroelectric power project, Santa Rosa hydroelectric plant, and Santa Cruz urban wastewater methane gas capture project.

Bolivia participates in efforts by intergovernmental organizations to promote sustainable and renewable energy. As a member of the Union of South American Nations (UNASUR), Bolivia helped establish the South American Energy Council to coordinate regional energy policy. It is a

member of the International Renewable Energy Agency and was a founding partner of the Global Geothermal Alliance at the 2014 United Nations Climate Summit.

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