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ALTERNATIVES IN ENERGY POLICIES FOR THE UNITED STATES AND BRAZIL

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The United States (US) uses over 21 million barrels of petroleum a day, of which 60% is imported as crude oil or refined products. About 94% of oil is burned as fuel, directly or indirectly, two thirds as gasoline. Gasoline demand has increased at 1–2% per year over the past 10 years. Expected demand growth in the US, China, India and the rest of the world has pushed oil prices to their highest levels in a quarter century.

Energy security, greenhouse gas emissions, and environmental issues all push the US to reduce petroleum use. The Energy Policy Act (EPAct) of 2005 mandates the use of 7.5 billion gallons (28.4 billion liters) of ethanol by the year 2012 and encourages the development of ethanol from biomass through increased funding for R&D, loan guarantees for plant construction and a 250 million gallon (946.3 million liters) mandate for cellulosic ethanol use in 2013.

However, growth of ethanol use in the US is currently limited to what the corn industry can produce (estimated between 17 to 20 billion gallons based on limiting adverse impacts on foodstuffs). Interest in cellulosic ethanol is increasing but is still in the pre-commercial phases of development with its ultimate contribution to ethanol production uncertain. If gasoline demand continues to rise at historic rates, by 2025 mandated ethanol use would constitute only 6–7% of the total fuel mix by volume. As a consequence, the light-duty fleet (LDF) could increase its carbon emissions almost 30% above current levels.

Two ways of reducing petroleum use include improving fuel economy of vehicles and substituting another fuel. We focus on the latter, envisioning three approaches: (a) a rapid expansion of a US cellulose-based ethanol industry, (b) direct importation of ethanol from Brazil or (c) a clean development type mechanism to promote a large-scale increase of ethanol use in Brazil, generating a significant excess supply of gasoline to be exported to the US. We investigate here whether this third alternative represents a sound alternatives-in-energy policy (in contrast with a alternative-energy policy) for both Brazil and the US.

In 1975, the first oil shock led to the creation of the Brazilian Alcohol Program (Proalcool). Ethanol production increased from 560 million liters in 1975 to 16 billion liters in 2005. With an increasing internal energy use and the potential for a growing export market, Brazil faces a transition from being a sugar producer that also produces ethanol and electricity (food producer) to an ethanol (and possibly electricity) producer that also produces sugar (energy producer). The future development of the hydrolysis technology for producing ethanol from bagasse combined with the usage of sugarcane trash in boilers is expected to increase ethanol production substantially and bring dramatic changes to the sugarcane agroindustry, possibly making Brazil the leading producer of renewable energy in the world.

Transportation costs limit the use of fuel ethanol to areas close to its production. In many of Brazil's federal states, ethanol prices are high, preventing its use in the newly introduced flex-fuel vehicles (FFVs).[1] About 90% of the ethanol output in 2005 was produced in the Center-South region of Brazil (62% in São Paulo). Investing in the construction of ethanol distilleries in the North-Northeast region would improve access to renewable energy in the region, increase income and employment, alleviate poverty and spur rural development. We propose that Brazil becomes the first country in the world to use renewable fuels for its entire LDV.

However, Brazil seeks to export large quantities of ethanol in the short to medium term. Better soil-climate conditions and infrastructure in the Center-South region is driving expansion of the sugarcane agroindustry in this region. However, this increased regional production will not make ethanol cheaper in other areas nor ease the large income disparities that still exist in Brazil.

Currently modest amounts of ethanol are imported into the US mainly through the Caribbean Basin Initiative where ethanol can be imported tarriff and duty-free. Ethanol imports under this act are limited to 7% of the US ethanol use. There is considerable political resistance to removing these tariffs. Thus, the idea of reducing Brazilian gasoline consumption by the widespread of ethanol domestically and the shipping of oil and refined productions to the US could provide an interesting opportunity for the Brazilian economy.

Brazil could benefit by exporting oil and refined products to the US from the regions where they are produced (coastline states in the Southeast) and producing ethanol in regions with enormous land availability for growing sugarcane (Center-West and Northeast, in parts far from the coastline) to meet local demand for fuel[2].

Petrobras (the Brazilian oil company) already has a number of operations in the Gulf of Mexico region in the US, including an oil refinery. It intends to invest over $1.5 billion by 2012 in its US operations. Petrobras could export surplus oil and refined products from Brazil to the US. In 2005, Brazil used 17.7 billion liters of gasoline, which corresponds to approximately 23 billion liters of ethanol. This represents about 51% of the 9.2 billion gallons (35.0 billion liters) of gasoline imported by the US in 2005.

In this paper we investigate the socioeconomic impacts (on income and employment) of the two alternatives (a) increased use of gasoline and export ethanol or (b) use all ethanol and export oil/gasoline to the US.

A clean-development type of mechanism for promoting renewable fuels involving incentives from one side to the other could provide additional incentives for such a scenario. We will suggest some alternatives.

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[1] FFV owners will change to gasoline if ethanol price exceeds a threshold level corresponding to 77% of gasoline price. In January, gasoline was preferable to ethanol in many federal states in Brazil.

[2] Excluding the Amazon and other reserve territories, Brazil has more than 100 million hectares (near 250 million acres) of available land to grow sugarcane with productivity higher than 65 tonnes per hectare, mainly in the Center-West and Northeast regions.