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Proposals for the improvement of biomass participation in the Brazilian energy matrix: the “Declaration of Recife”

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ABSTRACT

All the benefits (environmental, social, strategic, macro-economic) of biomass as energy source are well-known, specially for Brazil, due to its huge sugarcane production, its developed pulp/paper industry and its large agricultural production. Also the barriers currently existing for further bioenergy projects implementation have been discussed by all related sectors.

These barriers for the implementation of a large-scale biomass-based energy program (both in the transportation and the electric sector) include: lack of economic competitiveness, conservative behavior of involved industrial sectors and electric sector, inadequate legislation for bioenergy projects implementation.

Recent changes in the legislation of Brazilian electric sector have introduced the figure of the independent power producer (IPP) and, in the transportation sector, the liberalization of fuel prices is almost completed, both for gasoline and ethanol. However, further modifications in the energy legislation are still needed, with the introduction of adequate incentives to allow the competitiveness of bioenergy.

This paper analyses current situation of bioenergy in Brazil after the mentioned changes and proposes further actions to improve the participation of biomass in the Brazilian Energy Matrix, especially now with the opportunities created by the Kyoto Protocol.

1. INTRODUCTION

In Brazil, biomass figures are quite impressive: biomass corresponds to 28% of total primary energy, higher than fossil fuels production; Brazilian charcoal represents more than 25% of the world production. Sugarcane products are responsible for around 13% of all primary energy in the country and fuel alcohol corresponds to 32% of the energy consumption in light vehicles (BEN, 1997). Moreover, biomass use in sugar/alcohol sector places Brazil in a relevant situation as responsible for one of the most important renewable energy programs world-wide, Proalcool, despite its current difficulties.

Nowadays, examples of incorporation of more efficient technologies are taking place in Brazil, based on the use of biomass gasification for electricity generation. There are two projects being developed in Brazil supported by the Global Environment Facility (GEF), both regarding thermochemical gasification of biomass for electricity generation in gas turbine systems. The first one is from wood plantation in Northeast Brazilⁱ and the other one is the bagasse gasification plant being developed by Copersucarⁱⁱ (Walter, 1998).

Another example is the above mentioned Brazilian Alcohol Program, using ethanol as a fuel to replace gasoline. Despite the serious difficulties faced now by the Program, the use of alcohol replacing gasoline and of bagasse instead of fuel oil for electricity cogeneration has avoided the emission of 9.54 Mtons of carbon, around 15% of Brazil's total emissions from fossil fuels (Macedo, 1997).

However, a higher participation of biomass on the Brazilian Energy Matrix depends upon special mechanisms aiming to remove the existing barriers, mostly economic and political ones. With the objective of collaborating to reduce these barriers, this paper discusses their main reasons as well as the proposed mechanisms leading to the implementation of bioenergy.

2. THE MAIN GOALS ON BIOENERGY IN BRAZIL:

As already mentioned, the National Alcohol Program (Proalcool) is well known as being the largest program of commercial biomass utilization in the world. In the 96/97 harvesting season, 273 million tones (metric tones) of sugarcane were crushed, leading to 13.5 million tones of sugar and 13.7 billion liters of ethanol for automotive purposes (Coelho, 1997).

Another contribution for bioenergy in the country comes from sugarcane-based cogeneration. Nowadays almost all sugar/alcohol industries in the State of São Paulo - and many others in other regions - are self-sufficient (600 MW installed in São Paulo) and some of them even "export" electricity to the grid despite the small surplus (26 MW). Its potential for electricity generation is significant even with technologies commercialized in the country and can be still higher with the introduction of more efficient technologies. A large-scale co-

ⁱ Managed by CHESF, Companhia Hidrelétrica do São Francisco, together with Shell-Brazil and General Electric, Companhia Vale do Rio Doce, CIENTEC, a R&D institution with extensive experience in gasification, and Eletrobrás

ⁱⁱ Sugar and Alcohol Producers Cooperative of the State of São Paulo

generation program in sugar/alcohol sector would allow its diversification through better economic conditions. Moreover, together with the alcohol program, it would maintain current jobs in rural sector, create more jobs in industrial sector and improve industrial competitiveness (Coelho et al., 1998a, b).

Another important biomass energy source is related to vegetable oils. The National Energy Balance (BEN), organized by the Ministry of Mines and Energy, does not show the participation of vegetable oils in Brazilian energy matrix, what indicates that it is still inexpressive the use of such oils as an energy source in Brazil. However it is well known that small generators are being utilized in some rural areas inside the country, fueled with palm oil “in natura”, as well as with Brazil nuts and other vegetable specimen (Silva, 1997). An important study has identified six potential projects for the use of vegetable oil in Brazil (Moreira et al, 1995), from palm oil, castor oil and jatropa oil.

Considering the importance of bioenergy in Brazil, justified here by these examples, the “Permanent Forum on Renewable Energy” from the Ministry of Science and Technology has created the National Reference Center on Biomassⁱⁱⁱ, with the objective of meeting Brazilian energy needs with the nation’s own resources. The main goals to be attained on bioenergy include the generation of 3,000 MW from sugarcane, 1,000 MW from pulp and paper industry, and 150 MW from small vegetable oil generators, besides 80 million liters of biogas from urban and agricultural wastes. Also 20 million liters of vegetable oil for automotive purposes shall be produced and Brazilian alcohol production shall rise up to 18 billion liters (Coelho and Campos, 1998).

3. BARRIERS AGAINST A LARGE PROGRAM ON BIOENERGY IN BRAZIL:

The most significant barriers against the implementation of a large program on bioenergy in Brazil are political and economic ones (Coelho and Zylbersztajn, 1996,1998). In the electric sector, despite the official policy to strength the independent power producers (IPP), it can be observed a quite conservative behavior inside many utilities, still considering mainly the hydroelectric option for the sector’s expansion.

The official planning did not take into account other mechanisms like an integrated resource planning that includes cogeneration or self-generation processes, as well as renewable sources, like the sugarcane-based cogeneration or the diesel motors fueled with vegetable oils in Amazon and Northeast, as an important option for isolated communities. Presently, with the privatization of Brazilian electric sector, there are no prices officially imposed for the electricity sales for the utilities. The IPP can sell electricity to other consumers but the tariffs defined for wheeling are still quite high and do not incentive such process.

ⁱⁱⁱ In a partnership with the University of São Paulo, the Energy Secretariat of São Paulo and the Biomass Users Network do Brasil.

Regarding vegetable oils, the greatest difficulty in Brazil (and in other countries) is the high price of the vegetable oils: around US\$ 400-500 per ton for soy-bean oil or palm oil when compared to fuel oil. Nevertheless, the production cost identified in one of the commercial plants in Brazil is US\$ 250/ton (Silva, 1997).

Brazilian fuel sector was, in many aspects, similar to electric sector. This sector also was controlled by the state, through Petrobrás (Brazilian Oil Company), which had an enormous politic power. Only in 1997 its monopoly was broken with the creation of a general regulatory agency, ANP, the National Oil Agency.

In this situation, despite the achieved success of Proalcool, nowadays it presents significant difficulties mainly due to the lack of economic competitiveness of alcohol compared to gasoline and the removal of subsidies from the oil derivatives to ethanol. It must be considered the old and traditional conflict between Petrobrás and the alcohol producers; for the oil company, alcohol was always a competitor, responsible for an economic deficit, as discussed in many studies (Coelho et al, 1998, Moreira and Goldemberg, 1997).

There is currently a great surplus of hydrated ethanol and Brazilian plants are facing great difficulties, moreover with the liberalization of fuel prices being introduced by Federal Government. One very good option is now under development: the addition of alcohol to diesel oil; diesel oil consumption is quite high in Brazil, due to the fact that all trucks and buses use this fuel and there are high subsidies to diesel oil in Brazilian energy matrix.

4. MECHANISMS TO IMPLEMENT BIOENERGY IN BRAZIL - the 'DECLARATION OF RECIFE'

4.1. Self sustainability of fuel alcohol in Brazil

Regarding the use of fuel alcohol in Brazil, many factors deserve special consideration: accumulated knowledge, reduction of local and global pollution, strategic advantages, improvement of social conditions in rural areas, existing technology for the production of alcohol vehicles, etc. Therefore, mechanisms for the self sustainability of fuel alcohol are needed, such as:

- special measures to increase alcohol demand and supply, including the possibility of sales at the international market;
- the obligation for automotive industry to produce alcohol-fueled vehicles;
- an assessment of externalities regarding alcohol fuel when compared to gasoline, leading to mechanisms ensuring alcohol competitiveness.

4.2. Implementation of electricity generation from biomass

Also, considering the environmental, technological, political and socio-economic benefits from biomass-origin electricity, as well as that its technology is commercially available in Brazil, special policies are needed, such as:

- an assessment of the electricity generation potential from biomass and municipal solid wastes (MSW), giving support to the development of more efficient technologies in Brazil, including international successful experiences;
- the improvement of existing legislation regarding stationary pollutant sources;
- the allowance for cogenerators to access the market, by defining special conditions of back up and wheeling tariffs (mainly for independent power producers);
- incentives for biomass-based electricity generation in the Amazon;
- legal incentives and adequate financing policies for cogeneration in industrial sector, including the obligation of surplus electricity acquisition by local utilities;
- an assessment of externalities in the electric sector;
- Governmental policies and actions aiming bioenergy technology valorization.

4.3. Utilization of ethanol in diesel motors

Diesel oil consumption is extremely expensive for Brazilian trade balance and ethanol addition in diesel can help to equilibrate seasonal variations in alcohol supply and demand. Besides that, it will reduce local pollutant emissions, while avoiding carbon emissions. Considering the positive results from experiments on the mix alcohol-diesel, specialists recommended:

- the gradual introduction of alcohol blend with the Brazilian diesel oil, starting with the mixing of 2%, since this proportion is recommended as an anti-frosting additive;
- the establishment of goals and procedures to make possible higher mixture levels.

5. FINAL CONSIDERATIONS

The above policies were proposed by the several specialists at the workshop “II Partnership for Technological and Industrial Development of Bioenergy”, organized by CENBIO as part of the “IV Meeting of the Forum for Renewable Energy”, held by MCT in Recife, Brazil, last October, 1998. At that time, several specialists from Brazil and foreign countries presented their experiences and discussed the barriers and mechanisms for bioenergy implementation. From these discussions these recommendations were proposed, presented at the so-called “Declaration of Recife”.

The “Declaration of Recife” was edited by CENBIO and distributed to all Brazilian institutions, such as Federal, State and Municipal Governments, universities, research institutes, utilities, NGOs, agricultural and industrial sectors, etc. The main goal of such document is to contribute for the establishment of a national global policy aiming the implementation of a large biomass-based energy program, specially now with the opportunities created by the Kyoto Protocol regarding carbon emissions.

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