Cuba

The Republic of Cuba (República de Cuba) with its capital Havana (La Habana, 2.184.900 inhabitants, 1995) comprises an area of 114.525 km² and 11,19 million inhabitants, with a relatively high population density of about 98 inhabitants per km² and 77 percent urban population.

Cuba is the Caribbean's largest and least commercialised island and one of the world's last bastions of communism. Cuba is the largest of the Caribbean islands and lies between the Bahamas and Jamaica. It includes the Isla de La Juventud (the Isle of Youth) and many smaller islands. The island itself is mountainous in the southeast and south-central area and mostly flat or rolling elsewhere. One quarter of the area is forested and hundreds of rivers are characterising the landscape.
In an effort to mitigate the pressures faced by the Cuban people, President Castro's governance undertook limited economic reforms in the 1990s to reorient trade. Several reforms in agriculture and energy in order to increase self-sufficiency, address monetary supply issues, increase labour incentives and boost productivity were started. Cuba also began to establish limited partnerships with foreign investors, even if there are still tight governmental restrictions.

Cuba enjoys trade and political relations with more than 100 countries[1]. Since the end of Soviet subsidies and commercial ties, Cuba has broadened its trading relations to include much greater emphasis on Canada, Europe and Latin America. Political, cultural, technical and academic relations have expanded with the same regions, and Cuba continues to play a leadership role in international coalitions of developing countries such as the Non-Aligned Movement. Cuba sends doctors and humanitarian aid to Africa and other Latin American countries. Cuba was a founding member of the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO), but is not a member of the International Monetary Fund nor any of the international financial institutions. Cuba is a member of the Organization of American States (OAS); however, it has been excluded from voting or taking part in activities since 1962.

Recently the country launched a governmental program that should help to reduce electricity consumption and renew the electricity infrastructure with the assistance of several European companies. Cuba's overall electricity consumption in 2000 was about 11,47 million MWh and was mostly produced with fossil fuels at estimated 94,2 percent. The remainder of 5,8 percent is supplied by renewable energy sources. Hydropower electricity amounted 0,7 percent while 5,1 percent are produced from geothermal, solar and biomass.[2]

Cuba has no proven coal or natural gas reserves while oil reserves are estimated at 61 million barrels. During the period 1991-2000 the oil production has doubled and reached an average of 19,8 million barrels in 2000[3]. The overall consumption in 2000 was 61,9 million barrels and caused high imports from Venezuela and Mexico. Special financial arrangements,

[1] LANIC USAID Data Base, http://www.lanic.utexas.edu

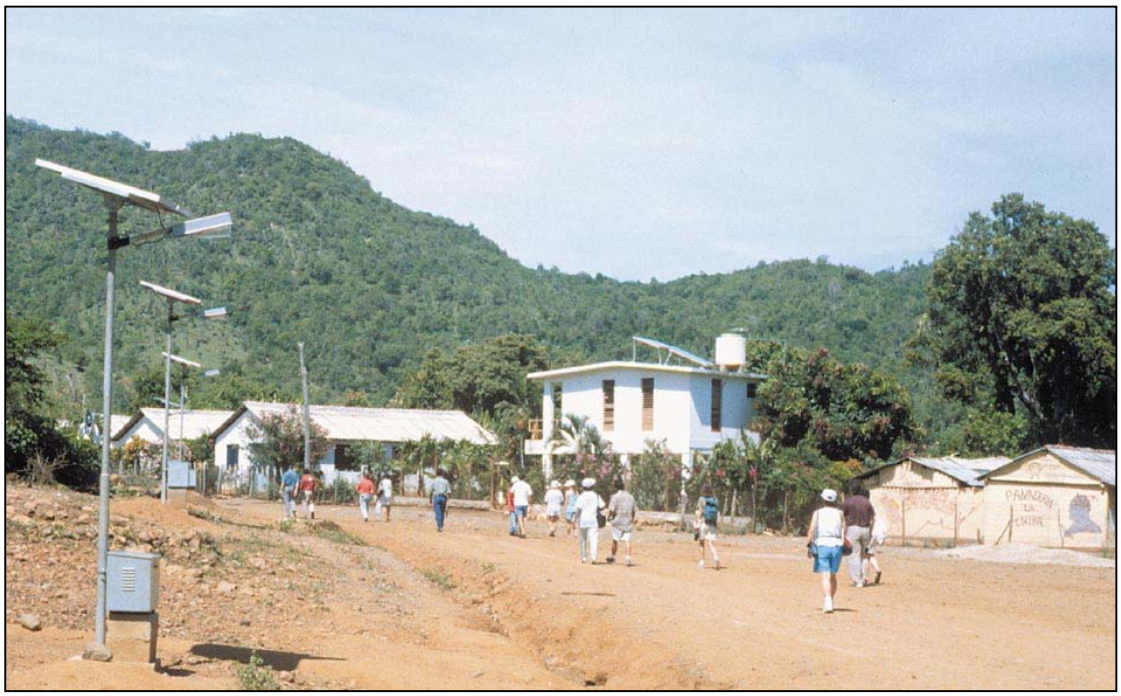
[2] EIA 2000.

[3] WEC 2002.

allowing the sale of oil under preferential conditions, have recently collapsed between Venezuela and Cuba. This leaves the island about 53.000 bbl/d short of the required amount.[4]

Nevertheless Cuba is also utilising several renewable energy resources. A country report by the International Solar Energy International (SEI) says, that hydropower in the form of micro-hydro power plants turns out to be a great potential, as Cuba has a lot of small rivers that could be utilised. The currently installed systems have an total capacity of 55 MW and producing 80 GWh per year which is a small share of 0,7 percent on the one hand, on the other hand remote regions without a grid connection are supplied with electric power. Cuba energy-mix contains 5,1 percent renewable energies, mostly bioenergy and photovoltaic. The utilisation of photovoltaic is also a part of Cuba's efforts in renewable energy. An outstanding example is Magdalena, a village located in the mountains, which has no connection to the grid and is completely powered by solar energy. The community has a population of over 500 people and each house has its own 70 watt PV system to run compact fluorescent DC lights, radio and small electric household appliances. There are 11-watt PV street lights lining the street and a 3 kW PV powered water pumping system which pumps water for the entire community. Figure 5-8 shows a picture of the installed standalone PV street lights.[5]

Figure -1 - PV street lights in Magdalena, Cuba



Source: Courtesy of Laurie Guevara-Stone, Solar Energy International (SEI)

Throughout Cuba, there are about 300 PV powered rural homes, three community systems averaging 2.500 peak watts each, and over 50 PV powered doctor offices.[6]They are manufacturing their own charge controllers and have developed a DC/AC converter.

[4] Cuba News, http://www.cubanews.com

[5] Solar Energy International - The Sol of Cuba:28.

[6] Solar Energy International - The Sol of Cuba:29.

Furthermore, they are assembling their own modules from imported PV-cells. The majority of the problems with PV systems have been related to the tropical conditions of the Cuban climate as most of the installed equipment was not designed for tropical conditions.

The main share of Cuba's renewable energy utilisation is supplied by sugarcane, Cuba's main export crop. Along with hydropower, the use of biomass for energy purposes is founded in the country's tradition and makes a considerable contribution to the energy balance. Mainly the 156 sugar factories (at the moment only 113 are operating due to financial difficulties) meet their energy and electricity demand by burning bagasse. To increase the efficiency of this booming field in energy generation, the surplus electricity can be fed into the national supply network. However, the installed capacity of approximately 800 MW is only available during the three months of sugar harvest. According to national studies there are considerable reserves in bagasse that could be used.[7] This is limited through the drastic decline in sugar production, which in 1998 was less than half that of 1990.[8] In 1999 the country's sugar industry produced 3,875 million tons of sugar and caused 12,632 million tonnes of bagasse, suitable for energy generation.[9]

Future enlargement of bioenergy could be seen as a special field of interest for the Cuban government as there is large funding for the national research institutions. In co-operation with the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) there are studies, projecting an increase in generating capacities for biomass from sugarcane cultivation by 500MW by the year 2010.[10]

[7] Study Center for Renewable Energy Technologies (Centro de Estudios de Tecnologías de Energías Renovables – CETER)

[8] GTZ 2002: 85.

[9] ISO 1999.

[10] GTZ 2002: 85. It is even suggested from the Cuban side that by 2020 all electricity supplies can be provided on biomass.