

If Brazil Can Do It, Why Can't We?: The Use of Alternative Fuels in Brazil and the United States

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Introduction

“Geography is fate,” according to author Ralph Ellison (qtd. in Callahan 133). In Ellison’s work, the setting where he placed his characters had an impact on their language, personality, and behavior. Even beyond the world of literature, geography plays a distinct role in the lives of individuals. Differences in climate, topology, proximity to natural resources, and other similar factors impact how people adapt to the geography of their region. Such adaptations lead to the formation of distinct cultural patterns in different geographical regions.

In general, culture can be understood as being “software of the mind”; thus, it impacts the way in which populations (and subsequently individuals) perceive, interpret, and respond to important world issues. This influence of cultural differences on important issues is exemplified when comparing the country of Brazil and the United States of America in terms of their adoption of alternative fuels. Brazil has managed to become nearly self-sufficient in fulfilling its energy needs because of the acceptance of ethanol as a primary source of fuel—even though Brazil has an upper middle income economy and a per capita GNP (in U.S. dollars) of \$7,300 (de Bilj and Muller 33). Conversely,

the United States has a high income economy with a per capita GNP of \$34,100; and yet, this country cannot detach from its dependency on foreign oil suppliers (de Bilj and Muller 34).

Even though the cultural differences between these two countries are not solely responsible for these different levels of adoption of alternative fuels, they are an influential element which must be considered. More specifically, the difference in cultural views within both countries toward the industry of agriculture appears to be the most significant factor influencing the adoption of alternative fuels. The respective strength and prominence of the agrarian subcultures within both Brazil and the United States influence the level of alternative fuel adoption in each country.

Agrarian Subcultures—Historical Perspective

The choice of the Brazilian government to adopt the extensive use of the alternative fuel ethanol (a sugar-based product) for the main source of energy in the 1970s had its roots within the historical establishment of agriculture in that country. The modern-day country of Brazil began to take shape after the signing of the Treaty of Tordesillas in 1494; this treaty separated the continent

of South America along the meridian of 50°W longitude into Spanish (on the West coast) and Portuguese (on the East coast). However, it wasn't until April 22, 1500, that Portuguese explorers, under the command of Pedro Álvares Cabral, actually landed on the east coast of the continent of South America and began to establish a Portuguese sphere of influence—especially in the northeastern portion of the country (“Brazil” 583).

After thirty years of effort to establish dominance over the indigenous populations, the Portuguese began to colonize the country of Brazil (Fausto 15). As the ruling colonizers of the region, they enslaved the indigenous Amerindian populations (mostly the Tupi-Guarani and the Tapuia) in order to have a supply of labor to achieve Portuguese economic endeavors (Fausto 7). Through this process of enslavement, the Portuguese were able to take away the Amerindians' claim of ownership and rights to any particular area of land. All of the land was now considered to be owned and controlled by the King of Portugal; only the king had the power to award individuals (usually members of the Portuguese nobility or those in the upper classes) expansive estate plots to develop to generate profits for the crown (Fausto 12).

These efforts to obtain profits resulted in the creation of a large-scale plantation economy devoted to the cultivation of sugarcane and the subsequent manufacturing of sugar, which produced the base on which Brazil could later transition to biofuels (“Brazil” 569). These sugarcane plantations began to thrive in Brazil for two reasons: the tropical climate and the rewards to grow the crop from the emerging Brazilian government. First, in order to grow successfully, sugarcane (*Saccharum officinarum*) requires a region where the temperatures range from 75° to 85° F and rainfall averages approximately 60 to 120 inches per year (“Sugar” 963). These positive climatic aspects were found in Brazil's humid equatorial climate, and the colonists were able to bring sugarcane to the region for their established slave labor to tend, harvest and process. Second, the royal government in Brazil encouraged the production of sugar in the region. Those who planted sugarcane on their estates received exemption from taxation for an established period of time (Fausto 35). These incentives helped to establish an infrastructure in Brazil that supported the manufacturing of sugar products—which would later prove to be essential for the creation of ethanol fuel.

In contrast, the United States possessed a much different history of agrarian development, which has promoted a different outlook toward the adoption of alternative fuels. Unlike Brazil, those who first settled in the United States were not explorers seeking to conquer and profit from a new world. Rather, these

settlers were primarily Puritans fleeing from religious persecution in their home country of England. The Puritans mainly wanted to survive and thrive in their new setting. This group did not strive to create plantations and otherwise individually profit from exploiting the resources of the New World. Agriculture was not used to enslave the masses for profit; it was utilized for survival.

However, as the United States became more populated with subsequent waves of immigration, agriculture began to develop as an industry. Even though not all of the land in the United States possessed a climate suitable for the development of plantations, this form of agriculture did become established in the southern region of the country. The warmer humid temperate climate allowed the plantation owners to grow a variety of subtropical crops—such as cotton and tobacco. The states of Florida, Louisiana, and Hawaii could also support a crop of sugarcane. However, Florida and Louisiana could experience frost which kills the sugarcane and requires it to be replanted every year—unlike Brazil. Therefore, the production of sugarcane was much more economically feasible in Brazil because their sugarcane is a perennial crop.

Additionally, since a significant portion of the region of the United States has a “humid cold” climate, an individual owner system of farming with smaller farms developed throughout much of the regions of the Midwest and the Great Plains. Such a system was identical to the farming practices within Europe, from which many immigrants came. Subsequently, individuals throughout the Midwest and Great Plains developed the commercial production of corn, wheat, soybeans, and sugar beets.

This system of individual farm ownership began to flourish after the United States separated itself from the imperial powers of Great Britain. Even though both Brazil and the United States were both once under imperial rule, this colonial period did not imprint a system of unequal land distribution in the United States as it did in Brazil. Those in the United States were not prevented from owning individual parcels of land to farm. Also, this ownership of land was not restricted to just the nobility or upper classes. Land could be owned by anyone who had the resources to do so. Overall, the land was viewed as a commodity which could provide a source of revenue for the new American government after the Revolutionary War. In fact, legislation was passed allowing for the land to be surveyed into easily identifiable units to be sold for agricultural purposes. For example, the “Ordinance of 1785 and the Land Act of 1796 introduced the use of systematic surveys as well as an administrative arrangement for alienating the public lands” (K. Lewis 91). Such accuracy in locating

land parcels was accomplished by having the undeveloped land surveyed into a rectangular grid format with specified units of “townships” and “sections.”

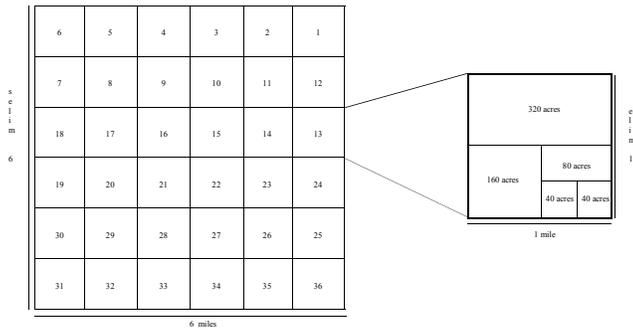


Figure 1: Depiction of the township and section grid system (adapted from F. Lewis 122).

Agricultural Legacy

After the fall of Portuguese colonialism in 1822, the residual agricultural economy as well as the general state of the Brazilian population created important factors which later influenced the adoption of alternative fuels in that country. In general, “Portugal profited tremendously from Brazil’s farm products and mineral wealth. It limited the country’s economic growth, however, by discouraging the development of manufacturing. Portugal wanted Brazilians to buy Portuguese products, rather than to make these products themselves” (“Brazil” 584). In other words, “Portugal’s colonial policy sought to milk Brazil rather than to develop it” (Page 48). Brazil started to develop other forms of industry only in the mid-1800s when the ruler, Dom João, “signed a decree opening up Brazilian ports to free trade. He also lifted the bans on industry and foreign residents in Brazil” (Page 49). However, industry did not really begin to boom in the country till the early 1990s, when “the government opened the country’s long-protected industries to international competition and foreign investment” (de Bilj and Muller 255-56).

Presently, despite these developments, agriculture remains an integral component in Brazil’s economy and accounts for approximately eight percent of the nation’s gross domestic product (“Brazil” 581). In fact, agriculture remains the primary way to make a living in the plantation areas developed by the Portuguese colonists. Large-scale industry has failed to substantially develop in the northeast region of the country where the Portuguese had created their massive sugar plantations approximately five centuries ago.

However, the prices for sugarcane and other crops grown in this area created only minimal profit margins. In an effort to improve the crop prices, new demand had to be generated through the creation of new markets. Currently, Brazil’s government has been able to create these markets for sugarcane through the production of ethanol. The extensive sugar infrastructure had to be altered only minimally to support the massive ethanol industry (“If Brazil” 1). Thus, instead of flooding an already crowded market with more sugar, the surplus sugarcane is converted into ethanol. This process benefits both the local farmers as well as the nation as a whole. In this manner, the crop that was once used for Brazil’s economic oppression is now a catalyst for the country’s economic prosperity.

The success of the alternative fuel industry in Brazil can also be partially attributed to the cheap labor in the region (resulting from the plantation systems imposed during the colonial period). The colonial period imposed a hierarchical class system that divided the masters from the slaves. Such a system, which imposed a distinct system of socially assigned value on an individual, still exists in Brazil’s contemporary culture. In the colonial period, the masters in many ways were above the law, and they were in complete control of their human property. This master-slave relationship was “replicated from the medieval relationship between the Portuguese king and his subjects, and it came to define the link between the powerful and the powerless in Brazil” (Page 12). Today, this sense of being “above the law” is still embodied by Brazil’s wealthy upper classes (Page 12). This attitude creates a great deal of inequality in Brazil, which serves to separate the “haves” from the “have nots.” Most Brazilians are poor; only “a small number of landowners, executives, and government leaders live in luxury” (“Brazil” 569). This adopted colonial plantation attitude causes current Brazilians to disregard the value of an individual and place a low value on human life (Page 12). Subsequently, this causes a lack of governmental legislation recognizing the rights and wages of poor workers in Brazil. This abundance of cheap labor in the country serves to benefit the ethanol industry.

In the United States, agriculture has continued to develop as an important industry, and the ultimate efficiency of agriculture has affected the nation’s outlook on biofuels. However, over time, the American people who directly rely on agrarian activities for their economic well-being have substantially declined. At the time of the country’s development, agriculture was a main source for profits, and a majority of the population lived in rural areas. In 1790 (the time of the first census), about 95 percent of the population in the United

States lived in rural areas (“United” 110). From the 1800s onward, the farming industry experienced many innovations in the processes associated with agriculture. Inventions, such as the steel plow and harvesting machines, allowed American farmers both to create more arable land as well as to better manage the production potentials of the land. The incorporation of “modern farm machinery and agricultural methods has helped to make U.S. farms the most efficient in the world” (“United” 133). Because of this efficiency, the percentage of the American population directly engaged in the farming industry began to decline. Overall, since 1925 “the number of farms in the United States has decreased from about 6,500,000 to about 2,200,000” (“United” 133). Such a shift has resulted in agriculture providing only 1 percent of the country’s gross domestic product (GDP), yet more than enough to sustain the needs of the United States as well as produce surplus for export (“United” 115). As a result of these declines, agriculture has become a minority issue in the governmental system. Therefore, farmers have less influence on governmental decisions.

Due to the increased efficiency of American agriculture and the subsequent decreases in profit margins, Americans moved to the growing cities for jobs within a variety of different industries. As of the last census, approximately 75 percent of the population described themselves as residing in an urban area, while the remaining 25 percent resided in rural areas (de Bilj and Muller 34). This migration to urban centers has caused the majority of the American population to lose sight of the needs of the current rural economies.

This disconnect between the urban and rural mindsets of Americans becomes important to the issue of alternative fuel adoption when considering the American cultural trait of individualism. Based on the research of Geert Hofstede (a Dutch scholar who developed five dimensions to measure culture), the United States functions with a culture that is highly individualistic (see Figure 1). In other words, the culture highly values and rewards the efforts of the individual, which creates a high degree of personal autonomy. Thus, individuals are more concerned about what changes will benefit them, rather than how changes will benefit different groups of people. Since the majority of the population now lives in urban areas, they will not receive a direct personal benefit if the country were to switch from gasoline to biofuels. In fact, at first, the population would actually be paying more for biofuels for their vehicles. The only group who would directly and immediately benefit from such a transition are those within rural farming communities (about 25 percent of the current population).

Comparison of Geert Hofstede’s Cultural Scores		
Dimension of Culture	United States	Brazil
Individualism	91	38
Uncertainty Avoidance	46	76
Masculinity	62	49
Power Distance	40	69
Long-Term Orientation	29	65

Table 1: Geert Hofstede’s rankings of the cultures in United States and Brazil along his cultural dimensions (“Geert” 1).

Despite this influence of individualism, however, those in rural areas are actually gaining strength for their arguments advocating the production of alternative fuels, and more ethanol plants are being built around the country. This momentum for alternative fuel could be attributed to both a growing collective national concern for the environment, as well as individuals’ wishes to contribute toward environmental improvement.

View of Alternative Fuels

In Brazil, the resulting abundance of sugarcane and cheap labor has served to mold an enthusiastic outlook regarding the potential of alternative fuels in the minds of the population. This positive outlook has fueled Brazil’s adoption of alternative fuels as a main source of fuel within the country.

In general, Brazil views the sale of alternative fuels as their key to becoming an economically prosperous country. This is because of the capacity to produce the two main sources for alternative fuels—sugarcane and oil rich seeds—in large quantities. The current populace of the country has been able to harness the profitability of sugarcane by producing ethanol from the sugary fluids of the plant. Ethanol is produced from the sugar of the sugarcane by the application of heat and enzymes (Herrera 1). The extracted juice from the sugarcane “can be easily processed, fermented, and distilled into ethanol” (Herrera 1). It is estimated that Brazil has the potential to export up to “10 billion liters per year for about \$2 billion in revenue” (Somaggi 1). Currently, with its present operations, “Brazil is the world’s largest producer and exporter of ethanol” (“Ambitious” 1). As a result, Brazil is in place to become a major global power if the demand for green energy from ethanol strengthens around the world.

In addition to the use of sugarcane for fuel, Brazilian agriculture produces oil rich seed plants (such as soybeans, sunflower seeds, and castor beans) in massive volumes; and these seeds can be used to produce biodiesel, which can be generated from any type of renewable vegetable oil (Aronow 2). Even though the production of biodiesel is less advanced than the ethanol industry in Brazil, the expansion of such an industry would have the potential to greatly improve this country's economy. As with ethanol, any "[l]arge-scale use of biodiesel fuels would allow it [Brazil] to all but discontinue those imports and would create jobs in needy farming communities" (Somoggi 1). If gasoline was blended with five percent biodiesel, Brazil could reduce its "import needs by 2 billion liters" (Aronow 3). Thus, the increased usage of biodiesels would not only generate revenue for the country; it would also increase its self-sufficiency.

Additionally, the adoption of alternative fuels is looked upon favorably by Brazilians because it would reinforce the country's thirty-year-old investment in alternative fuels. Before the 1970s, since the country of Brazil did not contain any known oil reserves, it had to import all needed fuel from outside the country. Due to this dependence, the oil embargo of the 1970s had an extremely negative impact. This event, plus the "[l]ack of known oil reserves led the Brazilian government to initiate sugar-based fuel production in 1973, when the price of crude oil was \$11/barrel" ("A Nation" 1). The "Brazilian government used laws and subsidies to promote ethanol-only cars [see Figure 2], which had 90% of the market by the late 1980s" ("A Tankful" 1). These laws created an extensive infrastructure that supported the developing ethanol industry in Brazil.



Figure 2: A Brazilian advertisement that was part of a governmental campaign to cut oil imports by promoting the use of ethanol for fuel. This sign carries two cautions: "do not mix with petrol, and do not use in unconverted engines" (Library 97).

These efforts may also reflect the culture's tendency toward "uncertainty avoidance" (see Table 1); in Hofstede's research, a high score reflects a culture's implementation of many societal rules to counteract the uncertainties that life creates. Essentially, the laws were put in place by the Brazilian government to ensure that ethanol was successful in the country—thus reducing the uncertainty of the venture. For a time, this caused ethanol to be everywhere in Brazil ("A Tankful" 1). However, in the 1990s, the ethanol industry suffered due to the increasing profitability of the production of refined sugar. The ethanol industry was almost dead until the introduction of flex-fuel cars that persuaded Brazilians to give ethanol a second try ("A Tankful" 1). In this way, the popularity of ethanol (and also biofuels) offered a way to rescue the entire industry in Brazil (Webber 2). Currently, Brazil's government still provides a needed infrastructure to support the use of alternative fuels. Today, approximately 70% of new cars sold in Brazil have "flexible" engines that can run on either ethanol or gasoline (Webber 1).

Similarly, in the United States, the view of alternative fuels is also perceived in a positive manner. Many farmers across the country are counting on the adoption of corn-based ethanol as the key to improving the situation of local farming economies. A farmer in one such small community in Michigan, William Schumacher, stated in a recent interview, "For a corn grower, ethanol provides a great opportunity for additional farm income." Many farms in the United States face flooded markets and lower profit margins on the sale of their crops. Small-scale and individually-owned family farms are affected the most by the declining farm market. Many of these small farmers reluctantly sell the frontage of their property (the portion of the cropland that is closest to a roadway) in order to generate enough revenue to keep their farms operating for another year (see Figure 3).



Figure 3: Picture of a representative sample of frontage development occurring in the Midwest. Photo by author.

The adoption of corn-based ethanol would translate into higher prices and profits for all corn growers across the country; many farmers are placing their bets and their futures upon its success. In many rural areas scattered throughout the country, farmers are eagerly constructing and operating cooperative ethanol plants to assist isolated rural markets (see Figure 4).



Figure 4: A cooperative ethanol production facility being developed in the Midwest, in Caro, Michigan. Photo by author.

However, the government of the United States does not seem to share the same commitment toward alternative fuels. Unlike Brazil, which facilitated the transition to ethanol with laws and incentives, the United States Government has not enacted legislative measures of a similar nature. For instance, there is a lack of incentives for automotive companies to manufacture flex-fuel and/or alternative fuel vehicles; without a great number of cars to fuel with ethanol, the industry remains in its infancy. Currently, “only about 1% of U.S.

vehicles can use gasohol with 85% ethanol” (Donlan 62).

Also, there is a lack of mandates to require alternative fuels at gas stations around the country. This lack of accessibility to the average consumer hinders the general adoption of alternative fuels. Only in some states where agriculture is a large part of the economy are alternative fuels widely available. For example, the state of Minnesota, one of the main areas for the production of sugar beets in the Midwest, is the only state to make E-85 fuel (a fuel that is 85% ethanol and 15% gasoline) widely accessible to its residents (Jacobs 2).

Resulting Levels of Adoption

Despite the positive perceptions of alternative fuels in both Brazil and the United States, the countries have accepted these fuel alternatives at different rates. With Brazil, the country “once imported 80 percent of its crude oil; now, it expects to be self-sufficient in a few years. Today, 40 percent of all the fuel Brazilians pump into their vehicles is ethanol. . . . The government requires that all fuel sold within the country contain at least 25 percent ethanol” (Brandon 1).

Brazil’s ability to generate large quantities of ethanol in a manner that is economically productive has also fueled its rapid adoption of ethanol as a main fuel source. Overall, “It only costs 68c/gal to produce ethanol in Brazil (using sugar), while it costs \$1.05-\$1.80/gal using corn in the US” (Gantz 1). This difference is due to the fact that “[t]he energy requirement for converting sugar into ethanol is about half that for corn”—corn being the main source for ethanol in the United States (Jacobs 1). Brazil can also produce biofuel more cheaply than Europe can with sugar beets (“Brazil: After” 1). Brazil estimates that “American ethanol costs 50% more to make than theirs, European ethanol 150%; their stuff, they claim, became competitive with petrol, at pre-tax prices, in 2002” (“Stirrings” 4). “Industry executives boast that the country can turn a profit from ethanol as long as crude oil prices are above \$35 a barrel” (“Brazil Tightens” 1). Because of the profitability of the industry, Brazil expects “to make some 16 billion litres of ethanol this year. . . . By 2010, their state oil company, Petrobras, hopes to be exporting 8 billion litres a year” (“Stirrings” 4).

Alternative fuel adoption has been a success in Brazil also because of its national economic benefits. Because of the cheap production methods of the sugar-based ethanol, “ethanol is up to 55% cheaper at the pump in Brazil than regular gasoline” (“Tankful” 1).

Because of these lower prices, Adermario Araujo, chief agronomist of the Agrovale Sugar Company in Brazil, said, “Now we cannot only supply our own motorists, but earn money from exports” (“A Nation” 1). In addition, by incorporating ethanol into the nation’s fuel supply, “Brazilian ethanol consultant Plinio Nastari said, ‘[t]he substitution of gasoline with ethanol has saved a considerable amount of wealth to Brazil.’ Specifically, forgoing gasoline imports between 1976-2004 saved Brazil U.S.\$60.74 billion” (qtd. in Gantz 1). Due to these savings in fuel for the country of Brazil, coupled with the growing demand for alternative fuels, “[b]illions of investor dollars are flowing into Brazil’s ethanol sector, and the country’s rural economies have received significant benefits” (Brandon 1).

In contrast, the United States is not in a position where alternative fuel production comes at such a cheap price as in the country of Brazil. The United States does not possess Brazil’s resources of cheap labor supplies, plentiful sugar cane crops, and strong governmental motivation, which enabled that country to make the production of alternative fuels profitable. The U.S. has yet to prompt enough innovation for the process of alternative fuel production to be cost-effective. Currently, “if ethanol prices were to drop below \$2.35 a gallon, it would not be profitable”—as opposed to the country of Brazil which can produce ethanol for 68 cents a gallon (Jacobs 3). With the prices of ethanol hovering around at least \$2.35 per gallon, it is more economical for the American consumer to purchase regular gasoline at approximately \$2.25 per gallon. More incremental innovations are needed in the United States to turn the process of producing either ethanol or biodiesel into a profitable investment. One method to reduce the cost of alternative fuel production is to change the type of feedstock (the material used to make the fuel). However, “Corn is currently the least-cost feedstock available for ethanol production” (Jacobs 3). At the present time, if those in the United States were to produce their fuel from sugar—like Brazil—the cost in the U.S. would be higher because “[e]thanol from sugarcane or sugar beet feedstocks costs twice as much” (Jacobs 3) (see Table 2).

Estimated Ethanol Production Costs		
Feedstock	Total Costs per Gallon	Processing Costs per Gallon
Corn (wet milling/dry milling)	\$1.03/1.05	\$0.63/0.52
Raw Sugarcane	2.40	0.92
Raw Sugar Beets	2.35	0.77

Molasses*	1.27	0.36
Raw Sugar*	3.48	0.36
Refined Sugar*	3.97	0.36

Table 2: Comparison of the production prices for ethanol production in the United States (adapted from Jacobs 7).

* indicates exclusion of transportation costs

Because of these costs, “there is no commercial production of ethanol from sugarcane or sugar beets in the United States”; instead “97 percent of ethanol is produced from corn” (Jacobs 1). Once the production of alternative fuels is seen as a profitable business endeavor, the technology will be more likely to be seen as worthy of mass adoption (see Figure 5).



Figure 5: The fall harvest of corn crops in the United States might fuel new hopes for the future of farming as well as the future of the environment. Photo by author.

Another issue concerning ethanol and cost arises when one considers the consequences of higher corn prices. If the American government passed legislation to mandate the strict use of corn-based ethanol, the price for corn would dramatically increase. This outcome is obviously beneficial for all corn producers, but there is a hidden negative consequence for consumers. The increase in corn prices also translates into increased prices for food. Americans will be called to balance their appetite for sustainable energy with their hunger for food. Corn is used as a key ingredient in a variety of consumer foods ranging from breakfast cereals to soft drinks. In addition, corn is crucial in the production of beef, pork, poultry, milk, and eggs (Donlan 62). In essence, the increase in corn prices could inevitably increase the price of almost all varieties of food (see Figure 6).



Figure 6: Corn is an important ingredient in many commercially produced foods as well as in many animal feeds. Photo by author.

Another factor impacting the rate of adoption of alternative fuels in the United States is the degree of incentive provided by the government. In Brazil, the government provides numerous incentives while ensuring the production and availability of vehicles that utilize alternative fuels. The United States Government does not provide similar benefits. Overall, governmental support for biofuels has not been especially strong in the U.S., while arguments ensue regarding which blend of biofuels will best achieve a sustainable future (Aronow 4). Even though a number of farming groups have expressed the need for governmental help in transitioning a nation from gasoline dependency to alternative fuel independence, little assistance has been provided. For example, “The American Sugar Alliance, an association of beet and cane sugar producers, has stated that the government would need to step in to stimulate a sugar-to-ethanol industry” (Jacobs 6). So far, the generalized goal of the U.S. government is to stipulate that “2% of motor-fuel consumption should be biofuel by 2005, and 5.75% by 2010” (“Stirrings” 3).

Even now, when a fuel that is 85% ethanol and 15% gasoline—named E-85—is available on the U.S. market, the government does not put forth measures to ensure that Americans in each state have access to this fuel. In fact, “14 states have absolutely no availability” of E-85 fuel (Brandon 1). More specifically, “only about 700 gas stations in the entire country sell 85% ethanol fuel” (Donlan 62). In order for the use of alternative fuels to flourish in the United States, “Congress needs to enact measures to facilitate

development of an infrastructure to make flex fuels available everywhere” (Brandon 2).

The final factor affecting the rate of alternative fuel adoption in the United States is the availability of such fuels. If the U.S. government were to declare that as of tomorrow the country is to use only biofuels, it would be difficult for the country to meet its own energy needs—both in terms of money and of supply. In 2006, the “U.S. ethanol prices averaged \$3.85/gallon across the nation” (Ngo 1). Converting to the use of strictly E-85 fuel would create supply constraints (“Stirrings” 1). In contrast, Brazil, which can more than adequately supply its citizens with enough alternative fuels to meet all of their transportation needs, has the appropriate infrastructure and potential production capacity to meet the demands upon it. Ironically, the U.S. would probably have to import ethanol from Brazil in order to meet its energy needs—as well as the cars needed to run on the fuel. The necessary imports would threaten the domestic production of alternative fuels and vehicles. The possibility of “a strong showing from Brazil in the domestic market threatens the U.S. producers who are now investing several billions of dollars to develop new plants” (Ngo 1).

Conclusion

Agrarian cultures in both Brazil and the United States have impacted the difference in the levels of alternative fuel adoption in these countries. From a historical perspective, colonial Brazil was molded into a plantation economy devoted to the production of sugarcane, creating the essential infrastructure as well as the social culture to develop large-scale ethanol production in the 21st century. This colonial legacy served to foster a strong degree of agricultural dependency and cheap labor necessary for the nation to promote and produce alternative fuels. These same factors created a generally positive outlook not only for the success of alternative fuels, but for improvement in the economic conditions of the nation as a whole. Because of this perception, the Brazilian government has put forth measures to reduce the cost of ethanol production and created the support services needed for a nation that runs on ethanol.

American agriculture has not gone along the same path as Brazil. The diversity of crops and the practice of individual land ownership promoted the concept of individualism as the key to economic success. The legacy of this perception was furthered by the introduction of mechanization, which drastically decreased the number of farming families necessary to

produce food for the nation. Subsequently, many American farmers began migrating to the urban centers of the country to accept non-farm employment as a means of ensuring their own economic survival. These migrations began a disconnect from rural life and the rural economy. Today, the focus on individual needs of the 75 percent of Americans in urban settings has offset the economic needs of the individuals living in rural areas. Despite the positive outlook of farmers toward ethanol, the American government and the mass populace do not wholly share this vision. Also, production costs, lack of governmental incentives, and lack of alternative fuel availability have contributed to the general lack-luster perception of alternative fuels in the United States.

Overall, the fate of alternative fuels in both cultures has been influenced by geography, government, and history. The success of alternative fuels in the United States will largely depend on change in governmental legislation and our cultural perspectives.

Works Cited

“Ambitious Aims for Brazilian Ethanol.” Agra Europe 2158 (27 May 2005): M/5. InfoTrac One File. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

Aronow, Louisa. “Fueling Brazil’s Future.” Americas 56. 6 (Nov./Dec. 2004): 46-52. Proquest. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://proquest.umi.com>>.

Brandon, Hembree. “Brazil Sets Pace on Alternative Fuels.” Delta Farm Press (26 Oct. 2005). InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

“Brazil.” The World Book Encyclopedia. Vol. 2. 2004 ed.

“Brazil: After Leading Efforts to Produce Ethanol from Sugar Cane for Decades, President Luiz Inacio Lula Says the Country is Now Looking to be at the ‘Leading Edge of Biodiesel Production’ within a Decade.” Oil & Fats International 22.1 (Jan. 2006): 13. InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

“Brazil Tightens Control Over Ethanol Supplies.” Petroleum Economist. 73.9 (Sept. 2006): 37. InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

Callahan, John. “Chaos, Complexity and Possibility: The Historical Frequencies of Ralph Waldo Emerson.” Black American Literature Forum 11.4 (Winter 1977): 130-138. JSTOR. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 24 May 2006 <<http://links.jstor.org>>.

De Bilj, H.J. and Peter O. Muller. Geography: Realms, Regions, and Concepts. 11th ed. Hoboken: John Wiley & Sons, 2004.

Donlan, Thomas. “The Bad Brazilian Example.” Barron’s. 25 Sept. 2006: 62.

Fausto, Boris. A Concise History of Brazil. Trans. Arthur Brakel. Cambridge: Cambridge University Press, 1999.

Gantz, Rachel. “Sugar-Based Ethanol Production Seen On Track for Global Expansion.” Global Refining & Fuels Report 9.15 (20 Jul. 2005). InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

Geert Hofstede Cultural Dimensions. ITIM International. 22 Nov. 2006 <http://www.geert-hofstede.com/hofstede_brazil.shtml>.

Herrera, Stephan. “Brazil’s Bounty.” Technology Review 109.3 (Jul./Aug. 2006): 28. InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

“If Brazil Can Do It . . . Why Can’t We?” Pro Farmer 34.18 (6 May 2006): 3. InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

Jacobs, James. “Ethanol From Sugar: What Are the Prospects for U.S. Sugar Co-ops?” Rural Cooperation 73.5 (Sept./Oct. 2006): 25-30. InfoTrac OneFile. Melvin J. Zahnnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.

Lewis, Ferris E. Michigan Yesterday and Today. 9th ed. Hillsdale: Hillsdale Educational Publishers, 1980.

Lewis, Kenneth E. West to Far Michigan: Settling the Lower Peninsula, 1815-1860. Lansing: Michigan State University Press, 2002.

Library of Nations: Brazil. Amsterdam: Time-Life Books, 1986.

- “A Nation that Runs on Sugar.” Farmers Weekly (14 Apr. 2006): 40. InfoTrac OneFile. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.
- Ngo, Peter. “Brazilian Ethanol Headed to the U.S.” World Refining & Fuels Today (14 June 2006). InfoTrac OneFile. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>
- Page, Joseph A. The Brazilians. Reading: Addison-Wesley, 1995.
- Schumacher, William. Personal Interview. 26 Nov. 2006.
- Somoggi, Laura. “Brazil.” Technology Review 108. 4 (Apr. 2005): 44. FirstSearch. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 12 Oct. 2006 <<http://0-firstsearch.oclc.org>>.
- “Stirrings in the Corn Fields—Biofuels.” The Economist 375.8426 (14 May 2005): 71. InfoTrac OneFile. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.
- “Sugar Cane.” The World Book Encyclopedia. Vol. 20. 2004 ed.
- “A Tankful of Sugar.” The Economist 376: 8445 (24 Sept. 2005): 79. InfoTrac OneFile. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.
- “United States.” The World Book Encyclopedia. Vol. 20. 2004 ed.
- Webber, Jude. “Fueling Progress: Pioneered by Brazil, Green Gasoline Initiatives are Gaining Ground Even in Major Oil-Producing Countries like Mexico and Venezuela.” Latin Finance 181 (Oct. 2006): 17-19. InfoTrac OneFile. Melvin J. Zahnow Library. Saginaw Valley State University. Saginaw, MI. 7 Nov. 2006 <<http://find.galegroup.com>>.