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# ENERGY IN THE AMERICAS

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## “Panamerican Energy Cooperation: Opportunities and Challenges”

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### **Summary**

In an era of increasing energy demand, diminishing oil reserves and heightened concern about climate change, the Americas have a unique opportunity to become a leader in low-carbon sustainable energy production through close cooperation. The continent has abundant natural resources, such as solar, wind and geothermal, for renewable power generation. Moreover, agricultural experience and land availability create a strong advantage for the establishment of a biofuels industry, where technologies from North America will complement Latin American know-how in sugarcane ethanol. However, for private investment to be forthcoming in the energy sector of the Americas, the existence of political stability, a regulatory framework and a commitment to renewable energy are key prerequisites.

### **Current Status**

The term “energy” encompasses electricity from power generation plants and liquid transportation fuels. Electric power in the United States and Mexico is predominantly produced from fossil sources. In 2009 the United States derived 45% of its power from coal, 23% from natural gas and 20% from nuclear power, whereas Mexico’s portfolio consisted mainly of oil and natural gas<sup>1</sup>. In contrast, Canada and Latin America produce

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<sup>1</sup> Energy Information Administration, US Department of Energy (2010).



half or more of their electricity from renewable hydroelectric sources. Clearly, each country utilizes primarily its domestic resources for electricity production.

Despite political and social differences, there has been significant cooperation among Western Hemisphere countries in the electricity sector. Canada is the main source of imported electricity (albeit small) for the United States, and U.S.-Mexico cooperation is strong. Similarly, Mexico and Central American countries are in the process of integrating their grid systems. In South America, cooperation tends to be bilateral, with the huge Itaipu hydroelectric plant (12.6 GW), which electrifies both Paraguay and Brazil, being a prime example.

In the transportation sector most countries depend exclusively on oil products, such as gasoline and diesel. Oil is imported mostly from unstable regions of the world, such as the Middle East, with the United States being the world's largest importer (over 50% of its consumption). Although Canada and Mexico collectively account for over 30% of oil imported into the U.S., the country depends heavily on Saudi Arabia, Venezuela and Nigeria, all countries facing political and social challenges. The mere sizes of the U.S. gasoline and diesel markets, 136 billion and 44 billion gallons per year<sup>2</sup>, make fuel diversification a major challenge.

Still, the United States and Brazil (and lately Colombia) have introduced biofuels – primarily ethanol, but also biodiesel – into their economies. In 2009 the U.S. produced 10.6 billion gallons of ethanol from domestic corn, whereas Brazil produced over 6.6 billion gallons of ethanol from its own sugarcane<sup>3</sup>. As a result, the United States and Brazil are the global powerhouses of biofuels, accounting for almost 90% of the ethanol fuel produced worldwide. While fuel diversification has gained momentum, it is unfortunate that it has been accompanied by protectionism in the form of quotas and other measures, such as the 54 cents/gallon tariff that the United States imposes on direct imports of Brazilian ethanol. As a result, the alternative (non-oil) fuel sector in the Americas has seen no integration and little cooperation.

### **Collaboration Opportunities in Renewable Power**

In the power sector the Americas are gifted with plentiful natural resources: sunlight, wind, geothermal activity, ocean currents and agricultural residues. However, before examining renewable energy options in more detail, it is worth reviewing the anticipated larger role that natural gas is expected to play in coming years, especially in the United States, with the discovery of large reserves in Texas, Pennsylvania and neighboring areas.

With the use of advanced recovery technologies, such as reservoir fracturing and directional drilling, the United States has an opportunity to reduce its oil and coal dependence in the near future with domestically-generated gas. Similarly, South America has large gas reserves not only in Trinidad & Tobago, but also in Bolivia and in newly discovered areas off the southern coast of Brazil. Since natural gas can be used

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<sup>2</sup> Ibid.

<sup>3</sup> Ethanol Industry Outlook 2010, Renewable Fuels Association.



for both power generation and fuel production and has a carbon footprint that is considerably lower (reportedly 30%) than that of oil, it can be a valuable tool in Panamerican efforts to become more energy self-sufficient, while at the same time combating climate change. Moreover, natural gas can buy the whole continent valuable time by allowing companies to make renewable power and biofuels more cost competitive.

With the technological advances accomplished in the last ten years in the United States and Europe, and with large economies of scale, wind and geothermal power are already at grid parity with coal and nuclear, the lowest-cost non-renewable sources. Prices of solar panels are dropping quickly, as increasing demand reduces manufacturing cost per unit. Commercial ocean power is still in its infancy, but it is a predictable and hence stable form of energy that holds a lot of promise for the near future along the Atlantic and Pacific coasts of the Americas.

Finally, the large agricultural sectors of most countries in the hemisphere generate an abundance of agricultural residues, such as sugarcane bagasse, wheat straw and other byproducts. These low- or no-value materials can be readily used as solid fuel in power plants, either in co-firing operations with coal and other fossils or by themselves, as practiced by the sugarcane industry. One of the world's largest agroenergy power plants (140 MW), owned by Florida Crystals Corporation, is located in South Florida. The plant uses as fuel exclusively biomass in the form of sugarcane bagasse and woody yard waste. The generated power is used to operate the mill, with excess electricity powering more than 50,000 houses in Palm Beach County.

Hence, opportunities for collaboration in renewable power in the Americas exist in:

- Solar energy (water heating, photovoltaics, concentrated solar)
- Wind energy (on-land and off-shore)
- Biomass (agricultural residues and municipal yard waste)
- Geothermal
- Ocean (current, wave, tidal, thermal)

Solar and wind are intermittent forms of energy more appropriate for peak-load needs. With batteries and other forms of energy storage (such as compressed air and flywheels) becoming progressively more cost-effective, there is an opportunity to make solar and wind energy key components of the power portfolios of countries in the Americas. Technical and business experience, as well as investment, from the United States and other countries can help Latin American countries expand their capacity.

### **Collaboration Opportunities in Renewable Fuels**

Ethanol is the “Fuel of the Americas,” with the United States and Brazil dominating the global scene. In the United States, 10.6 billion gallons of ethanol are produced from corn, whereas in Brazil sugarcane is the source of 6.6 billion gallons of ethanol. Based on numerous analyses, sugarcane ethanol is significantly more sustainable than corn ethanol; moreover, it enjoys a lower production cost. Actually, Brazil is the world's



lowest-cost producer of ethanol, thanks to 40 years of industrial and policy experience. Yet, the import tariff that the United States levies on direct Brazilian imports of ethanol has deprived U.S. consumers from benefitting from an alternative fuel that is cost-competitive with gasoline (at less than \$50 per barrel of oil) and helps reduce carbon emissions on a comprehensive lifecycle basis.

The tariff has for years been the subject of dispute between the United States and Brazil, but in 2007 the two countries decided to set aside their differences and collaborate in a joint effort to promote the development of a biofuels industry in Latin America. Teams of U.S. and Brazilian technical, business and policy experts have visited a number of countries in Central America and the Caribbean to offer guidance to governments and the private sector. Today, Colombia is following in the footsteps of Brazil, producing ethanol from sugarcane and mandating its use throughout the country as a blend with gasoline. In Central America several countries produce ethanol from molasses, a byproduct of cane sugar production. Finally, in a few countries there are ethanol dehydration plants, which import limited quantities of hydrous Brazilian ethanol, remove the water and export anhydrous ethanol to the United States, taking advantage of a tariff-free preferential treatment for such ethanol under the Caribbean Basin Initiative.

Encouraging signs of biofuels collaboration in the Americas have emerged from the area of next-generation biofuels<sup>4</sup>. These so called “advanced biofuels” are derived from cellulosic biomass and algae, technologies that do not use food crops (hence no food vs. fuel controversy) and do not necessitate land-use change, since biomass is already available as an agricultural byproduct and algae can be cultivated on marginal non-agricultural land. The United States and Canada are the world leaders in cellulosic and algal technology development, but it is Latin America that possesses large quantities of biomass, such as sugarcane bagasse, and large areas of unutilized or underutilized land, along with plenty of sunshine and warm weather, for production of algal biodiesel and renewable hydrocarbons. In fact, advanced biofuels production co-located at existing sugarcane mills in Latin America can reduce the capital expenditure and operation cost of such fuels and make them a commercial reality. Hence, partnerships in the forthcoming commercialization of advanced biofuels, which will bring together technologies and feedstocks, represent excellent prospects for Panamerican energy collaboration.

On a much smaller scale than ethanol, biodiesel production has also increased throughout the Western Hemisphere, with the majority of it being produced and consumed locally. The U.S. production of 700 million gallons (2008) came primarily from soybeans<sup>5</sup>, whereas Brazilian and other Latin American production is more diverse, including palm, sunflower, canola, castor and other vegetable oils, as well as used cooking oil and animal fat. Given that production technology is largely nonproprietary, and production capacity is still low (compared to ethanol) in hemispheric countries, biodiesel has not yet faced protectionism controversies, like those of ethanol.

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<sup>4</sup> Philippidis, G. “Energy Security Achievable with Biofuels Made in the Americas”, Ethanol Producer Magazine (2008).

<sup>5</sup> National Biodiesel Board (2010).



On the contrary, there have been business collaborations in this industry in the form of equipment purchases, technology transfer, and international investment. Such collaborations have now extended into nonedible oil-producing plants, such as jatropha, which is a plant native to Central America and the Caribbean. U.S. companies are investing in Central America and the Caribbean, where jatropha can grow well on low-priced land.

### **Collaboration Challenges**

Trade protectionism, as mentioned earlier, represents a major drawback in Panamerican efforts for closer energy collaboration and integration. In fact, such barriers prevent biofuels from becoming a global commodity and hence, a serious alternative to oil. The root of the problem must be identified in the agricultural nature of biofuels. Countries around the world have historically subsidized and protected their own farmers and agriculture industries. It would be naïve to expect that this centuries-old practice will change now. As a result, first generation biofuels, such as ethanol from sugarcane, are bound to remain hostage to such policies.

Political stability is another challenge that affects energy collaboration. Energy production and distribution is a public-private partnership; hence it is vulnerable to political fluidity. Moreover, energy generation is capital intensive, requiring foreign direct investment, which will naturally shy away from countries with a history of political trouble, as are many in Latin America. Hence, a few countries, like Brazil, Chile and Colombia tend to attract most foreign energy investment. For energy cooperation to become a benefactor to the whole hemisphere, democracy, open market economies and transparency are sorely needed. High levels of corruption, lack of intellectual property protection and uncertainties about the sanctity of business contracts will continue to discourage U.S. and other investors from supporting the development of energy projects in most of Latin America.

Regulatory obstacles are also a major challenge. Although harmonization in the hemisphere remains a distant goal, most Latin American countries lack even a basic regulatory framework regarding the production, distribution and use of energy, thus discouraging investors. In addition, the absence of legislated Renewable Portfolio Standards (for power generation) and Renewable Fuel Standards (for biofuels), which provide the policy umbrella that stimulates investment in low-carbon energy sources, increases the risk of investment, as it makes unclear a country's long-term commitment to renewables. Finally, countries need to streamline industrial permitting processes for new power plants and biofuels facilities, so investors can have a reasonable understanding as to how long it will take for their investments to start generating cash flow.

Yet, there is reason for optimism. It is now evident that first generation biofuels can make up only a small fraction (10%-20%) of a country's liquid fuel needs in a sustainable way without disrupting food production or land use. As a result, countries increasingly look towards advanced biofuels as a key future player in a diverse low-carbon energy portfolio that will also include renewable energy sources, natural gas,



nuclear power and electric vehicles. For the advanced biofuels industry to materialize, we need significant amounts of private capital, low-cost technologies and plenty of biomass. With capital and technologies available from North America and agricultural biomass and ethanol experience available in Latin America, Panamerican collaboration in advanced biofuels and renewable power represents an excellent economic opportunity that no country in the Americas should miss.

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