

## Bolivia

The Republic of Bolivia (República de Bolivia) with its capital city Sucre (163.563 inhabitants, 1997) covers an area of 1.098.580 km<sup>2</sup> and a population of 8,329 million. The population density is with about 8 inhabitants per km<sup>2</sup> quite low<sup>1</sup>; the urban population is 63 percent. The capital city Sucre is with 163.563 inhabitants compared with other Bolivian cities like Santa Cruz della Sierra (914.795, 1997) and La Paz (758.141, 1997), which is the governments residence, one of the smaller cities. This administrative and socio-geographic characteristic could be related to the fact, that Bolivia is the highest and definitely most isolated country of Latin America. It is also one of the least-developed countries in South America - about two-thirds of its people, most of them are subsistence farmers, live in poverty. Bolivia's high mortality rate restricts the annual population growth rate to around 1,9 percent in 1999.<sup>2</sup>

The most important recent structural changes in the Bolivian economy have involved the capitalisation of numerous public sector enterprises. Capitalisation in the Bolivian context is a form of privatisation as investors acquire a 50 percent stake and management control of public enterprises in return for a commitment to undertake capital expenditures equivalent to the enterprise's net worth. Parallel legislative reforms have led into market-oriented policies, especially in the hydrocarbon and mining sectors, that have encouraged private investment. Foreign investors are accorded national treatment, and foreign ownership of companies enjoys virtually no restrictions in Bolivia.

Most of the nation's energy consumption is used for residential and commercial purposes (34,6 percent), followed by industry (36,5 percent) and transportation (28,9 percent).<sup>3</sup> Bolivia's electricity consumption in 2000 which amounted about 3,22 million MWh was generated with a 56 percent contribution of fossil fuels, a 42 percent share of hydropower and 2 percent of other renewable energy sources.

Bolivia has no proven resources of coal and therefore it is not a major component of the country's energy mix. The total oil consumption of 15,69 million barrels in 2000 was covered by a 85 percent share of self-produced oil and a 15 percent share of imports. In 2000 Bolivia's proven oil resources were estimated at 440,5 million barrels. The natural gas consumption of 1,32 milliard cubic metres was totally covered by the exploitation of own resources of 675,1 milliard cubic metres.<sup>4</sup>

The Cochabamba Light and Power Company (Empresa de Luz y Fuerza Eléctrica de Cochabamba); and the Rural Electricity Cooperative (Cooperativa Rural de Electrificación), are working in rural areas, generating much of its own electricity by utilising charcoal and firewood. Indians in the highlands are relying almost entirely on shrubs, charcoal, bottled gas, and animal dung as fuel sources. The transportation sector relies entirely on hydrocarbons

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<sup>1</sup> Population density ranges from less than one person per square kilometre in the southeast to about 10 per square kilometre. in the central highlands.

<sup>2</sup> WHO 2001.

<sup>3</sup> IEA 2000.

<sup>4</sup> as of 2000.

while industry uses primarily hydrocarbons (57 percent); bagasse, or sugarcane residues (30 percent); electricity (8 percent); and charcoal as well as firewood (5 percent).<sup>5</sup>

With funding from the World Bank and the Andean Common Market's Development Corporation, Bolivia is attempting to improve access to electricity for rural communities. Policymakers are considering to increase the utilisation of alternative energy resources, such as geothermal, solar, wind and biomass. Geothermal potential was positive with an 350 megawatt capacity, including a possible plant at Sol de Mañana in Laguna Colorada. Solar, wind, and biomass resources offered varying potential but remained unattractive because of the high costs of technology.

The high percentage of biomass<sup>6</sup> use for energy generation in rural areas could be seen as related to the remoteness and the wide lack of infrastructure in these locations. The villagers have to rely on this sources of energy and therefore they are developing various forms of utilisation in perfect adaptation of their harsh environment.<sup>7</sup> Potential biomass resources for the increased utilisation of bioenergy can be found as residues of the country's agricultural products which comprise of soybeans, potatoes, corn, rice wheat, coffee, sugar cane and cotton. The 1999 sugar production of 293.000 tons created 0,956 million tons of bagasse.<sup>8</sup>

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<sup>5</sup> WEC 2002.

<sup>6</sup> Direct use from combustion of : animal dung 3.270 TJ, sugar cane and bagasse 10 TJ and 458 TJ, crop residues 307 TJ. Data according to WEC 2002.

<sup>7</sup> IEA 2002: 7.

<sup>8</sup> ISO 1999.