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THE ENERGY SECTOR: THE CASE OF ALCOHOL FUEL (ETHANOL)

Submission by Brazil

I. INTRODUCTION

1. Brazil considers that the Secretariat's Note on "*Environmental Benefits of Removing Trade Restrictions and Distortions*" (WT/CTE/W/67) is a good basis to identify situations where trade liberalization and environmental protection can be mutually supportive. To achieve a more substantial progress in the discussions under Item 6, Brazil feels that Members should now bring their own national experiences to present existing and potential "win-win" situations.

2. Brazil considers that the CTE should give special consideration to the energy sector. As the Secretariat's paper points out, "*production in the energy sector is not an end in itself; energy is an important input to almost all economic activities*". WT/CTE/W/67 identifies petroleum, coal, natural gas and electric power as the main primary source of energy. Among trade restrictions and distortions, the paper identifies that this sector is still considerably subsidized and some energy taxes still restrict trade. The Secretariat concludes that the removal of subsidies and the restructuring of taxes to bring energy prices in line with marginal social costs could result in significant environmental benefits.

3. Following those conclusions and bearing in mind the attainment of the objectives of the United Nations Framework Convention on Climate Change and its Kyoto Protocol, Brazil would like to address the Committee's attention to renewable energy sources, particularly to the case of alcohol fuel (ethanol).

II. THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE AND THE KYOTO PROTOCOL

4. Article 4(c) of the Climate Change Convention establishes that all Parties shall "promote and cooperate in the development, application and diffusion, including transfer of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors". Articles 10 and 11 of the Kyoto Protocol to the UNFCCC, agreed in December 1997, reaffirm the existing commitments in Article 4 and request all Parties to "formulate, where relevant and to the extent possible, cost-effective national, and where appropriate regional programmes to improve the quality of local emission factors (...)". Additionally, those Articles also request the Parties to formulate and implement programmes that would, *inter alia*, "concern energy, transport and industry sectors as well as agriculture, forestry and waste management".

5. As explained in document WT/CTE/W/74 (Note from the UNFCCC's Secretariat), the Kyoto Protocol sets the commitments by developed countries to reduce their collective emissions of six key greenhouse gases by at least 5 per cent. This group target will be achieved through cuts of

8 per cent by Switzerland, most Central and East European states, and the European Union (the EU will meet its target by distributing different rates to its Member States); 7 per cent by the U.S.; and 6 per cent by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to one per cent, Australia by up to 8 per cent, and Iceland 10 per cent. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO_2 equivalents" that are then added up to produce a single figure.

6. The commitments of developing countries in the UNFCCC are to develop and periodically update national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol (Article 4 under the Convention) and to produce a general description of steps taken or envisaged to implement the Convention (Article 12 under the Convention).

7. In the context of those commitments related to the Climate Change Convention, Brazil proposes that the CTE explore situations where trade liberalization could facilitate the accomplishment of the commitments undertaken in Kyoto. Increasing market access conditions to cleaner renewable energy sources that reduce the greenhouse effect would be beneficial not only to exporting countries, but also to importing countries (particularly those included in Annex I of the Kyoto Protocol).

III. THE BRAZILIAN EXPERIENCE WITH ETHANOL FUEL

8. Brazil has a large experience in the use of ethanol fuel. In response to the oil crisis of the mid-1970's the Brazilian government, in cooperation with private industry, created in 1975 the National Alcohol Program ("PROALCOOL") to produce alcohol from sugar cane and to build ethanol compatible engines. To better balance Brazil's petroleum consumption with its crude oil production, intensive research was conducted from the late 1960's through the early 1970's to identify an economically viable alternative to oil as a fuel source. Ethanol, extracted from sugarcane, was chosen as one of these alternatives. By 1985, when PROALCOOL was fully implemented and the production of vehicles running on neat ethanol (100 per cent) reached its peak (66.4 per cent), the production of ethanol was around 12.3 billion litres, and some 500,000 jobs had been created. Moreover, all vehicles running on gasoline also contained a blend of up to 20 per cent of ethanol.

9. Different factors, however, led to a loss of PROALCOOL's competitive advantage - particularly the lowering of oil prices in the international market since 1985 and Government restructuring. Consequently, the production of cars running on ethanol dropped to only 6,373 (or 0.4 per cent of the total production) in 1996.[1] Alcohol production, however, continued to increase, reaching 14.5 billion litres in 1996-7. PROALCOOL has been suffering structural changes in order to eliminate Government intervention. The most recent measures in this process were the end of price controls in May 1998. In this process of liberalization, PROALCOOL demands new patterns of ethanol production, which are still being discussed at the national level in order to provide sustainability to the program on a free-market basis. Within the context of developing an energy strategy based on sustainable development, however, PROALCOOL should have a significant role to play in the internalisation of some positive externalities in energy prices.

[1]Source: National Association of Automobiles Manufacturers (ANFAVEA) - Anuário Estatístico da Indústria Automobilística no Brasil *in Programa Nacional do Álcool.*

10. Today, several countries[2] around the world, such as the US[3], Canada, France, Italy, South Africa and Sweden are also testing both oxygenated and neat (near 100 per cent) alcohol fuels produced from corn, wheat or beet. In some other countries, projects are underway to test the viability of replacing diesel fuel with ethanol.

IV. ENVIRONMENTAL BENEFITS FROM THE USE OF ETHANOL

11. Some scientific studies acknowledge several environmental benefits from the use of ethanol. Certainly, its main benefit comes from the fact that alcohol fuel is essentially biomass energy derived from agricultural crops – a renewable energy source. Although ethanol production may yield greenhouse gases such as CO_2, CH_4 and N_2O, (around 250 kg of equivalent CO_2/m^3 of ethanol produced), the final balance is highly positive, since the sugarcane photosynthesis process absorbs a volume of CO_2 proportional to the burning of alcohol and the sugarcane wastes. As a consequence, the net reduction of CO_2 emission amounts to 2,46 tons of CO_2 equivalents per m^3 of ethanol consumed. In Brazil, the reduction of emissions in 1995 corresponded to 9-10 millions tC (Carbon content in CO_2) per year. The total net balance between 1975 and 1995 amounts to 70-90 million tons of C-CO_2 (see box below). It should be noted that this process is especially effective in sugarcane production, if compared to other sources to ethanol production, such as corn, wheat or beet, that use fossil fuel as input energy (as opposed to sugar cane in Brazil, where the bagasse is used as a renewable energy for the distillation of ethanol).

CO_2 Equivalent Flux in the Ethanol Production and Consumption in Brazil		
Gases	**Flux (t CO_2/m^3 ethanol)**	**Total in 1995*** (106 t CO_2)**
Avoided CO_2*	**-2,71**	**-37,20**
(substitute from gasoline)	-2,44	-33,49
(subst. From oil fuel)	-0,27	-3,71
CO_2 released**	**0,25**	**3,44**
(ethanol/sugarcane production)		
Total net	**-2,46**	**-33,76**

Source: acedo,1997, in *Programa Nacional do Álcool*

Elaboration: *Average CO_2 avoided from gasoline substitution (0,76 Kg C-CO_2/l) whether by dehydrated (1,04 l/l gasoline) or hydrated (0,8 l/l gasoline) alcohol and substitution of fuel oil (0,86 Kg C/Kg de óleo) by bagasse.

**Equivalent CO_2 in the agricultural and industrial phases of sugarcane and ethanol production.

***Production in 1995: 4,27 millions m^3 dehydrated and 9,47 millions m^3 hydrated ethanol.

[2]A comprehensive report on the main national experiences with ethanol fuel programmes can be obtained in *"World Ethanol Production and Trade"* (Dr. Christoph Berg of F.O. Licht, Commodity Analysts, in http://www.distill.com/berg).

[3]The US Government established in 1979 its National Programme on Corn Ethanol. In the next 4 years around 400,000 cars running either on gasoline or on alcohol (85 per cent ethanol or E-85) are expected to be available in the market. A coalition of Pro-Ethanol Governors gathers 50 governors from American states. The Coalition coordinates with 40 countries around the world to stimulate the use of ethanol in transportation.

12. Consequently, ethanol makes a significant contribution to the global reduction of greenhouse gases. Although the level of many of the greenhouse gases (CO, HC, NOx, and CHO, for instance) resulting from gas-engine cars has been decreasing thanks to technological improvements both in gas and engines, much of this reduction is also due to the blend of ethanol (10 per cent in the US[4], for instance) and gasoline (gasohol). It should also be pointed out that even if gas emissions from gas-engine cars are reduced to the same level as from ethanol-engine cars, the former will be recycled into organic tissue during plant growth, while the latter will persist in the atmosphere, contributing to the aggravation of the greenhouse effect.

13. Finally, other positive externalities are worth mentioning, such as:

- job creation (in Brazil, around 1.5 million direct and indirect jobs, where 700,000 are direct);
- reduction of health costs related to atmospheric pollution in large urban centers;
- diversification of energy sources;
- development of new car engine technologies;
- development of environmentally sustainable agricultural production processes;
- extremely positive energy balance (the external energy consumption of ethanol production is much inferior to its output); and,
- potential use of wastes in the co-generation of renewable electrical energy (particularly in the case of sugarcane wastes – bagasse and also leaves and tops).

V. TRADE RESTRICTIONS AND DISTORTIONS

14. Brazil believes that different ways of applying the Polluter Pays Principle may be used to provide incentives for the development and use of renewable energy or more environmentally-friendly technology. Export subsidies, however, differ from such incentives, since they may distort market access conditions. In some countries, for instance, subsidised exports may reach 39.3 million dollars for a quantity of 450,000 hectolitres.[5]

15. Additionally to domestic production and export subsidies, the ethanol market in several developed countries is strongly protected by high tariffs. In general, the main developed countries apply tariffs that range between US$ 0.17 to US$ 0.33 per liter for ethyl alcohol. Some countries also apply additional duties to their tariffs, adding, for example, US$ 0.1427 to a tariff of 2.8 per cent - which may represent an increase of 72 per cent in the original price of imported ethanol. Consequently, the average price of US$ 50 for a barrel of ethanol would amount to US$ 86 in some markets.

16. As the largest world producer of ethanol (14.5 billion litres in 1996-7, or 46 per cent of the world production)[6], and having a great production capacity, Brazil is greatly concerned with trade restrictions and distortions relating to this product. In spite of the fact that the ethanol market is

[4] *"Biomass-derived Liquid Fuels"* - US National Renewable Energy Laboratory - http://nrelinfo.nrel.gov/business/international/info-energy/supplies/biomass/bio-liquids.html.

[5] See, for instance, document G/AG/N/EEC/5, page 4.

[6] See *World Ethanol Production and Trade*, Op.cit.

expanding, its exports are severely limited by foreign trade barriers. Several other ethanol producer countries could also benefit from trade liberalization, both as exporters and as importers.

VI. CONCLUSION

17. Various Members have already stated the importance of the energy sector in the discussions at the CTE by addressing the increasing importance of global environmental problems, in particular climate change, resulting from the use of fossil fuels, particularly in the context of the Kyoto Protocol to the Climate Change Convention. Considering that the commitments under that MEA may have a potential effect on trade, Brazil understands that the CTE could play a constructive role in analysing how to improve market access for alternative energy sources based on biomass.

18. This submission means to demonstrate that there is a good potential for tariff reductions and elimination of trade distortions on ethanol, through granting better market access conditions to this cleaner energy source, to permit better efficiency in the allocation of resources and environmental benefits.

Source:

"*O Programa Nacional do Álcool* (Nota técnica)" SECTEC/RJ – MCT. José Cesário Cecchi (Secretário Executivo/CEMEE) and Marcos Aurélio Vasconcelos de Freitas (GT - CEMEE/PPE-COPPE-UFRJ). Mimeo (Background study for the preparation to the Brazilian Communication to the UNFCCC).

Related sites on the internet:

- Brazilian Ministry of Science and Technology: Brazil and the United Nations Framework Convention on Climate Change (http://www.mct.gov.br/gabin/cpmg/climate/programa/ingl/homeclim.htm)
- The Online Distillery Network (http://www.distill.com/)
- Canada's Greenfuels Homepage (http://www.greenfuels.org)
- American Coalition for the Use of Ethanol's internet homepage (http://www.ethanol.org)
- US National Renewable Energy Laboratory (http://www.nrel.gov/)
- Renewable Fuels Association (http://www.ethanolrfa.org/)