



## Heinrich Böll Foundation's Briefings

The Heinrich Böll Foundation tries to enrich through scientific studies and papers the current energy debate in Brazil. The updating of the criticism on the nuclear power was likewise main focus as it was the debate on agro-fuels. The Heinrich Böll Foundation supports the workgroup energy of the Brazilian Environment-Forum and the international dialogue about energy policy.

### Energy in Brazil – opportunity and paradox

Energy policy in Brazil is a key issue for the development path which the country wants to pursue. From a worldwide perspective, Brazil represents an exceptional case: no other country has such a clean energy balance, based on the criterion of CO<sub>2</sub> emissions: but at the same time, the ecological costs of this comparatively good balance are very high. Seventy five percent of the power generation is based on hydropower, i.e., an energy source that produces very little CO<sub>2</sub>. Furthermore, a high percentage of energy relies on biomass – predominantly through the use of agro-fuels from sugar cane – another factor that contributes to reducing CO<sub>2</sub> emissions in power generation.

Even if one looks at the total energy balance (i.e. not just what is used for power generation), Brazil has a very comfortable position in the world because of the low amount of natural gas and coal used in supplying power.

| Sources of Energy  | Brazil | World |
|--|--------|-------|
| Petroleum (Oil)  | 39.1%  | 35.7% |
| Coal   | 6.7%   | 23.3% |
| Natural gas  | 8.9%   | 20.3% |
| Biomass<br>(Firewood, charcoal and products from sugar<br>cane). | 27.0%  | 11.2% |
| Nuclear  | 1.5%   | 6.7%  |
| Hydropower   | 14.4%  | 2.3%  |
| Other (solar, wind, waves, geothermal, etc.).                    | 2.7%   | 0.4%  |

With respect to the consumption of oil alone (transport system), Brazil's position relative to the world is average, which is not surprising, since the country became self sufficient in oil in the year 2007. In international forums, Brazil's government never fails to stress the excellent CO<sub>2</sub> balance which the country has in its energy matrix. To the environmental movement, those favorable balances, touted by the government, are quite misleading. The favorable CO<sub>2</sub> balance is based on ecologically questionable choices. This Brazilian paradox will dominate the energy debate in coming years.

### Big dams – clean energy?

The future of “clean energy” in Brazil lies in hydroelectric power, and this is the explicitly stated choice of the country's government. The future of hydroelectric power lies in the Amazon region – and that alone already determines the dilemma of environmental policies.

Expanding hydropower nowadays means basically planning for the construction of big dams in the Amazon region, which has the greatest potential for new dams. For the energy policy of the Brazilian government, the auction of the dam project on the Rio Madeira (name of river) in December 2007 represented a major breakthrough. For the first time in some 20 years, a big dam project entered the implementation phase. In 1990, after intensive national and international protests (Sting in the Amazon!) a big project on the Xingu River was halted. The same project is now listed as a high priority, under a new name (Belomonte). For the environmental and indigenous movements, such recent triumphs of the government are a nightmare. Big dams in the Amazon have an enormous impact on the region, reaching far beyond the immediate destruction of the environment caused by the construction of the dam. In this sense, an economic boom is being expected on the river Madeira, and along with that, the expansion of soy bean culture in the region.

### **Agro-fuels**

An intensive debate has arisen over ecological fact and fiction relating to agro- or bio-fuels. It is not possible to go into a deeper explanation in this briefing, but we would like to make a few comments on some specific aspects of the bio-fuel boom in Brazil. Unlike other places in the world, since the seventies Brazil has implemented a program to promote the production of bio-fuels based on sugar cane ethanol. The use of this plant offers an excellent energy balance in comparison with others. One liter of fossil fuel is used to produce two liters of alcohol from sugar beets, but the same liter renders eight liters of alcohol from sugar cane.

The production of alcohol from sugar cane is highly profitable, given current energy market prices. Since Brazil has huge agricultural potential (its land mass), the government envisages the country as one of the future powers in agro-energy production. Brazil has enough land – be it for food crops or agro-fuels – and this has become the refrain of the government in the current debate. But where the government and the sugar cane industry see only land, the environmentalists see valuable ecosystems. They also point out that it is not just an issue of bio-fuels. The combined boom in soy bean farms, tree plantations for the production of pulp and paper, cattle breeding and agro-fuels makes up the ecological nightmare which generates the criticism of the Brazilian agrarian model, which is basically oriented to exports. The interdependencies are the reason for most of the concerns: at the moment, the sugar cane crops are not destroying the rainforest, but the intensification of agriculture in traditional agricultural areas is presently pushing cattle breeding towards the rainforest.

Regardless of such discussions, the Brazilian government is doing its calculations on how much CO<sub>2</sub> emissions were avoided in recent years due to the use of alcohol to replace gasoline.

### **Nuclear**

The argument that nuclear power is clean energy is driving the revival of this energy source also in Brazil. At present, Brazil has two nuclear power plants in operation, and in 2007 the government decided to resume the construction of Angra 3, which had been started and then halted many years ago. At the same time they also announced additional plans to build some smaller nuclear power plants. The option to go nuclear is hard to understand from a political point of view, since nuclear power has a much higher cost than hydroelectric power. The development of expensive

nuclear power is seen as part of an entire nuclear strategy, which is being followed by Brazil as an emerging global power: the country is looking to diversify the nuclear sector as a whole (research, enrichment of uranium, energy....) in order to be a global player in this area and to be able to react quickly, should geopolitical developments require it. In that context, the climate argument will likely be postponed, and the discussion concerning the nuclear option will be accordingly more difficult.

### **Are there any green alternatives?**

The problematic trio of hydro, agro- and nuclear energy puts the Brazilian environmental movement in a difficult position (as well as the Environmental Department); since they firmly say “NO” to big dams and nuclear power and are very skeptical towards agro-energy, it was not difficult for the government to declare the environmentalists as simply out- and- out opponents of development. The never ending “mantra” that states that the country needs to be developed and therefore needs more energy is plausible and dominates public opinion. But the environmentalists and some scientists have developed quite an alternative energy strategy in recent years.

This strategy base primarily upon the following elements:

- Modernization of the existing dams. According to scientific studies the ‘repotentialisation’ and renovation of outdated turbines is able to raise the efficiency of the dams remarkably.
- Advancement of the efficiency with the transport of energy. The routes of transportation are very long, especially from the dams in the Amazon.
- Incentives to save energy and to raise the efficiency of energy.
- Expanding the wind power. It is difficult to understand why there does not exist a significantly wind power electric energy production in such a high-capacity country with such a long coastline.

Some of the Brazilian environmental movements deal critically with the claim of the need of the expansion of energy production. In the Amazon a great part of the produced energy there runs to the aluminium factories. Cheap energy always will evoke new requirements.

But is it possible to design a sustainable model of development, while it is placing emphasis on energy-intensive production?

An alarming development is the increase of the carbon and gas-part of the Brazilian energy-mix. To counteract energy-shortages it has been facilitated the licensure for gas- and carbon-power-plants. Due to gas-supply problems with Bolivia Brazil now focus more on carbon. The Environmental Departement loves holding the Brazilian environmental movement responsible for the “pollution“ of the Brazilian energy balance, because it would retard the license for the construction of new dams and hence force the government and industry to focus on carbon.