

## **Henning Suhr: Between Abundance and Bottlenecks: Brazil's Energy Sector is on the Move**

Brazil's energy sector seems to be in the ascendant. People talk about the end of dependence on crude-oil imports, about Brazilian-American cooperation in the field of biofuels, about a strategic partnership agreement with the EU, and even about coming to terms with Bolivia which only two years ago nationalised its natural-gas reserves and took away Brazil's gas fields on Bolivian soil. What is more, there is talk about ethanol as the power source of the future, about building new nuclear-power plants, and about erecting mega-dams in the Amazon jungle. The country's energy sector has been set in motion. Brazil is in a good starting position, but the energy demand is rising constantly, so that endeavours to secure the supply in the long run must be stepped up. In this context, it is worth our while to analyse the perspectives and problems of Brazil's energy sector.

In 2006, primary-energy supplies equivalent to 211.9 million tons of oil were obtained from crude oil, hydroelectric or wind power, sugar cane products, wood and charcoal, natural gas, soft and hard coal, uranium, and other primary energy carriers. All in all, 8.3 percent were imported. Primary-energy consumption was spread out among industry and mining, transport, private households, energy production, agriculture, public facilities, and trade. Demand is continuously rising, and availability of cheap energy still is an important factor for the growth of the country's economy.

In recent years, the fastest-growing demand was that for electricity. To expand supplies and to reduce dependence on water power, the output of the thermal power plants was increased. Nevertheless, water power remains important; witness the plans to build several large dams in the jungle which the country holds on to despite the possible negative effects associated with them. And yet – even such projects will not be able to solve Brazil's energy problem in the long run. How scanty the electricity reserves really are emerged during the energy crisis at the turn of the year 2007/2008, when the rains failed and electricity prices doubled within one month and even increased thirteenfold within a year in some regions.

Missed opportunities are especially numerous in politics. It seems that the current government has learned nothing from the mistakes of its predecessors, although Mr Lula da Silva, at that time the opposition leader, criticised the former head of state, Mr Cardoso, when the country experienced its worst energy crisis so far under his rule. Now, Mr Lula himself must fear to lose his popularity. At the moment, there are three areas in which we find deficits: First, investments in electric power generation and the related infrastructure were too low both under Mr Cardoso and (!) under Mr Lula. Second, politics and energy utilities are interlinked to an alarming degree. And third, hardly anybody has thought about alternative solutions so far.

All these deficits are home-made, i.e. related to politics. However, the country is by no means without a concept. Now, an energy mix of oil, gas, uranium, and renewable energies is supposed to fix everything.

When, at the end of 2007, the state-owned oil company Petrobras announced that it had discovered an oil field off the coast of Santos which promised to contain up to eight billion barrels, Mr Lula started dreaming about his country becoming a member of the OPEC. However, exploiting the Tupi field which is located at depths of up to 8,000 metres is not unproblematic, as there is nobody with any experience in developing offshore oil fields at such a depth. Although Brazil by now is no longer extracting oil solely to meet its own demands, it still depends on importing expensive light oil as its own processing capacities are insufficient at the moment. Therefore, Petrobras increasingly invested in expanding its domestic facilities. By increasing its national share, the country aims at three objectives – to reduce Brazil's dependence on foreign countries, to give more Brazilians a share in the success of the sector, and to achieve true self-sufficiency.

In Brazil, gas is used as fuel in electric power generation, cars, private households, and the industry. Early in 2008, Petrobras announced the discovery of the Jupiter gas field off the coast of Rio de Janeiro, not far from the Tupi oil field. Energy minister Lobão immediately talked about gas reserves of gigantic dimensions, the exploitation of which would soon make the country independent of foreign gas imports. However, the technical problems that are to be expected in this as well as in the other case tend to dampen the euphoria. Moreover, expanding national gas extraction does not only involve sounding out the fields but also investing in processing. In this respect, everything is still in the pipeline. Before Bolivia's president, Mr Morales, nationalised the country's domestic industry in 2006, Petrobras held 46 percent of the extraction rights for Bolivian gas reserves and 95 percent of the country's refinery capacities. A short time before that, it was agreed that Bolivian deliveries to Brazil were to be doubled. Politicians in La Paz have shown Brazil its vulnerability in the energy question, so that the country intends to enhance the development of its own sources now.

Ever since the price of oil rose, people all over the world, including Brazil, are looking for ways of substituting crude oil or at least reducing its consumption. Following the USA, Brazil is the second biggest producer of ethanol produced from sugar cane. This product, which is added to petrol in the form of pure alcohol, by now accounts for 20 percent of Brazil's total fuel consumption. This being so, other countries are interested in cooperating with Brazil, even though Europe and the USA favour a fixed admixture rate of ethanol to petrol. Especially the EU has certain reservations. On the one hand, it is feared that the cultivation of sugar cane to produce ethanol might affect other food crops, and on the other, that expanding the cultivation area for sugar cane would push livestock farming back into the northern part of the Amazon rainforest which, in turn, would foster deforestation. By now, the government has reacted by imposing a ban on sugar-cane cultivation in the Amazon region and the Pantanal. However, because of Europe's reservations, Brazil's sugar-cane and ethanol industry fears for its approach, arguing that the country's cultivation area for sugar cane makes up less than one tenth of the entire agricultural area.

In fact, there are some good reasons for using ethanol as a fuel additive, especially as it can be produced not only from sugar cane and maize but from all kinds of plant residues in the form of cellulose ethanol without occupying arable land. There are plans to increase the share of biodiesel in conventional diesel fuel. Brazil also produces biodiesel from a wide variety of plants for socio-economic reasons, as there are more than three million Brazilians working in the sugar-cane and ethanol industry alone. Yet this also involves some conflicts – biodiversity versus biofuels but also food security versus biofuels. At the moment, the EU is negotiating with Brazil about introducing a certification system, its objective being to document that the production of a certain product does not involve sacrificing any part of the forest.

Not least with the intention of securing its own power supply, Brazil has resumed its nuclear programme. Formerly dependent on foreign contractors, Brazil is now capable of enriching the uranium for its two reactors, Angra I and Angra II. Moreover, there are plans to build Angra III, especially as the country has the sixth biggest uranium deposits worldwide. There are hardly any reservations about nuclear power among the population – much to the joy of the nuclear industry. Although the drawbacks of nuclear energy are known – nuclear waste disposal and the risk of a core meltdown –, they do not count for much in the face of the benefits. These include profits from extracting and exporting uranium as well as the protection of national security interests. Thus, the minister of defence, Mr Jobim, has already announced his intention to build nuclear submarines to protect the oil fields off the coast and to fend off terrorist attacks, among other things. At the same time, he emphasised the country's peaceful intentions, dismissing the charge that Brazil was planning to build an atomic bomb.

The use of wind power in Brazil still is at the beginning of its development. The same holds true for solar energy, even though the country's proximity to the equator offers golden opportunities.

Brazil is endeavouring to reduce its development deficits through continuous economic growth, in which access to sufficient amounts of energy plays an important role. One problem is that the country strongly depends on water power, so that a diversification of supply sources is urgently needed. Yet many things must be considered in selecting the right energy carriers – not only profit but also the creation of new jobs, the security-policy aspect, and environmental and climate protection. In the end, the answer to how Brazil will solve the problem of securing its energy supply will depend on politics. It is now for the government to create regulatory conditions to secure a sustainable and growth-oriented supply of energy. If it does, Brazil will be able to exploit its rich energy potential and to catch up with the 'big players' of the world economy.