



Promoting the Sustainability of Biofuels in America: Looking to Brazil

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ARTICLE

**PROMOTING THE SUSTAINABILITY OF BIOFUELS IN
AMERICA: LOOKING TO BRAZIL**

*By: Julia Johnson**

“We stand now where two roads diverge. But unlike the roads in Robert Frost’s familiar poem, they are not equally fair. The road we have long been traveling is deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster. The other fork of the road — the one less traveled by — offers our last, our only chance to reach a destination that assures the preservation of the earth.”
— Rachel Carson, *Silent Spring*

I. Introduction

Many Americans today would struggle to envision the United States (“U.S.”) completely independent from foreign oil. The U.S. is so intertwined with its foreign oil interests that debates over the U.S.’s continued reliance on foreign oil now pervade the country’s political, economic, and national security agenda. Calls for increased energy independence¹ and a transition to a green economy have largely failed to materialize.² Moreover, the U.S.’s economy remains stagnant in the wake of the 2008 recession, leaving

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¹ *Final Staff Report of the Select Committee on Energy Independence and Global Warming*, H.R. REP. NO. 11-709, (2011) (statement of Edward of J. Markey) (stating that “[o]ther countries are taking the lead in clean energy and the United States must act now if it is to remain competitive in this rapidly developing global market.”).

² Matthew L. Wald & Edmund L. Andrews, *Call to Cut Foreign Oil is a Refrain 35 Years Old*, N.Y. TIMES, Jan. 31, 2006, at A16.

policymakers struggling to revive America's prosperity. Perhaps then, it is ludicrous to strive for an increased role for alternative energy sources, which so far have failed to garner widespread public support and remain highly partisan.³ Nonetheless, installing innovative energy policies has become increasingly important as the U.S. stands at a crossroads.

Previous attempts at incorporating biofuels into energy legislation have failed to experience widespread success because the U.S. has not adequately incentivized consumers to purchase biofuel blends. Notably, the U.S. has not sufficiently promoted the competitiveness of biofuels in the marketplace, thereby limiting their long-run viability.⁴ While the U.S.'s policies remained targeted at subsidizing producers, Brazil's policies place a greater emphasis upon creating and maintaining ethanol demand.⁵ Due to this approach, Brazil's biofuels framework has now become a model for emulation.⁶

³ See *Letter to Congress from Secretary Jacob J. Lew*, U.S. DEP'T OF TREASURY (May 31, 2013) (warning of consequences of the failure to raise the debt ceiling).

⁴ See *NREL Highlights 2012 Utility Green Power Leaders: Top 10 Programs Support More Than 4.2 Million MWh of Voluntary Green Power*, NAT'L RENEWABLE ENERGY LAB (June 5, 2013) (detailing alternative energy providers and price markup over conventional fuels).

⁵ See Nancy I. Potter, *How Brazil Achieved Energy Independence and the Lessons the United States Should Learn from Brazil's Experience*, 7 WASH. U. GLOBAL STUD. L. REV. 331, 346–7 (2008).

⁶ ROLAND A. JANSEN, *SECOND GENERATION BIOFUELS AND BIOMASS: ESSENTIAL GUIDE FOR INVESTORS, SCIENTISTS AND DECISION MAKERS* 159–60 (2013) (stating “Brazil is considered to have the world's first sustainable biofuels economy and be the biofuel industry leader, a policy model for other countries, and its sugarcane ethanol ‘*the most successful alternative fuel to date*’”) (emphasis in original).

For the U.S.'s biofuels policies to be more effective, the nation must employ better consumer-side factors and devise policies around promoting biofuels' ability to compete with conventional fuels. Consumer-side factors include biofuels' accessibility and pricing, as well as the ease and attractiveness of purchasing alternative energy-powered vehicles. As shall be discussed, the U.S.'s initiatives have neither been aggressive enough, nor sufficiently comprehensive, to enable the U.S. to mirror Brazil's success.

This article will review the factors that have limited the efficacy of the U.S.'s biofuels initiatives, as compared to Brazil. First, a background of Brazil's ethanol framework will be provided. Second, the U.S.'s biofuels policies will be reviewed. Third, the factors reducing the success of the U.S.'s policies, as compared to those policies in Brazil, shall be considered. Finally, recommendations will be set forth describing how the U.S. can more effectively incorporate biofuels into its energy framework.

II. Background

A. Energy Policy in Brazil

By taking a multi-faceted approach that integrates supply-side and demand-side considerations, Brazil's biofuels program has remained viable for the past thirty years.⁷ Furthermore, Brazil's continued efforts to promote and cultivate ethanol have also played a vital role in fostering the nation's energy independence, though increased domestic oil production has been employed as a corresponding strategy.⁸

Broadly, there have been several key government initiatives attributed to ethanol's current success. Specifically, Brazil has: (1) generated and maintained consumer demand for alternative fuels;⁹ (2) artificially reduced the price of ethanol for consumers;¹⁰ (3) developed infrastructure supports, including ensuring that consumers have ready access to fueling stations selling ethanol;¹¹ (4) effectively utilized its natural opportunities for expanded sugarcane ethanol production as a

⁷ Potter, *supra* note 5, at 345.

⁸ *Id.* at 334 (stating "following the 1973 oil crisis, Brazil adhered to a two-prong strategy of increasing domestic oil production through the state-owned oil company Petrobras and decreasing petroleum demand by developing sugarcane-based ethanol as a viable alternative").

⁹ David N. Cassuto & Carolina Gueiros, *The Evolution of Brazilian Regulation of Ethanol and Possible Lessons for the United States*, 30 WIS. INT'L L. J. 477, 488 (2012).

¹⁰ Sergio Barros, *Brazil: Biofuels Annual*, U.S. DEP'T AGRIC. FOR. AGRIC. SERV. (2010), at 4 (providing that "the government set a 65 percent price ratio (later increased to 67 percent) between hydrated ethanol (E100) and gasoline prices at the pump based on the energy power both fuels").

¹¹ Potter, *supra* note 7, at 337 (stating that "[o]ver twenty-nine thousand filling stations across the country are equipped with ethanol pumps, which enables the market to function and allows consumers to choose equally between ethanol and gasoline").

centerpiece for its biofuels program;¹² and, (5) created incentives for private investors, who otherwise may have been deterred by unstable or tepid market demand, to engage in research and development within the industry.¹³ Consequently, increasing consumer demand for ethanol has promoted its long-term sustainability by fostering continued production and development.¹⁴

The history of Brazil's ethanol policies may be broken down into four phases. Phase 1 comprises the initiation of *Pró-Álcool* beginning in 1975. Phase 2 comprises the period beginning in mid-1979 whereby Brazil strengthened and refined its ethanol targets. Phase 3 is characterized by deregulation and a decline in ethanol production. Phase 4 begins in 2003 and comprises the beginning of widespread use of flex-fuel vehicles (FFVs) in the nation.

¹² *Id.* at 348.

¹³ Barros, *supra* note 10, at 5, 7 (noting the role of the private sector).

¹⁴ *See id.* at 7.

1. PHASE 1

Phase 1 of Brazil's biofuels program began on November 14, 1975, when Decreto No. 76.593 launched the beginning of *Pró-Álcool* in response to the 1973 foreign oil crisis.¹⁵ Although Brazil had previously attempted a variety of initiatives to encourage biofuel use, *Pró-Álcool* marked a substantial turning point in Brazil's energy policy by requiring that ethanol be mixed into conventional fuels, thereby merging the sugarcane and fuel industries.¹⁶

Decreto No. 76.593 lays out the regulatory framework of *Pró-Álcool* (also referred to herein as the National Alcohol Program).¹⁷ In its early phases, the National Alcohol Program was overseen by the National Commission on Alcohol (hereinafter "Commission"), which was comprised of representatives from the Ministries of Finance, Agriculture, Industry and Trade, Mines and Energy, Interior, as well as the Planning Secretariat of the Presidency of the Republic.¹⁸ A key

¹⁵ National Alcohol Programme (PROALCOOL), Decreto No. 76.593 de 14 de Novembro de 1975, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 14.11.1975 (Braz.) [hereinafter Decreto No. 76.593].

¹⁶ James Bixby, *The 2005 Energy Policy Act: Lessons on Getting Alternative Fuels to the Pump from Minnesota's Ethanol Regulations*, 26 WASH. U. J. L. & POL'Y 353, 359-60 (noting that, in response to the 1973 oil crisis, among other initiatives, the Brazilian government required gasoline to contain at least 10 percent ethanol); see also Vanessa M. Cordonnier, *Ethanol's Roots: How Brazilian Legislation Created the International Ethanol Boom*, 33 WM. & MARY ENVT. L. & POL'Y REV. 289, 296-97 (2008).

¹⁷ For purposes of this paper, *Pró-Álcool* and National Alcohol Program are used synonymously.

¹⁸ Decreto No. 76.593, (1975), art. 3. Please note that the Commission was replaced in 1979 by the National Council of Alcohol, though the Council inherits these responsibilities. See also Decreto No. 83.700 de 05 de Julho de 1979, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 5.7.1979 (Braz.) [hereinafter Decreto No. 83.,700], art. 4.

role was conferred upon the Commission, that of creating biofuel initiatives and considering proposals for revising the Program's framework.¹⁹ The Commission also devised policies that directly and indirectly helped expand ethanol production.²⁰ For example, the Commission worked to formulate a criterion that best determined where to place ethanol production facilities geographically.²¹ Similarly, the Commission developed an annual schedule specifying the appropriate use for a variety of types of biofuels.²²

Among other initiatives, early legislation notably created the minimum blend- requirements for ethanol in fuel, which demand that a certain minimum percentage of ethanol must be mixed into gasoline prior to sale, and remains in place today. In response to supply fluctuations and other market factors, the Ministerio da Agricultura, Pecuaria e Abasecimento ("MAPA") received the responsibility to periodically alter the minimum blend requirements.²³ Furthermore, throughout this period, the Instituto do Acucar e Alcool ("IAA")

¹⁹ Decreto No. 76.593 (1975).

²⁰ *Id.*

²¹ *Id.* When determining where an ethanol production facility will be located, the Commission considers factors including (i) reducing income disparities within a region, (ii) availability of resources, (iii) costs of transportations, as well as (iv) production needs of the unit. *Id.*

²² *Id.* Decreto No. 83.700 develops factors that the Commission must consider when reviewing the Alcohol Program's framework, including (i) economic production, (ii) investment levels, (iii) production factors availability, (iv) where consumption is located, (v) transportation costs, (vi) road infrastructure and other distribution issues, as well as (vii) income disparities within a region. Decreto No. 83.700, (1970), art. 4.

²³ See Cassuto & Guerios, *supra* note 9, at 490. See Portaria No. 143/2007/MAPA, Article 1, de 29 de Junho de 2007, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.), Portaria No. 7/2010/MAPA, Article 1, de 12 de Janeiro de 2010, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.), Portaria No. 678/2011/MAPA, de 1 de Setembro de 2011, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] Braz.).

controlled the price of ethanol; the IAA helped to promote price parity between ethanol and sugar, and subsidized the price of ethanol relative to gasoline.²⁴ During this time, the IAA subsidized the price of ethanol for consumers so that its price remained consistently 59% of the price of gasoline.²⁵

Brazil also encouraged modernization of production methods²⁶ and redevelopment of existing idle sugar distilleries.²⁷ Brazil's government banks, including Banco Nacional do Desenvolvimento Economico e Social, Banco da Amazônia, Banco do Brasil, and Banco do Nordeste do Brasil, assisted with funding for investment in ethanol production.²⁸ Similarly, the National Monetary Council helped to fund and develop projects to spur production in regions that traditionally had little ethanol production.²⁹ Coupled with government funding and support, Brazil also promoted ethanol's viability on the commercial market by developing an ethanol distribution system to facilitate its sale at petroleum companies.³⁰ Even more, Brazil encouraged private investment in sugarcane ethanol production by dispersing over \$4.9 billion in subsidized government loans with interest rates that were below the nation's inflation levels.³¹

²⁴ Decreto No. 76.593, *supra* note 15, art. 8; Decreto No. 80.762 de 18 de November de 1977, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] 18.11.1977 (Braz.), art. 8 (amending Decreto No. 76.593).

²⁵ Decreto No. 76.593, (1975), art. 8; *see also* Michael McDermott, Marcio Cinelli, Denise J. Luethge & Philippe Byosiere, *Brazil and Biofuels for Autos: A Model for Other Nations*, 2 GSTF BUS. REV. 162 (Mar. 2013).

²⁶ *Id.* at Art. 2.

²⁷ *Id.*

²⁸ *Id.* at Art. 5(a).

²⁹ *Id.* at Art. 5(b)§1.

³⁰ *Id.* at Art. 7.

³¹ Renato Guimarães Jr. & Bruce B. Johnson, *Legal Implications of Biomass Energy: The Case of Brazil's Alcohol Program* 3–4 (São

Many of the policies encompassed within *Pró-Alcool* have been refined or expanded since the initial authorizing legislation was devised. Notably, in 1978, Decreto No. 82.476 established a reimbursement plan as a way to encourage investment by ethanol producers.³² Similarly, additional infrastructure supports were also developed. For instance, in 1979, through government assistance, initially about 300 ethanol pumps were outfitted at gas stations and storage tanks were built to store ethanol in between locations where the ethanol was being produced and consumed.³³

Moreover, in 1979, Decreto No. 83.700 further refined the National Alcohol Program.³⁴ Expanding membership and regulatory oversight of the Program, Decreto No. 83.700 abolished the Commission and created the National Council of Alcohol (“Council”).³⁵ The Council is comprised of former members of the Commission, as well as representatives from the Ministries of Transport and Labor, representatives from the National Confederation of Agriculture, Trade, and Industry, and the Technological Affairs Deputy Chief of Staff of the Armed Forces.³⁶ The Council inherited the Commission’s responsibilities and has the authority to develop criteria to help determine ethanol market prices, as well as other financing conditions.³⁷

In conclusion, Phase 1 was marked by the development of a number of initiatives to spur investment, as well as the creation of minimum blend requirements

Paulo Conference on the Law of the World. Work Paper, 1981). *See also* McDermott et. al., *supra* note 25.

³² Decreto No. 82.476, de 23 de Outubro de 1978, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 23.10.1978 (Braz.).

³³ Cordonnier, *supra* note 16, at 297.

³⁴ *See* Decreto No. 83.700 (1979).

³⁵ *Id.* at Art. 4.

³⁶ *Id.* at Arts. 2–6.

³⁷ *See id.* at Art. 2.

and the beginning of significant price subsidies for ethanol.

2. PHASE 2

Motivated by the 1979 Middle East oil shocks, Brazil responded by reinvigorating its ethanol policies.³⁸ Expanding upon early legislation, Phase 2 heightened ethanol-blend requirements³⁹ and, during this time, on average required that ethanol constitute roughly 22% of conventional fuel blends.⁴⁰ Moreover, Brazil also pushed automobile makers to redesign vehicle engines to more effectively run on ethanol.⁴¹ In 1982, Brazil set forth an objective that required automobile makers to produce and retail 500,000 ethanol-powered vehicles before the year's end.⁴² To further expand ethanol production in anticipation of heightened demand, the government created new financial incentives that encouraged the creation of new ethanol distilleries.⁴³

In addition to its production-side initiatives, the Brazilian government also worked to promote consumer confidence in ethanol's quality as compared to gasoline.⁴⁴ For instance, in 1981, as a way to promote transparency surrounding ethanol products to consumers, Brazil required that fueling stations affix "direct-reading, temperature-corrected hydrometers" at

³⁸ Cassuto & Gueiros, *supra* note 9, at 484.

³⁹ Guimarães & Johnson, *supra* note 31.

⁴⁰ See e.g., Portaria No. 144/1984/MAPA, Article 1, de 21 de Agosto de 1984, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.).

⁴¹ Cordonnier, *supra* note 16, at 298.

⁴² *Id.* at 302. Please note these vehicles were not the FFVs as will be later discussed.

⁴³ *Id.*

⁴⁴ Cassuto & Gueiros, *supra* note 9, at 484–85.

each ethanol dispenser that would “allow the consumer himself to verify the quality of the product.”⁴⁵

Brazil’s efforts to increase the palatability, accessibility, and affordability of ethanol fuel were largely successful.⁴⁶ The number of ethanol-run vehicles increased dramatically within a few years, and as of 1984, 84% of vehicles sold in Brazil could run on ethanol.⁴⁷

3. PHASE 3

Beginning in 1986 with the demise of Brazil’s dictatorship, Phase 3 is characterized by the deregulation and decrease in support for ethanol production.⁴⁸ These policies resulted in a consequent reduction in ethanol supply.⁴⁹ In 1990, the IAA, which had been controlling ethanol prices, was disbanded.⁵⁰ As the Brazilian government ceased to regulate ethanol, its use as a fuel in vehicles declined dramatically.⁵¹ Ethanol production became subject to market forces, which largely reduced ethanol’s attractiveness.⁵² Consequently, as the century came to an end, it appeared that ethanol would no longer play a prominent role in Brazil’s energy framework.

4. PHASE 4

Beginning in 2003 and continuing to present-day, Phase 4 is notably characterized by the introduction of

⁴⁵ Cordonnier, *supra* note 16, at 302.

⁴⁶ *Id.* at 303.

⁴⁷ *Id.*

⁴⁸ Cassuto & Gueiros, *supra* note 9, at 485.

⁴⁹ *Id.*

⁵⁰ Decreto No. 99.240, de 7 de Maio de 1990, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] DE 7.5.1990 (Braz.), art. 1.

⁵¹ Cassuto & Gueiros, *supra* note 9, at 486.

⁵² *Id.* at 486–87.

flex-fuel vehicles (“FFVs”) in the nation, thereby initiating a dramatic resurgence in the use of ethanol fuel.⁵³ FFVs have become extremely popular among consumers and are now retailed in a variety of makes and models. By 2006, 83% of vehicles sold in Brazil had the capacity to run on either ethanol or gasoline, and this figure had ballooned to roughly 90% by 2009.⁵⁴ Unlike the FFVs sold in the U.S., which can only operate on gasoline or E85,⁵⁵ Brazilian FFVs can operate on any gasoline-to-ethanol combination.⁵⁶ Therefore, by fostering the consumer’s ability to choose which fuel to purchase by quickly comparing the price of ethanol to that of gasoline, FFVs have simultaneously promoted consumer choice and revived ethanol’s competitiveness.⁵⁷ Even more, for those vehicles operating on gasoline, Brazil’s ethanol blend requirements have also remained intact and conventional fuel continues to be blended with ethanol. The mandatory ethanol blend requirement for automobiles varies, but has in recent years wavered between 20% and 25%.⁵⁸

⁵³ *Id.* at 487–88.

⁵⁴ Juscelino F. Colares, *A Brief History of Brazilian Biofuels Legislation*, 35 SYR. J. INT’L L. & COM. 293, 295 (2008).

⁵⁵ *See id.* (noting that “[t]he introduction of ‘flex fuel’ engine technology in Brazil has allowed motorists to safely switch between consumption of either gasoline or ethanol depending on prices at the pump”). E85 is a fuel blend that is 85% ethanol and 15% gasoline.

⁵⁶ Cassuto & Guerios, *supra* note 9, at 487–88; *see also* Jose Goldemberg, *Brazil’s Energy Story: Insights for U.S. Energy Policy*, ASPEN INST. (2013) (noting that FFVs in Brazil “can run on any proportion of ethanol and gasoline, from zero to 100 percent, as they have sensors that can detect the proportion and adjust the ignition electronically”).

⁵⁷ *Id.* at 488.

⁵⁸ *Compare* Portaria No. 143/2007/MAPA, Article 1, de 29 de Junho de 2007, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.), *with* Portaria No. 7/2010/MAPA, Article 1, de 12 de Janeiro de 2010, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.), *and with* Portaria No. 678/2011/MAPA,

Next, although Brazil has not reintroduced the ethanol subsidies and stringent pricing regimes of earlier decades, the nation continues to employ a number of mandates, subsidies, and taxes that help to accommodate ethanol production.⁵⁹ For instance, under the Contribuicao de Intervencao no Dominio Economico (“CIDE”), Brazil imposes higher taxes on gasoline than it does on ethanol.⁶⁰ Likewise, Brazil continues to provide credits for ethanol producers to further spur innovation and investment; over 94% of this funding is applied to capital investments such as machinery and equipment.⁶¹ As a complementary strategy, Brazil has also recently sought to more effectively incorporate biodiesel into its energy framework.⁶² As one example, in 2005, pursuant

de 1 de Setembro de 2011, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] (Braz.) (demonstrating the variability of ethanol requirements between 20 and 25 percent); *see also Country Analysis Briefs: Brazil*, U.S. ENERGY INFO. ADMIN (Feb. 28, 2012) at 5.

⁵⁹ Lei No. 9.478, de 6 de Agosto de 1997, (Braz.) (discussing national energy policy which oversees ethanol production and use). *See also* Lei No. 12.249, de 11 de Junho de 2010, (Braz.) art. 131 (establishing infrastructure incentives); Barros, *supra* note 10 at 6–7 (providing examples of Brazilian government support programs).

⁶⁰ Cassuto & Gueiros, *supra* note 9, at 490 (noting that “the imports and internal sales of gasoline is R\$860 per cubic meter, while ethanol imports and internal sales are charged only R\$37.20 per cubic meter”).

⁶¹ Constanza Valdez, *Brazil’s Ethanol Industry: Looking Forward*, U.S. DEP’T AGRIC. ECON. RES. SERV. (June 2011) at 24.

⁶² Rodrigo Augusto Rodrigues & José Honório Accarini, *Brazil’s Biodiesel Program*, (Dec. 15, 2013), <http://dc.itamaraty.gov.br/imagens-e-textos/Biocombustiveis-09ing-programabrasileirobiodiesel.pdf> (last visited Dec. 15, 2013); *see* Decreto No. 5.297, de 6 de Dezembro de 2004, DIÁRIO OFICIAL DA UNIÃO (Braz.) (implementing the Social Fuel Seal); *see also* Gabriella P.A.G. Pousa, André L.F. Santos & Paulo A.Z. Suarez, *History and Policy of Biodiesel in Brazil*, 35 ENERGY POL’Y 5393, 5393 (2007) (discussing the current biodiesel fuels used in Brazil).

to Lei No. 11.097, Brazil required that at least 5% biodiesel be blended into diesel fuel.⁶³

Phase 4 is also characterized by policies addressing ancillary considerations that can be intertwined with ethanol production, such as promoting development in rural areas, ensuring the profitability of smaller sugarcane ethanol farms, and zoning and environmental considerations. For example, in 2003, Brazil created the National Programme of Biodiesel Production (hereinafter “PNPB”) to encourage increased biodiesel production, especially outside of urban centers.⁶⁴ Similarly, in order to preserve small farmers’ profitability, the Ministério de Desenvolvimento Agrário (“MDA”) created the Selo Combustível Social, which promotes business relationships with small ethanol farmers.⁶⁵ Additionally, Brazil has recently implemented an agroecological zoning plan to expand sugarcane ethanol production, while placing a significant emphasis on mitigating environmental damage.⁶⁶

⁶³ Lei No.11.097, de 13 de Janeiro de 2005, (Braz.) (mandating that at least 5% biofuel by volume be incorporated). The portion of the law cited has been repealed by Law No. 13.033.

⁶⁴ See *National Program for Production and Use of Biodiesel*, MINISTÉRIO DE MINAS E ENERGIA, <http://www.mme.gov.br/programas/biodiesel/menu/biodiesel/pnpb.html> (last visited Nov. 17, 2013) (providing that “[s]ince the launch of PNPB, the private sector is contributing resources, investing in the distribution of fuel, in laboratories, in research, production of raw materials, all thanks to the security of the regulatory environment provided by the regulatory setting goals and creating a legal framework for biodiesel”).

⁶⁵ See generally ANDRE CHAGAS ET AL., *An Application of Dynamic Spatial Panels to Municipalities in the State of Sao Paulo, Brazil*, in ENERGY BIO FUELS AND DEVELOPMENT: COMPARING BRAZIL AND THE UNITED STATES 292 (Edmund Amann et al. eds, 2011); see also Decreto No. 5297, de 6 de Dezembro de 2004.

⁶⁶ Marlon Arraes J. Leal, *The Agro-ecological Sugarcane Zoning in Brazil*, MINISTÉRIO DE MINAS E ENERGIA (Sept. 16, 2010), <https://www.iea.org/media/bioenergyandb>

In sum, the effectiveness of Brazil's biofuels regime can be attributed to its emphasis on all aspects of ethanol's production and sale.⁶⁷

B. History of Biofuel Initiatives

Like Brazil, the U.S. responded to the 1973 foreign oil crisis by enacting legislation to reduce the nation's dependence on foreign oil. However, in seeking to reduce its foreign oil reliance, the U.S. has traditionally focused more upon reducing the nation's overall fuel consumption and less upon increasing biofuels use. Due to this approach, biofuels have not yet experienced comparable success in the U.S. Moreover, though the U.S. has recently taken strides to increase its biofuels initiatives, these policies have been largely aimed at reducing production costs for biofuels producers.

As a response to the sharp spike in oil prices caused by the crisis, Congress passed the Energy Policy and Conservation Act of 1975 ("1975 Act"), which aimed to reformulate U.S. energy initiatives and increase fuel conservation.⁶⁸ Notably, the 1975 Act set forth the Corporate Average Fuel Economy ("CAFE") standards, which created fuel economy requirements for American vehicles.⁶⁹ At present, the CAFE standards, requiring gradual improvements in vehicle efficiency, have played a key role in reducing fuel consumption in vehicles.⁷⁰

iofuels/06_arraes.pdf.

⁶⁷ Sizou Matsuoka, Jesus Ferro & Paulo Arruda, *The Brazilian Experience of Sugarcane Ethanol Industry*, IN VITRO CELLULAR & DEVELOPMENTAL BIOLOGY – PLANT 372, 379 (2009).

⁶⁸ Energy Policy and Conservation Act of 1975, Pub. L. No. 94-163, 89 Stat. 871 (1975).

⁶⁹ *Id.* at § 301.

⁷⁰ Virginia McConnell, *The New CAFE Standards: Are They Enough on Their Own?*, RESOURCES FOR THE FUTURE 1, 29 (2013),

Nonetheless, despite their success in increasing vehicle efficiency,⁷¹ the CAFE standards have not been correspondingly effective in promoting biofuels.⁷² For instance, one of the shortcomings of the CAFE standards is that automobile manufacturers have been able to obtain CAFE credits for selling FFVs in the form of large vehicles and SUVs that in practice nearly always run on gasoline.⁷³

The Energy Policy Act of 1992 (“1992 Act”) was the next major legislation targeted at improving the U.S.’s energy efficiency and increases the authority of the Department of Energy (“DOE”) to oversee alternative fuels use and production.⁷⁴ The 1992 Act contains several provisions specifically devised to increase the use of biofuels and other renewable energy sources. Among other efforts, the Act creates the Alternative Fuel Vehicle Program, which incentivizes research that focuses upon improving engine technology in alternative fuel-powered vehicles.⁷⁵ The 1992 Act also develops production

<http://www.rff.org/RFF/Documents/RFF-DP-13-14.pdf> (noting that the “new reformed CAFE rules would require fuel use and CO₂ emissions by light-duty vehicles to fall by close to 40 percent over the next 15 years”).

⁷¹ U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-07-921, REFORMING FUEL ECONOMY STANDARDS COULD HELP REDUCE OIL CONSUMPTION BY CARS AND LIGHT TRUCKS, AND OTHER OPTIONS COULD COMPLEMENT THESE STANDARDS 3 (Aug. 2, 2007).

⁷² *Id.* at 5.

⁷³ REPORT TO CONGRESS: EFFECTS OF THE ALTERNATIVE MOTOR FUELS ACT: CAFE INCENTIVES POLICY, U.S. DEP’T OF TRANSP., U.S. DEP’T OF ENERGY, U.S. ENVTL. PROT. AGENCY (2002), at *xii*; *see also* U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-07-551T, PASSENGER VEHICLE FUEL ECONOMY: PRELIMINARY OBSERVATIONS ON CORPORATE AVERAGE FUEL ECONOMY STANDARDS 17 (2007) (noting that CAFE credits “may be actually increasing oil consumption among passenger vehicles”).

⁷⁴ *See* Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776.

⁷⁵ *Id.* at § 2023(a)–(c).

incentives for renewable energy sources and alternative fuels, including payment for qualified producers.⁷⁶ More broadly, the Act reduces tax burdens for renewable energy projects.⁷⁷ Similarly, in order to encourage innovation, the Act creates the Renewable Energy Advancement Awards, which provide monetary awards for innovative projects.⁷⁸

Among other initiatives established pursuant to the legislation, DOE's increased regulatory authority under the 1992 Act has led to the development of new programs aimed at improving the viability of biofuels.⁷⁹ For example, in 1993, in response to its heightened authority, the DOE created the 'Clean Cities' program as a way to promote the use of alternative fuels in major cities.⁸⁰ As of 2013, the 'Clean Cities' program is estimated to have reduced petroleum usage by 6.5 billion gallons since its inception.⁸¹

More recently, the Energy Policy Act of 2005 ("2005 Act") reinvigorated attempts⁸² to incorporate

⁷⁶ *Id.* at § 1212.

⁷⁷ *Id.* at § 1205. Please note that "renewable energy" is not limited to biofuels, but may encompass other energy forms such as wind and solar.

⁷⁸ *Id.* at § 1204.

⁷⁹ *Key Federal Legislation: Alternative Fuels Data Center*, U.S. DEP'T OF ENERGY, (Dec. 15, 2013), http://www.afdc.energy.gov/laws/key_legislation.

⁸⁰ *About Clean Cities*, U.S. DEP'T OF ENERGY, (Dec. 10, 2013), <http://www1.eere.energy.gov/cleancities/about.html> (providing that "DOE created Clean Cities in 1993 to provide informational, technical, and financial resources to EPA-regulated fleets and voluntary adopters of alternative fuels and vehicles").

⁸¹ *Clean Cities Goals and Accomplishments*, U.S. DEP'T OF ENERGY, (Dec. 10, 2013) <http://www1.eere.energy.gov/cleancities/accomplishments.html>.

⁸² *See Methyl Tertiary Butyl Ether (MTBE)*, ENVTL PROT. AGENCY, (Dec. 12, 2013) www.epa.gov/mtbe/gas.htm. The 1990 Clean Air Act Amendments set forth the Reformulated gasoline (RFG) program, which demanded an oxygenate requirement for gasoline. However,

alternative fuels.⁸³ Notably, the 2005 Act created the Renewable Fuels Standard (“RFS”), which mandates that a certain volume of ethanol be blended into automobile gasoline.⁸⁴ The RFS originally mandated that, by 2012, 7.5 billion gallons of alternative fuels be mixed into gasoline.⁸⁵ The Energy Independence and Security Act of 2007 (“EISA”) later expanded upon the 2005 Act’s provisions by increasing RFS mandates and setting volume targets for usage of advanced biofuels.⁸⁶

EISA broadened the scope of the RFS to expand its application to diesel fuel and demands use of a variety of advanced biofuels, including cellulosic biofuel and biomass-based fuels.⁸⁷ EISA also raises the RFS mandate to require that 36 billion gallons of renewable fuels be mixed into gasoline by 2022.⁸⁸ The 2013 RFS requires that cellulosic biofuel comprise 0.004% of total U.S. fuels, biomass-based diesel comprise 1.13% of total fuel, advanced biofuel comprise 1.62% of total fuel, and renewable fuel comprise 9.74% of total fuel.⁸⁹ Largely due to the RFS

upon discovering the toxicity of Methyl Tertiary Butyl Ether (MTBE), a key oxygenate, the Energy Policy Act of 2005 removed this requirement and replaced it with the Renewable Fuel Standard. *Id.*

⁸³ Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 [hereinafter EPA 2005].

⁸⁴ *Id.* at § 1501.

⁸⁵ *Id.*

⁸⁶ See Energy Independence and Security of 2007, Pub. L. No. 110-140, §202, 121 Stat. 1492 [hereinafter EISA].

⁸⁷ *Id.*; See *Renewable Fuel Standard (RFS)*, U.S. ENVTL. PROT. AGENCY (Nov. 18, 2013), <http://www.epa.gov/OTAQ/fuels/renewablefuels/>.

⁸⁸ EISA § 202.

⁸⁹ 2013 Renewable Fuel Standards, 78 Fed. Reg. 49,794 (Aug. 15, 2013) codified at 40 C.F.R. pt. 80); see also 2012

Renewable Fuels Standards, 77 Fed. Reg. 1320 (Jan. 9, 2012) (codified at 40 C.F.R. pt. 80). The 2012 Renewable Fuel Standards provide that there must be 10.45 million gallons of cellulosic biofuel, 1.5 billion

mandates, ethanol and other biofuels are currently mixed into roughly 50% of all U.S. gasoline, though most is mixed at 10% ethanol or lower levels.⁹⁰ Nonetheless, because the vast majority of U.S. vehicles are not equipped to run on fuel that is comprised of more than 10–15% ethanol without risking significant engine damage, and thereby encountering what is known as the “blend-wall,” the RFS’s continued expansion may be limited.⁹¹

In addition, the U.S. has also created a variety of tax credits in order to help encourage biofuel use.⁹² For example, in 2004, the Volumetric Ethanol Excise Tax Credit (“VEETC”) was created and fostered the development and production of biofuels through tax incentives.⁹³ The VEETC became one of the major ways by which the U.S. subsidized ethanol until it expired in 2011.⁹⁴ The VEETC provided that, subject to certain restrictions, ethanol blenders could be “eligible for a tax

gallons of biomass- based diesel, 2.0 billion gallons of advanced biofuel, and 15.2 billion gallons of renewable fuel. *Id.*

⁹⁰ Hazardous Liquid Pipelines Transporting Ethanol, Ethanol Blends, and other Biofuels, 72 Fed. Reg. 45002 (Aug. 10, 2007) (to be codified at 49 C.F.R. pt. 452) (stating that “[t]oday, nearly half of all U.S. gasoline contains some ethanol (mostly blended at the 10 percent level or lower)”).

⁹¹ See *EPA Proposes 2014 Renewable Fuel Standards/ Proposal Seeks Input to Address “E10 Blend Wall,” Reaffirmed Commitment to Biofuels*, ENVTL PROT. AGENCY (Dec. 15, 2013), <http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceec8525735900400c27/81c99e6d27c730c485257c24005eecb0!opendocument>.

⁹² American Jobs Creation Act of 2004, § 301, Pub. L. No. 108-357, §301, 118 Stat. 1418, 1459-63, (2004) [hereinafter Jobs Creation Act].

⁹³ *Alternative Fuels Data Center: Expired, Repealed, and Archived Incentives*, U.S. DEP’T. ENERGY, http://www.afdc.energy.gov/laws/laws_expired.

⁹⁴ Zachary M. Wallen, *Far From A Can of Corn: A Case For Reforming Ethanol Policy*, 52 ARIZ. L. REV. 129, 135 (2010).

incentive in the amount of \$0.45 per gallon of pure ethanol . . . blended with gasoline.”⁹⁵ Costing nearly \$6 billion annually, the VEETC garnered widespread criticism that it did not adequately promote advanced biofuels and instead unnecessarily incentivized corn ethanol production.⁹⁶ Among other incentives,⁹⁷ further examples have included the Small Ethanol Producer Credit, which provided 10 cents per gallon to small ethanol producers to offset production costs,⁹⁸ and the Biodiesel Tax Credit, which provided a \$1.00 per gallon tax credit to biodiesel producers.⁹⁹ Similarly, another policy that has been proposed includes taxing the carbon dioxide output on conventional fuels.¹⁰⁰ Nevertheless, many of these initiatives have been allowed to expire amid considerable backlash.¹⁰¹

Moreover, in addition to tax credits, there are working groups and programs already in place¹⁰² that have been created to promote investment in biofuels

⁹⁵ *Alternative Fuels Data Center*, *supra* note 93.

⁹⁶ *See e.g., Let the VEETC Expire: Moving Beyond Corn Ethanol Means Less Waste, Less Pollution and More Jobs*, NAT. RES. DEF. COUNCIL (Aug. 2010), at 1–2 (describing shortcomings of VEETC).

⁹⁷ *See* BRENT D. YACOBUCCI, CONG. RES. SERV., R40110, BIOFUELS INCENTIVES: A SUMMARY OF FEDERAL PROGRAMS, 1–5 (2012) (listing biofuels initiatives).

⁹⁸ Omnibus Budget Reconciliation Act of 1990 § 11502, Pub. L. No. 101-508 (1990) [hereinafter Omnibus Act]

⁹⁹ *See Alternative Fuels Data Center*, *supra* note 95 Jobs Creation Act § 302.

¹⁰⁰ U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-07-713, BIOFUELS: DOE LACKS A STRATEGIC APPROACH TO COORDINATE INCREASING PRODUCTION WITH INFRASTRUCTURE DEVELOPMENT AND VEHICLE NEEDS 22 (2007); *see also* Phil Izzo, *Economists Back Fossil-Fuel Tax To Spur Alternative Energies*, WALL ST. J., Feb. 9, 2007, at A6.

¹⁰¹ YACOBUCCI, *supra* note 97, at 1.

¹⁰² *Id.* at 2-3.

production.¹⁰³ For instance, in 2009, the U.S. created the Biofuels Interagency Working Group to expand and promote the competitiveness of the biofuels market.¹⁰⁴ Likewise, in 2008, the Food, Conservation, and Energy Act created the Biorefinery Crop Assistance Program (“BCAP”), which provides financial assistance for developing biorefineries to produce advanced biofuels.¹⁰⁵ BCAP aims to simultaneously help producers transition to cellulosic energy crop production while promoting economic development in rural areas.¹⁰⁶ On October 21, 2013, USDA announced that the government would provide \$181 million to help fund these initiatives.¹⁰⁷

¹⁰³ See e.g., Production Incentive or Cellulosic Biofuels, 74 Fed. Reg. 52,867 (to be codified at 10 C.F.R. pt. 452) (providing an example of additional incentive).

¹⁰⁴ Biofuels and Economic Development: Memorandum for the Secretary of Agriculture, the Secretary of Energy, [and] the Administrator of the Environmental Protection Agency, 74 Fed. Reg. 21,531 (May 5, 2009) (proposing that the Working Group shall develop “the Nation’s first comprehensive biofuel market development program”).

¹⁰⁵ Food, Conservation, and Energy Act of 2008, Pub. L. No. 110-246, §9009, 112 Stat. 1651, 2089-93 (2008); see also *USD Announces Availability of Funding to Develop Advanced Biofuels Projects*, U.S. DEP’T AGRIC. (Oct. 21, 2013), <http://www.usda.gov/wps/portal/usda/usdamediafb?contentid=2013/10/0195.xml&printable=true&contentidonly=true>.

¹⁰⁶ U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-09-446, BIOFUELS: POTENTIAL EFFECTS AND CHALLENGES OF REQUIRED INCREASES IN PRODUCTION AND USE 48 (2009). (“Under [BCAP], producers would enter into multiyear contracts with USDA to obtain payments of up to 75 percent of the cost for planting and establishing a perennial energy crop”).

¹⁰⁷ See *USDA Announces Availability of Funding to Develop Advanced Biofuels Projects*, *supra* note 105. There, Tom Vilsack, USDA Secretary, stated that “benefits [of BCAP] go beyond reducing our dependence on foreign oil. These biorefineries are also creating lasting job opportunities in rural America and are boosting the rural economy as well.” *Id.*

Thus, like Brazil, some recent U.S. biofuels policies have been motivated by dual aims.

In sum, the U.S. has already undertaken a substantial investment to promote the viability and use of alternative fuels; a report by the U.S. Government Accountability Office (“GAO”) estimated that from 1979 to 2000, about \$11 billion in tax incentives were employed to promote ethanol fuels.¹⁰⁸ However, despite these expenditures, the policies devised by the U.S. have not been as effective as those in Brazil.

III. Comparing U.S. AND Brazilian Policies

Despite a number of similarities, the U.S.’s policies have not been as successful as those in Brazil because they do not consider consumer-side factors to the same extent as do Brazil’s policies.¹⁰⁹ Consumer-side initiatives help to create and sustain market demand, and also encourage private-sector investors to infuse additional resources into research and development.¹¹⁰

¹⁰⁸ Letter from Jim Wells, U.S. Gen. Accounting Office, to Sen. Tom Harkin (Sept. 25, 2000), at 2, *available at* <http://www.gao.gov/archive/2000/rc00301r.pdf>.

¹⁰⁹ CHAGAS ET AL., *supra* note 65, at 292; *see also* Mauricio Antonio Lopes, Agricultural Innovation and Challenges in Promotion of Knowledge and Information Flows in Agrifood Systems in Brazil, OECD (2012).

¹¹⁰ CRAIG A. HART, CLIMATE CHANGE AND THE PRIVATE SECTOR: SCALING UP PRIVATE SECTOR RESPONSE TO CLIMATE CHANGE (2013), at 82-83; McDermott, et. al., *supra* note 25. Moreover, as shall be further discussed, the U.S. has not undertaken sufficient efforts to ensure that biofuels are accessible, nor has the U.S. forced large oil companies and car makers to play a role in spearheading technological and infrastructure changes. For instance, as FFVs have become increasingly popular in Brazil, car makers, including mainstream producers Ford and Toyota, have responded by creating a number of attractive vehicles models and sizes, which has further bolstered the success of Brazil’s biofuels policies.

Additionally, the U.S. and Brazil's policies differ in their extent; Brazil's initiatives have been significantly more stringent and have had a broader application.¹¹¹ Nonetheless, as demonstrated by the number of commonalities between the U.S. and Brazil's biofuels policies, increasing biofuels use can be both viable and sustainable in the U.S.

A. Brazil's ethanol-blend mandates have nearly always been more stringent than the U.S.'s RFS, and biofuels are mixed into a greater proportion of Brazil's conventional fuel supply.

First, Brazil's biofuels policies have had a greater impact because the nation's biofuels mandates are significantly more demanding and are broader in reach than comparable U.S. policies.

The U.S. and Brazil's present-day biofuels policies are facially similar in many regards. Both nations employ a two-track regime for incorporating biofuels into the fuel supply: through biofuel-blend requirements in gasoline and through the sale of FFVs. These policies have both proven effective in ensuring that biofuels are incorporated into each nation's fuel supply¹¹² and guarantee constant demand for these fuels.¹¹³ Moreover, though Brazil's

¹¹¹ Kaylan Lytle, *Driving the Market: The Effects on the United States Ethanol Industry if the Foreign Ethanol Tariff is Lifted*, 28 ENERGY L.J. 693, 695–96 (2007).

¹¹² Constanza Valdes, *Can Brazil Meet the World's Growing Need for Ethanol?*, U.S. DEP'T AGRIC. ECON. RESEARCH SERV. (Dec. 1, 2011), http://www.ers.usda.gov/amber-waves/2011-december/can-brazil-meet-the-world's-growing-need-for-ethanol.aspx#.VS_qI86sTS4 (“As in the U.S., support for consumption of ethanol continues through mandatory blending of ethanol with gasoline”).

¹¹³ See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-11-513, BIOFUELS: CHALLENGES TO THE TRANSPORTATION, SALE, AND USE OF

blend requirements have been comparatively more responsive to supply and price considerations, both the RFS and Brazil's blend requirements are periodically adjusted in response to current needs.¹¹⁴

Nevertheless, Brazil's blend requirements have nearly always been more stringent than those mandated by the RFS. Specifically, while Brazil's ethanol blend requirements have demanded that gasoline be comprised of 11–25% ethanol,¹¹⁵ the RFS has not yet required more than a 10–15% concentration due to concerns of damaging older vehicles' engines.¹¹⁶ Additionally, Brazil's blend requirements extend through a greater proportion of the nation's fuel supply than does the RFS. Whereas biofuels are currently mixed into only about 50% of U.S.

INTERMEDIATE ETHANOL BLENDS (2007), at 2–4; *see also* Op-Ed, *Ethanol's Best Kept Secret – The Brazil Mandate*, U.S. ENVIROFUELS LLC (Jan. 9, 2012) (noting that “approximately 50% of Brazil's motor fuel supply is ethanol as a direct result of ethanol's mandated use”).

¹¹⁴ *See e.g.*, Meghan Sapp, *Brazil May Boost Ethanol Blends to Offset Gasoline Imports*, BIOFUELS DIGEST (June 27, 2012) (raising the ethanol blend requirements to reduce gasoline imports). *Compare* Erin Voegele, *Brazil to Increase Ethanol Blend Level to 25 Percent*, ETHANOL PRODUCER MAG. (Mar. 7, 2013), <http://www.ethanolproducer.com/articles/9628/brazil-to-increase-ethanol-blend-level-to-25-percent> (In 2011, “the 25 percent blend mandate was reduced to 20 percent due [to] a poor cane harvest. The blend level was expected to return to 25 percent once sugarcane production recovered”) with *EPA Finalizes Renewable Fuel Standard for 2013; Additional Adjustments Expected in 2014*, U.S. ENERGY INFO. ADMIN, <http://www.eia.gov/todayinenergy/detail.cfm?id=12531> (stating that “[t]he rule sets a 6 million gallon target for cellulosic biofuels use in 2013, less than half the level of the proposed rule issued in February 2013, and far below the 1 billion gallon target specified in the Energy Independence and Security Act of 2007”).

¹¹⁵ Jansen, *supra* note 6, at 24 (discussing the variability in ethanol blend mandates from 11-25%).

¹¹⁶ *E15: Frequently Asked Questions*, ENVTL. PROT. AGENCY, Dec. 15, 2013, <http://www.epa.gov/otaq/regs/fuels/additive/e15/e15-faq.htm> (noting previous gasoline fuels blended at E10).

automobile fuel,¹¹⁷ gasoline-only fuels are no longer sold in Brazil.¹¹⁸

B. Brazil has encouraged car makers to produce and retail FFVs to a much greater extent, which has increased FFVs' popularity with consumers.

Second, Brazil's biofuels policies have been more successful because policymakers have been more aggressive in encouraging the production and sale of FFVs and comparable models than has the U.S. While Brazil has placed immense pressure upon auto makers to develop FFVs and ethanol-powered vehicles, the U.S. has focused its initiatives on increasing vehicle fuel efficiency. As a result, the U.S. auto industry has not been comparably incentivized to produce FFVs and similar designs. In order to increase the number of FFVs and biofuel-operated vehicles on the road, U.S. policymakers would likely need to impose additional demands on carmakers to develop engines suitable for these fuels.

Brazil's strategy has demonstrated efficacy in two separate instances. First, in the 1980s, Brazil gave the auto industry targets as to the number of ethanol-powered vehicles to be retailed, which rapidly increased the sale of these vehicles.¹¹⁹ Second, since 2003, Brazil has

¹¹⁷ Pipeline Safety: Hazardous Liquid Pipelines Transporting Ethanol, Ethanol Blends, and other Biofuels, 72 Fed. Reg. 45002 (Aug. 10, 2007).

¹¹⁸ Barros, *supra* note 10, at 10 (describing fuel offerings as a "75 percent gasoline and 25 percent ethanol blend" as well as a 100 percent ethanol fuel); *see also* *Statistical Yearbook 2011*, AGÊNCIA NACIONAL DO PETRÓLEO, GÁS NATURAL E BIOCMBUSTIVELS Dec. 16, 2013, http://www.brasil-rounds.gov.br/portugues/anuario_estatistico.asp.

¹¹⁹ Cordonnier, *supra* note 16, at 302.

strongly incentivized the production and sale of FFVs, and has looked to the private automobile sector to play a prominent role in increasing FFVs' attractiveness and palatability among consumers.¹²⁰ As mentioned in Section II, FFVs have become extremely popular with consumers, and automobile manufacturers have created a variety of car models for customers to choose from. By utilizing the automobile industry's ability to redesign and develop ethanol-powered vehicles as a way to promote ethanol use, these efforts have helped to further the viability of Brazil's biofuels program.¹²¹ In both instances, Brazil's efforts to force the automobile industry to produce ethanol-powered vehicles resulted in a dramatic increase in their use within a short period of time, which incidentally also promoted ethanol use.¹²²

In contrast, the U.S.'s policies have not comparably pressured domestic carmakers to produce biofuel-powered vehicles, but instead have focused

¹²⁰ See John Wilkinson, *The Emerging Global Biofuels Market*, 32 REVIEW (FERNAND BRAUDEL CENTER) 91, 99 (2009); see also See Kenneth Rapoza, *Brazil Auto Makers Drive on the Road to Ethanol*, WALL ST. J. (Sept. 10, 2008) ("Everyone in Brazil wants a flex-fuel car," said Angelo Bressan, a biofuels specialist at the Agriculture Ministry. "The auto makers here have helped push ethanol forward, but it's been the consumers who really made the difference," he said. "If these guys don't make flex-fuel cars, they lose market").

¹²¹ *Id.*

¹²² See *id.* The limited number of FFVs in the road helps to demonstrate this discrepancy. Compare *Flexible Fuel Vehicles: Alternative Fuels Data Center*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/vehicles/flexible_fuel.html (last visited Dec. 15, 2013) (noting that there are 10.6 million FFVs in the U.S.), with *Table 1-11: Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances*, BUREAU TRANSP. STAT., http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national_transportation_statistics/html/table_01_1.html (last visited Dec. 15, 2013) (providing that, in 2011, there were 253,108,389 registered vehicles in the U.S.)

more so upon increasing vehicle efficiency.¹²³ Accordingly, under current U.S. policy, U.S. carmakers have little incentive to produce FFVs or other biofuel-operated vehicles, though the auto industry has accommodated the government's demands to design engines for increased fuel efficiency.¹²⁴ The auto industry's responsiveness to increased demands for increased fuel efficiency suggests that a comparable approach could be effectively employed to increase the use of biofuels in U.S. vehicles. Thus, to some degree, the design of today's vehicles is the product of choices made by government regulators. For FFVs and biofuel-powered vehicles to be more widely used, the U.S. would likely need to devise regulatory initiatives that demand domestic carmakers produce these vehicles.¹²⁵

Consequently, by pushing automobile manufacturers to produce FFVs and ethanol-powered vehicles, Brazil has fostered their popularity among consumers. In contrast, U.S. policymakers have not comparably demanded that domestic carmakers produce FFVs or other biofuel-operated vehicles.

¹²³ McConnell, *supra* note 70, at 29. *See also infra* Section II.

¹²⁴ *See* Bill Vlasic & Jaclyn Trop, *Vehicle Fuel Efficiency Reaches a High, Nearing Goal for 2016*, N.Y. TIMES, Sept. 10, 2013, at B3. ("The car companies are under pressure to increase fuel efficiency to meet strict federal [CAFE] standards").

¹²⁵ Moreover, if these vehicles are made more available on the market, recent studies have indicated that consumers will become increasingly willing to purchase these vehicles. *See Consumer Research: What Do Consumers Think About Fuel Retailers and the Future?*, ASS'N FOR CONVENIENCE & FUEL RETAILING (2013), http://www.nacs-online.com/YourBusiness/FuelsReports/GasPrices_2013/Pages/What-Do-Consumers-Think.aspx (noting that 46% of consumers who were considering purchasing a vehicle would consider a non-gas vehicle; likewise, 55% of consumers would consider purchasing a flex-fuel vehicle).

C. While Brazil has mandated ethanol's sale at fueling stations, the U.S. has not undertaken sufficient efforts to ensure that consumers have access to affordable biofuel blends.

Third, Brazil's biofuels policies have been more effective than those of the U.S. because policymakers have devised initiatives to ensure that biofuel blends are accessible to consumers. While the Brazilian government has largely spearheaded efforts to install ethanol pumps at fueling stations, the U.S. has been more willing to allow retailers to make this decision. These differing approaches have caused significant disparities in the number of ethanol fueling stations in each nation.

Notably, Brazil has installed mandates that ethanol be retailed at a number of fueling stations since the 1970s, when it first required that ethanol pumps be installed at fueling stations;¹²⁶ currently, nearly all fueling stations in the nation retail ethanol blends.¹²⁷ As a result of these initiatives, Brazilian consumers who own a FFV or ethanol-powered vehicle are able to readily access and purchase ethanol fuels. On the contrary, the U.S.'s policies have not comparably encouraged that ethanol and other biofuels be accessible at fueling stations. The U.S. has further hindered this effort by failing to impose mandates or targets for the sale of biofuels blends.¹²⁸ Because it is seldom cost-effective to outfit a fueling station with ethanol fuel due to uncertain financial

¹²⁶ Cordonnier, *supra* note 16, at 297.

¹²⁷ Barros, *supra* note 10, at 10.

¹²⁸ Christopher Doering, *Ethanol Makers Face Obstacles to Expanding*, USA TODAY (Dec. 8, 2013) (noting that currently, only about 60 fueling stations sell E15, and about 3,200 fueling stations sell E85).

returns, fueling stations are not likely to install ethanol pumps without government support.¹²⁹

The U.S. already has explored using tax incentives through the Alternative Fuel Station Credit, which subsidized the price of installing biofuel infrastructure. Yet current initiatives have been largely insufficient to dramatically increase the number of alternative fueling stations.¹³⁰ Due to a lack of government initiatives, there are presently only 12,888 fueling stations retailing alternative fuels,¹³¹ as compared to the approximately 160,000 gasoline stations in operation in the U.S.¹³² Due to the weak response to previous initiatives, the U.S. would likely need to create additional tax incentives or impose mandates in order to motivate fueling stations to retail biofuel blends.

Additionally, Brazil has undertaken a much more active role in promoting ethanol's sale at fueling stations by encouraging consumers to purchase ethanol fuel when it is cost-effective to do so.¹³³ In Brazil, a relatively simple

¹²⁹ See Michael Hirtzer, *Analysis: High-Ethanol Gas – Not Coming to a Pump Near You*, REUTERS Nov. 27, 2013, <http://www.reuters.com/article/2013/11/27/us-usa-ethanol-e85-analysis-idUSBRE9AQ1AU20131127>.

¹³⁰ See EPA 2005 § 1342 (creating the Alternative Fuel Station Credit).

¹³¹ *Alternative Fuels Data Center*, U.S. DEP'T OF ENERGY, <http://www.afdc.energy.gov/locator/stations/> (last visited Nov. 23, 2013).

¹³² *Access to Alternative Transportation Fuel Stations Varies Across the Lower 48 States*, U.S. ENERGY INFO. ADMIN. (Apr. 30, 2012), <http://www.eia.gov/todayinenergy/detail.cfm?id=6050>; see GAO-11-513, *supra* note 113, at 13, 25. Demonstrating these infrastructure shortcomings, the U.S. mandated that all government vehicles be transitioned to flexible fuel vehicles (FFVs), yet has been unable to consistently fuel these vehicles.

¹³³ See David Luhnnow & Geraldo Samor, *As Brazil Fills Up on Ethanol, It Weans Off Energy Imports*, WALL. ST. J., (Jan. 9, 2006), available at <http://online.wsj.com/news/articles/SB113676947533241219>.

ratio is employed as a way to indicate to consumers when it is cost-effective to purchase ethanol or vice-versa for their FFVs.¹³⁴ Pursuant to this ratio, consumers are encouraged to purchase ethanol when its cost is 70% of that of gasoline, and revert to conventional gasoline when the cost ratio is higher.¹³⁵

In contrast, in the U.S., the fraction of fueling stations that do retail higher concentrations of ethanol often do not adequately promote these blends or price them competitively. Because biofuels are generally not sold under the conventional producer's brand label, these fuels often do not constitute a major source of revenue for many large producers.¹³⁶ Due to limited marketing, U.S. FFV owners may be unaware of the possible option of choosing a biofuel blend to fuel their vehicles.¹³⁷

Consequently, while Brazil has mandated that fueling stations retail ethanol blends, the U.S. has not undertaken comparable initiatives, which has limited consumer access to biofuels.

¹³⁴ Barros, *supra* note 10, at 32-34

¹³⁵ *Id.* ("The 70 percent ratio between ethanol and gasoline prices is the rule of thumb in determining whether flex car owners will choose to fill up with ethanol (price ratio below 70 percent) or gasoline (price ratio above 70 percent)").

¹³⁶ GAO-07-713, *supra* note 100, at 30 (According to representatives from BP, Chevron, ConocoPhillips ExxonMobile, and Shell Oil Products, "while no stations are prohibited from selling biofuels, none of the companies offer E85 to their stations as a branded product and none of the companies offer biodiesel except where required to by state mandate").

¹³⁷ *Id.*

D While Brazil has carefully monitored the price of ethanol, the U.S.'s policies are producer-oriented and often only indirectly influence the consumer price of biofuel blends.

Next, Brazil's policies have been more successful than those of the U.S. because Brazil has been more influential in dictating the price of ethanol, which has enabled it to be cost-competitive in the marketplace. While Brazil has employed several strategies to ensure that the price of ethanol remains below that of gasoline, the U.S.'s policies often only incidentally reduce the consumer price of biofuel blends. Although the U.S. has imposed a number of tax credits and other subsidies targeted at producers, these initiatives generally have not been directly focused upon lowering the consumer price of biofuel blends as compared to gasoline. Because many of the U.S.'s policies have been aimed at reducing input costs for producers, these policies have fallen short because they do not adequately push the cost-savings on to consumers.

As mentioned in Section II, a key reason for ethanol's long-term success in Brazil has been its cost-competitiveness with gasoline.¹³⁸ While Brazil has created a variety of producer-oriented incentives, these policies play a comparatively smaller role within Brazil's ethanol framework. Instead, Brazil's policies have been focused more so upon improving ethanol's viability in the marketplace, and the government has pursued several different options to ensure that ethanol's price remains attractive.¹³⁹ For instance, in the 1970s, the IAA oversaw the price of ethanol; during this time, ethanol's price was subsidized so that its cost was 59% of

¹³⁸ See *infra* Section II.

¹³⁹ McDermott, *supra* note 25, at 163-64.

that of gasoline.¹⁴⁰ The importance of the price subsidy was demonstrated when its repeal in 1990 brought about a rapid decline in ethanol use across the country.¹⁴¹ Today, even though Brazil has not re-installed price subsidies for ethanol, ethanol's price relative to gasoline remains influenced by tax incentives such as the Contribuicao de Intervencao no Dominio Economico ("CIDE"), which imposes higher taxes on gasoline than on ethanol.¹⁴² Consequently, Brazil continues to oversee the price of ethanol as a way of maintaining its viability.

Unlike Brazil, the U.S. has not undertaken comparable efforts to ensure that the consumer price of biofuels is consistently below that of gasoline. Instead, the U.S.'s biofuels initiatives are largely producer-oriented. For instance, many of the United States' incentives, such as the Volumetric Excise Tax Credit, the Small Producer Tax Credit, and the Biodiesel Tax Credit, are designed to reduce the costs paid by producers, but do not directly manipulate how these reductions would be passed on to consumers.¹⁴³ Moreover, the U.S. has no

¹⁴⁰ *Brazilian Ethanol and (Some of) Its Lessons*, U. MINN. DEP'T ECON. (2012), <http://www.econ.umn.edu/~schwe227/teaching.s12/files/slides/18-ethanol6.pdf> (noting ethanol price ceiling at 59% of gasoline prices).

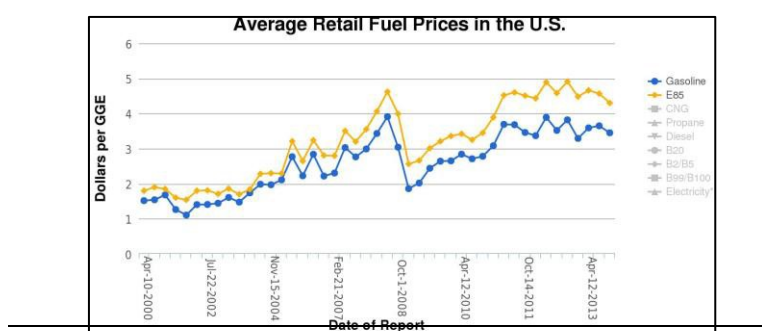
¹⁴¹ Cassuto & Gueiros, *supra* note 9, at 486. In 1990, the IAA was disbanded and ethanol's price was subjected to market forces, which reduced the fuel's competitiveness with gasoline.

¹⁴² *Id.* at 483. Currently, the Agencia Nacional do Petroleo is the primary agency that currently regulates biofuels in Brazil. *See Biofuels*, AGENCIA NACIONAL DO PETROLEO GÁS NATURAL E BIOCMBUSTÍVES (Dec. 12, 2013), <http://www.anp.gov.br/?pg=60467&m=&t1=&t2=&t3=&t4=&ar=&ps=&cachebust=1387565952900> (describing the ANP's involvement in biofuels regulation).

¹⁴³ *See* American Job Creation Act of 2004, Pub. L. No. 108-357, § 301 (creating the Volumetric Ethanol Excise Tax Credit which imposed a 51 cents/gallon tax credit for ethanol blenders); Food, Conservation,

comparable mechanism to ensure that the price of biofuels remains consistently lower than the price of conventional fuels.

Unless biofuel blends become more cost-competitive with conventional fuels, consumers will not be incentivized to purchase these blends. Because biofuels are associated with reduced fuel economy, their price must be below that of gasoline to enable these blends to be competitive.¹⁴⁴ Nonetheless, as demonstrated by the graph below, in the U.S., high-concentration ethanol blends can often be more expensive than gasoline.¹⁴⁵



and Energy Act of 2008, Pub. L. No. 110-234, § 15321 (creating the Credit for Production of Cellulosic Biofuel which imposes a 1.01 dollar/gallon tax credit); American Jobs Creation Act of 2004, Pub. L. No. 108-357, § 302 (creating the Biodiesel Tax Credit which imposes a 0.50 dollar/gallon credit for biodiesel producers). Notably, however, these initiatives are aimed at reducing the inputs costs for producers, yet any price reductions passed on to consumers would be incidental.

¹⁴⁴ *The Great Ethanol Debate*, CONSUMER REPORTS (2011), <http://www.consumerreports.org/cro/2011/01/thegreat-ethanol-debate/index.htm> (noting that “[e]thanol’s lower fuel economy results from its lower energy content compared to gasoline”).

¹⁴⁵ *Fuel Prices: Alternative Fuels Data Center*, U.S. DEP’T ENERGY (Dec. 15, 2013), <http://www.afdc.energy.gov/fuels/prices.html>. *But cf.* CLEAN CITIES ALTERNATIVE FUEL PRICE REPORT, U.S. DEP’T ENERGY 7 (Oct. 2013), (For the month of October, “[o]n average, E85 is about 41 cents lower in price than regular gasoline on a per-gallon basis”).

Therefore, Brazil's policies have been more effective because they are targeted at ensuring that ethanol's price is competitive for consumers, while the U.S.'s policies often only indirectly reduce the costs of biofuel blends in the marketplace.

E. Brazil's policies incorporate comprehensive infrastructure supports, while the U.S.'s initiatives are more modest and rely upon investment from the private sector to improve distribution networks.

Additionally, Brazil's policies have been more successful than those of the U.S. because Brazil has focused comparatively more on creating accommodations to foster ethanol's distribution and sale. While Brazil's government plays an active role in overseeing its ethanol distribution networks, the U.S. has relied to a greater extent upon private sector investments to devise infrastructure accommodations.

Brazil's infrastructure initiatives are fairly expansive and encompass distribution networks throughout the nation. Specifically, Petrobras, an oil company controlled by the state, operates nine ethanol and distribution facilities, which are spread across the country.¹⁴⁶ Similarly, Transpetro, a quasi-state entity, oversees a transport system that includes 44 export terminals and 156 storage facilities to assist in ethanol

¹⁴⁶ ILDO SAUER, BIOFUELS IN BRAZIL: SALES AND LOGISTICS 50 (2009) (providing that "[t]he Petrobras logistics infrastructure plays a key role in domestic ethanol distribution . . . [t]hrough nationwide multimode systems, Petrobras ships, stores and distributes fuels all over Brazil").

distribution.¹⁴⁷ Among other supports, government-funding initiatives have been used to install ethanol storage tanks at intermediate locations from distilleries and at fueling stations.¹⁴⁸

In contrast, the U.S.'s infrastructure supports lack the comprehensive approach evidenced in Brazil's policies. The U.S.'s initiatives have often been sporadic and piecemeal, and much of the assistance provided to biofuel production facilities occurs through other avenues.¹⁴⁹ For instance, funding to install fuel dispensers for high-concentration ethanol blends have often been left to the states and private foundations.¹⁵⁰ Due to the more limited approach, as the U.S.'s current biofuel distribution networks reach their capacity, private investors will likely need to provide funding to expand these networks.

Nonetheless, despite Brazil's investment in infrastructure supports, neither nation has shown an advantage in reducing biofuel transport costs once the fuel leaves a distribution facility. Both nations employ relatively inefficient transport methods, including rail cars, trucks, and barges to transport biofuels.¹⁵¹ In order to reduce transport costs, both the U.S. and Brazil have

¹⁴⁷ Valdes, *supra* note 61, at 14. The system helps to transport ethanol as well as other fuels.

¹⁴⁸ Cordonnier, *supra* note 16, at 297.

¹⁴⁹ Joshua A. Blonz, Shalini P. Vajjhala & Elena Safirova, *Growing Complexities: A Cross-Sector Review of U.S. Biofuels Policies and their Interactions* 31–2 (Dec. 2008), available at <http://ssrn.com/abstract=1368419> (noting that the RFS can increase private investment in infrastructure).

¹⁵⁰ *Id.* at 28–29.

¹⁵¹ See FRED BOSSELMAN ET. AL., *ENERGY, ECONOMICS, AND THE ENVIRONMENT* 1093 (Robert C. Clark et. al., eds., 3d ed. 2010); see also Valdes, *supra* note 112 (noting that “Brazil faces considerable infrastructure and transportation constraints along its supply chain . . . [t]he bulk of ethanol is transported from processing plants to collection centers and then to ports by truck”).

considered the development of an ethanol pipeline. While the U.S. has not yet begun funding a pipeline, Brazil has already begun construction on an ethanol pipeline, which is scheduled to be completed in 2016.¹⁵² Nonetheless, any cost reductions from building a pipeline would only be realized over the long run,¹⁵³ and thus, Brazil's decision to fund a pipeline may not necessarily indicate that the U.S. should employ a similar strategy.

Consequently, while neither Brazil nor the U.S. has an advantage over the other in devising methods to reduce transport costs, Brazil has undertaken significant efforts to install ethanol storage tanks and create distribution centers, while the U.S. has failed to adequately address many of these infrastructure issues.

F. Although it is viable for Brazil to rely heavily on a single input, the U.S. has been unable to replicate these results with policies centered upon corn ethanol because it lacks a similar advantage in corn production.

Next, Brazil's policies have been comparatively more successful than those of the U.S. because many of its initiatives are centered upon the nation's natural production strengths. Though Brazil was able to achieve considerable success with sugarcane as the key input underpinning its biofuels framework because of its ability

¹⁵² GAO-07-713, *supra* note 100, at 6; 49 C.F.R. pt. 452 (stating that “[a] large pipeline can transport roughly two million barrels of gasoline a day. By way of comparison, 9,375 large semi-truck tankers are required to transport two million barrels of product.”). *See also Valdes*, *supra* note 112 (noting the proposal of a Brazilian ethanol pipeline to be completed by 2016 which will accommodate about 22 billion liters (doubling current transportation capacity) at about one-third the current cost of shipping ethanol by truck”).

¹⁵³ *Id.*

to produce a cheap supply of sugarcane ethanol,¹⁵⁴ the U.S. has not been able to obtain similar results by centering its policies upon the production of corn ethanol.¹⁵⁵

In the U.S., although corn remains the choice input for ethanol production, its increased cultivation has resulted in labor and production barriers, and has reduced the amount of corn available for the food supply.¹⁵⁶

¹⁵⁴ Cordonnier, *supra* note 16, at 311; *See also* Valdes, *supra* note 112 (noting that “[t]he rapid expansion in Brazil’s sugarcane production is the result of a favorable climate, land availability, abundant labor, a pro-ethanol public policy, and research by public agencies to develop higher yielding cane varieties and new planting techniques to increase efficiency”).

¹⁵⁵ Christine L. Crago, Madhu Khanna, Jason Barton, Eduardo Giuliani, & Weber Amaral, *Competitiveness of Brazilian Sugarcane Ethanol Compared to U.S. Corn Ethanol*, ENERGY BIOSCIENCES INST. 1, 4 (2010),

http://www.ageconsearch.umn.edu/bitstream/60895/2/crago_costofcornandsugarcaneethanol_AAEEA.pdf (finding that “on average (for the 2006-2008 period) the domestic production cost of sugarcane ethanol in Brazil is 24% lower than corn ethanol in the U.S.”).

¹⁵⁶ Steven Wallander, Roger Claasses, & Cynthia Nickerson, *The Ethanol Decade: An Expansion of Corn Production, 2000-09*, U.S. DEP’T AGRIC. ECON. RESEARCH SERV. 1, 3 (2011), <http://www.ers.usda.gov/media/121204/eib79.pdf> (stating that “[n]on-ethanol uses of corn have not increased over the past decade, as greater ethanol production has captured a larger share of corn production”). *See also* Colin Carter, Gordon Rausser, & Aaron Smith, *The Effect of the U.S. Ethanol Mandate on Corn Oil Prices*, U.C. DAVIS, DEP’T OF AGRIC. & RESEARCH ECON. 1, 1-3 (2011), <http://www.ourenergypolicy.org/wp-content/uploads/2013/07/The-Effect-oftheUS-Ethanol-Mandate-on-corn-prices-.pdf> (noting that U.S. energy policy now mandates that about 15 percent of global corn production to be converted into ethanol for use); C. Matthew Rendleman & Hosein Shapouri, *New Technologies in Ethanol Production*, U.S. DEP’T AGRIC. (2007), at *i* (stating that “the fraction of annual U.S. corn production used to make ethanol rose from around 1 percent in 1980 to around 20 percent in 2006”); Timothy A. Wise, *The Cost to Developing Countries of U.S. Corn Ethanol Expansion*, 5 (Global Dev. & Env’tl Inst.,

Because the U.S. will increasingly need to source corn from multiple inputs to meet demand without further encroaching upon the corn crop,¹⁵⁷ Brazil's narrower policy focus upon a single feedstock does not constitute a viable approach for the U.S. Due to production barriers associated with corn ethanol, the U.S. would likely need to diversify its sources in order to expand biofuel production significantly. For that reason, this is an aspect where Brazil's policies would provide only limited guidance for the U.S.

In order to help foster the long-run sustainability and cost-competitiveness of biofuels, the U.S. likely must rely upon advanced biofuels to a much greater degree than Brazil has.¹⁵⁸ Advanced biofuels can come from a variety of natural sources. For instance, cellulosic feedstocks include "corn stover, switchgrass, poplar trees, and any other raw material composed primarily of cellulose."¹⁵⁹ Title XV of the Energy Policy Act of 1992 defines cellulosic biomass ethanol as ethanol "derived from any lignocellulosic or hemicellulosic matter" obtained from a renewable source, including wood, plants, grasses, fibers, and animals and other wastes.¹⁶⁰ Additionally, Executive Order 13134 defines renewable biomass as "any organic matter that is

Working Paper No. 1202, 2012) (noting that the poor are strained by increasing agricultural commodity price).

¹⁵⁷ CONG. RES. SERV., RL33928, ETHANOL AND BIOFUELS: AGRICULTURE, INFRASTRUCTURE, AND MARKET CONSTRAINTS RELATED TO EXPANDED PRODUCTION 3, 8 (2007) (describing agricultural and infrastructure barriers to expanded corn ethanol production).

¹⁵⁸ See generally Blonz, et. al., *supra* note 149 (describing mechanisms to reduce costs).

¹⁵⁹ See generally Wallace E. Tyner, *The U.S. Ethanol and Biofuels Boom: Its Origins, Current Status, and Future Prospects*, 58 BIOSCIENCE 646, 649 (2008).

¹⁶⁰ Energy Policy Act § (o)(1)(A)(i)-(viii) (2005).

available on a renewable or recurring basis.”¹⁶¹ Similarly, another promising alternative fuel for use in vehicles is biobutanol, a corn-based isobutanol, which can also be cheaper to produce than either corn-based or cellulosic ethanol.¹⁶²

Nevertheless, there remains considerable uncertainty as to advanced biofuels’ viability as an adequate replacement.¹⁶³ Advanced biofuels are often characterized by significant technological barriers and can be more expensive to produce than corn ethanol.¹⁶⁴ For instance, cellulosic ethanol often has high production costs,¹⁶⁵ and there remain several technical challenges hindering its commercial viability, including reducing the costs of converting biomass into fermentable sugars.¹⁶⁶

Consequently, the U.S.’s policies have been less effective than those in Brazil because the U.S. lacks a

¹⁶¹ Exec. Order No. 13,134, 64 Fed. Reg. 44,639 (Aug. 16, 1999); *see also* Energy Policy Act § 1512(4)(B) (2005).

¹⁶² *See generally* Timothy A. Slating & Jay P. Kesan, *A Legal Analysis of the Effects of the Renewable Fuel Standard (RFS2) and Clean Air Act on the Commercialization of Biobutanol as a Transportation Fuel in the United States*, 4 GCB BIOENERGY 107, 107 (2012).

¹⁶³ *See generally* Jay J. Cheng & Govinda R. Timilsina, *Advanced Biofuels Technologies: Status and Barriers* (Pol’y Research Working Paper No. 5411, 2010), *available at* <http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5411>.

¹⁶⁴ *Replacing the Whole Barrel to Reduce U.S. Dependence on Oil*, U.S. DEP’T OF ENERGY 1, 11 (2013), http://www1.eere.energy.gov/bioenergy/pdfs/replacing_barrel_overview.pdf (“Federal investment can significantly accelerate progress in bringing these hydrocarbon biofuels to market”).

¹⁶⁵ Manuel B. Sainz, *Commercial Cellulosic Ethanol: The Role of Plant-Expressed Enzymes*, 45 *IN VITRO CELLULAR & DEVELOPMENTAL BIOLOGY-PLANT* 314, 315 (2009) (noting that “[t]he major economic barrier to viable commercial ethanol production are high production costs, estimated to be between US\$102 and 123 per barrel or more than US\$2.50 per gallon”).

¹⁶⁶ *Id.*

comparable production advantage in producing corn ethanol, though the nation's policies have traditionally emphasized its production.

G. Brazil has played a much more directive role in shaping the biofuels industry, while the U.S. has enabled producers to dictate the market's development.

Brazil's biofuels policies have proven more sustainable because its government has been aggressive in influencing the ethanol industry's formation over time.¹⁶⁷ In contrast, the U.S.'s policies have often granted deference to producers to dictate their supply chain, biofuel retail prices, and related factors.¹⁶⁸ To maintain biofuels' long-run feasibility, the U.S. would likely need to become more engaged through the entire production and sale process.

Though Brazil has also created legislation aimed at reducing input costs for producers,¹⁶⁹ the U.S.'s policies have been more deferential to producers and market participants than Brazil's policies. Many of the U.S.'s initiatives are characterized by a more moderate, market-oriented approach. This disparity is likely a consequence

¹⁶⁷ See Cordonnier, *supra* note 16, at 317 (describing the relationship between the Brazilian government and the market).

¹⁶⁸ See e.g., *What Happened to Biofuels?* ECONOMIST (Sept. 7, 2013), http://www.economist.com/news/technology-quarterly/21584452-energy-technology-making-large-amounts-fuel-organic-matter-has-proved-be?fsrc=scn/tw_ec/what_happened_to_biofuels_ (noting the role of the market in biofuels projects); *USDA Accomplishments 2009-2012*, U.S. DEP'T AGRIC., <http://www.usda.gov/documents/Result-s-Energy.pdf> (last visited Dec. 18, 2013) (outlining a number of biofuel initiatives).

¹⁶⁹ *Id.*

of differing government structures;¹⁷⁰ while Brazil had in place a military dictatorship for many of the years at the beginning of *Pró-Álcool*,¹⁷¹ the U.S.'s policies are created through a democracy.

Additionally, Brazil's policies have been especially comprehensive from their inception, which has enabled the country to play a greater role in shaping the industry. For instance, from the outset of *Pró-Álcool*, the government oversaw numerous production factors, including influencing where ethanol production facilities should be located geographically,¹⁷² and was instrumental in fostering the redevelopment of idle sugar distilleries and the creation of new ethanol production facilities.¹⁷³ Currently, in addition to instilling production mandates, the government also plays a key role in overseeing ethanol distribution networks and spearheading reforms in the market. On the consumer side, Brazil has been assertive in demanding measures to help instill consumer confidence in biofuels through mandatory labeling and quality control at fueling stations.¹⁷⁴ By overseeing nearly every facet of ethanol's production and sale, Brazil has been able to safeguard ethanol's viability.

On the contrary, the U.S.'s policies often do not provide significant oversight of the entire production process. For instance, the Small Ethanol Producer Credit and the Biodiesel Tax Credit are limited in focus upon reducing input costs for producers, yet do not provide extensive guidance as to

¹⁷⁰ See Cassuto & Gueiros, *supra* note 9, at 496 (noting that Brazil's aggressive initiatives during the early years of *Pró-Álcool* were made possible by Brazil's military dictatorship).

¹⁷¹ *Id.*

¹⁷² Decreto No. 76.593 (1975), art. 3.

¹⁷³ Cordonnier, *supra* note 16, at 298.

¹⁷⁴ *Id.* at 297.

how these funds must be spent.¹⁷⁵ Similarly, the VEETC has been heavily criticized for not being sufficiently targeted to its ultimate goal, but was instead though to be subsidizing the efforts of wealthy oil companies.¹⁷⁶

Consequently, the success of some of the U.S.'s biofuels policies has been hampered because they have not been sufficiently directive to ensure that policymakers' intended outcomes are achieved.

¹⁷⁵ See Omnibus Budget Reconciliation Act § 11502 (1998); Job Creation Act § 302 (2004).

¹⁷⁶ See *Let the VEETC Expire*, *supra* note 96.

H. Brazil's ethanol policies have been more sustainable because many of these initiatives are motivated by dual aims, though the U.S.'s biofuels policies have recently incorporated ancillary goals.

Lastly, Brazil's ethanol framework has been viable over time because many of its policies incorporate ancillary goals, such as economic revitalization, which helps sustain support for these programs. In contrast, many of the U.S.'s biofuels policies have traditionally been narrower in focus, which has limited their long-run application. However, recent initiatives such as the Biorefinery Crop Assistance Program ("BCAP") and the Rural Energy for America Program ("REAP") suggest increasing willingness of the U.S. to incorporate dual aims in its policies, which could help to promote the longevity of these biofuels initiatives.¹⁷⁷

As demonstrated in Brazil, biofuels initiatives are often linked with other national issues, such as re-developing low-income areas. For instance, during the early years of *Pró-Álcool*, the Commission and later, the Council, helped determine where ethanol production facilities should be located in an attempt to reduce regional income disparities.¹⁷⁸ Likewise, Brazil provided funding and created projects that helped to promote ethanol production in poor crop areas.¹⁷⁹ More recently, Brazil has undertaken efforts to promote the viability of biodiesel and other crops as a way to spur economic

¹⁷⁷ See Food, Conservation, and Energy Act of 2005, Pub. L. No. 110-246, §9003, 122 Stat. 1651, 2012 (2008) (codified at 7 U.S.C. 8103 (2012)); Food, Conservation, and Energy Act of 2005, Pub. L. No. 110-246, §9007, 122 Stat. 1651, 2007 (2008) (codified at 7 U.S.C. §8107 (2012)).

¹⁷⁸ See Decreto No. 76.593, de 14 de Novembro de 1975, DIARIO OFICIAL DA UNIAO [D.O.U.] de 14.11.1975 (Braz.) (1975), art. 3.

¹⁷⁹ *Id.*, at Art. 5(b) § 1.

development in rural areas.¹⁸⁰ By linking two or more initiatives, Brazil simultaneously increased its GDP and promoted the success of its biofuels program.¹⁸¹

In contrast, many of the U.S.'s biofuels initiatives reflect a narrower focus by only incentivizing a single factor, resulting in reduced support for these initiatives over the long-term. For instance, programs devised to reduce costs for producers have been met with widespread criticism that this funding has not been appropriately distributed and is sometimes provided directly to large producers.¹⁸² Nevertheless, this trend may be changing. The U.S.'s most recent biofuel policies employ more targeted metrics, such as increasing economic development in the Midwest and rural areas and ensuring the profitability of smaller producers and businesses, which can help the nation achieve multiple goals concomitantly.¹⁸³ Accordingly, the U.S.'s biofuels policies may become more sustainable as dual goals are more readily incorporated—a move which could render these initiatives less partisan and divisive.

Overall, Brazil has been more effective than the U.S. at incorporating market forces and consumer preferences into its biofuels policies. Though the U.S. and Brazil share similar motivations for reducing their

¹⁸⁰ *Programa Nacional de Producao e uso do Biodiesel*, MINISTERIO DE MINAS E ENERGIA, *supra* note 64.

¹⁸¹ See Valdez, *supra* note 61, at 4.

¹⁸² See *Let the VEETC Expire*, *supra* note 96, at 4 (“If the VEETC is allowed to expire, taxpayers will save money and big oil companies won’t get paid to consume a few billion gallons more of corn ethanol we don’t need”).

¹⁸³ See e.g., *Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants Program 101*, U.S. DEP’T AGRIC., <http://www.rd.usda.gov/programs-services/rural-energy-for-america-program-renewable-energy-systems-energy-efficiency> (last visited Mar. 8, 2015).

consumption of foreign oil, Brazil's comprehensive approach spearheaded the long-run viability of its biofuel policies.¹⁸⁴

IV. Recommendations

In order to better integrate biofuels into the U.S. energy framework, the U.S. must take more directive action to shape how the industry forms over time. Though promoting the sustainability of biofuels requires a comprehensive approach, several considerations require specific attention:

A. The U.S. should work to more effectively promote private competition within the biofuel industry in order to expand the competitiveness of advanced biofuels.

Due to increased government support, some corporate entities already show interest in increasing research and investment in advanced biofuels.¹⁸⁵ While early signs have been encouraging, the U.S. should introduce further initiatives aimed at promoting the entrance of new corporate players into the biofuels market; this will spur technological innovation and

¹⁸⁴ Wilkinson, *supra* note 120 (“Comprehensive regulation ensured the attractiveness of this option at a time when the Brazilian automobile market was largely self-sufficient and protected from imports”).

¹⁸⁵ *USDA Putting Big Money Into Advanced Biofuels*, Business Wire, Oct. 1, 2013, available at <http://www.bloomberg.com/bb/newsarchive/abgSiOnlMN5M.html>.

There, Paul Watson of Green Technology Solutions, Inc. noted that “[t]he USDA’s payment program is an extremely positive sign that the need for an alternative fuel source is being taken seriously. . . . It should be encouraging to [the company’s] investors and Americans in general that our government is putting its money where its mouth is when it comes to advanced biofuels.”

lower input prices, which may ultimately reduce prices for consumers.¹⁸⁶

Because the biofuels industry is young and developing, new and transitioning producers can play a key role in shaping the future of renewable energy. Pursuant to the Energy Policy Act of 2005, Section 1501(a), the U.S. Federal Trade Commission (“FTC”) conducts market saturation studies for the ethanol industry.¹⁸⁷ In its 2013 study, the FTC determined that “[t]he level of concentration and the large number of market participants in the U.S. ethanol production industry suggests that exercise of market power to set prices or coordination on prices or output levels is unlikely.”¹⁸⁸ In light of this malleability and relative ease of entry, U.S. policymakers should incentivize interested fuel producers

¹⁸⁶ *Today in Energy: Ethanol Producers Respond to Market Conditions*, U.S. ENERGY INFO. ADMIN. (Mar. 11, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=1031>

(discussing the relationship between profit margins, production, consumption and prices of ethanol). As mentioned in Section II, the creation of the Biofuels Interagency Working Group suggests that some efforts at these initiatives have already begun. *See infra* Section II.

¹⁸⁷ Energy Policy Act of 2005 § 1501(a), 42 U.S.C. 7545.

¹⁸⁸ *2013 Report on Ethanol Market Concentration*, FED. TRADE COMM. (2013), available at <https://www.ftc.gov/sites/default/files/documents/reports/2013-federal-trade-commission-report-Congress-ethanol-market-concentration-november-2013/2013ethanolreport.pdf> (last visited Mar. 8, 2015); *see 2012 Report on Ethanol Market Concentration*, FED. TRADE COMM. (2012), available at <https://www.ftc.gov/sites/default/files/documents/reports/2012-federal-trade-commission-report-Congress-ethanol-market-concentration/2012ethanolreport.pdf> (last visited Mar. 8, 2015); *see also* Michelle Ratton Sanchez Badin and Daniela Helena Godoy, *International Trade Regulatory Challenge for Brazil and Some Lessons from the Promotion of Ethanol* 1, 29 (2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2207894 (discussing mobilization of the private sector) (last visited Mar. 8, 2015).

of all sizes to enter the market, thereby promoting heightened competition within the biofuels industry.

Nonetheless, new producers will not be motivated to enter the biofuels industry unless it is profitable. Although the outcome of tax incentives has not been heavily studied, a study by the Food and Agriculture Policy Research Institute found that ethanol production would likely decline by nearly 80% if it were not incentivized.¹⁸⁹ In order to entice producers to enter the biofuels industry, the U.S. should devise subsidies or tax credits that provide additional benefits to new or converted alternative fuel producers, thereby shifting the focus of current initiatives away from subsidizing existing biofuel producers and instead to increasing market competition. Moreover, the U.S. should also strengthen conversion incentives for farmers seeking to convert their crop to biofuel production, a move increasing access to arable lands.

Consequently, as a way to spur innovation within the industry, tax incentives should be specifically aimed at encouraging the entry of new producers and corporate entities into the biofuels market.

B. The U.S. should promote biofuels' cost-competitiveness and develop a price-ratio formula to help ensure the price-competitiveness of biofuels.

Consumer demand for biofuel is generally surmised to be perfectly or almost-perfectly elastic.¹⁹⁰

¹⁸⁹ BRENT D. YACCOBUCCI, CONG. RESEARCH SERV., RL33290, FUEL ETHANOL: BACKGROUND AND PUBLIC POLICY ISSUES, at 12 (2008) (noting possible production decline of up to 80% without exemption).

¹⁹⁰ John Cobb, *Mitigating the Unintended Consequences of Biofuel Tax Credits*, 49 HARV. J. ON LEGIS. 451, 458

Therefore, consumers' willingness to purchase biofuel blends is a direct function of its price as compared to that of gasoline.¹⁹¹ Although strongly incentivizing the use of alternative fuels is imperative to sustain consumer demand, the burden must ultimately be placed on producers and private investors to engage in research and development initiatives that will help to mitigate the price differential, as well as to design vehicles that can use these fuels more effectively.

However, in the interim, one way to promote the cost-competitiveness of alternative fuels is through creating a price-ratio formula that ensures that biofuels prices remain consistently below gasoline prices. Pursuant to this price-ratio formula, ethanol or a comparable blend would be subsidized so that its cost would be fixed to a certain proportion below that of conventional fuels. Though this may artificially reduce the price of biofuels for consumers, lowering the costs below that of gasoline is necessary to offset the loss of fuel economy associated with these blends. In this way, consumers whose vehicles can run on a biofuel blend will not be incentivized to instead choose a conventional fuel.

(2012) (providing that “in the long term consumers and motor vehicle fuel suppliers are likely to be relatively indifferent between relying on gasoline and biofuels. Therefore, the long-term demand for biofuels is likely quite elastic, at least in ranges where it is priced competitively with gasoline.”).

¹⁹¹ *Id.* See generally Robert Z. Lawrence, *How Good Politics Results in Bad Policy: The Case of Biofuel Mandates* (Harv. Kennedy School Faculty Research, Working Paper, RWP10-044, 2010) (providing that ethanol use is also correlated to oil prices; if oil prices drop substantially, this could impair effort to convert to ethanol in the absence of stringent federal requirements).

C. The U.S. should mandate that a certain number of FFVs are sold in the nation per year.

Like Brazil, the U.S. could require that a certain number of ethanol-powered vehicles or FFVs be sold annually, or strongly promote their sale. FFVs are already available for sale in the U.S., though accessibility, price, and access to fueling stations remain impediments to their widespread use.¹⁹² By requiring flex-fuel engines on a number of new vehicles, many of the barriers hindering the expansion of alternative energy shall be reduced, and mass-production and geographic dispersion will increase their affordability and accessibility.¹⁹³ Specifically, the U.S. government, which already owns a large stake in the auto industry, should heavily incentivize domestic automobile makers to increase efforts to re-design vehicles that can more effectively operate on biofuels.¹⁹⁴ These initiatives could be tied into existing policies targeting the ailing domestic automobile industry and could be viewed as an additional way for the auto industry to adapt and become more competitive with foreign manufacturers.¹⁹⁵

¹⁹² See GAO-09-446, *supra* note 106, at 122 (comparing ethanol transport costs as 13 to 18 cents per gallon as compared to 3 to 5 cents per gallon of gasoline).

¹⁹³ See Lytle, *supra* note 111, at 694–95.

¹⁹⁴ See *Examining the State of the Domestic Automobile Industry: Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs*, 110th Cong. 2nd Sess. 1–3 (Nov. 18, 2008) (statement of Chairman Christopher J. Dodd) (stating that “the Big Three [auto manufacturers] . . . derided hybrid vehicles as making ‘no economic sense.’ They have dismissed the threat of global warming, the role played by their products in creating it, and the strong desire of the American people to do something to stop it. The prices of GM and Ford shares have declined steadily and have now reached historic lows. In short, the auto makers have failed to adapt to change . . .”).

¹⁹⁵ Remarks on the United States Automobile Industry, 2009 Daily Comp. Pres. Doc. 738 (Jun. 1, 2009) (There, President Obama stated

Similarly, an important—albeit somewhat ancillary—consideration is meeting consumer demand by providing a greater selection of attractive biofuel-powered vehicles to choose from. Correspondingly, adequate consumer demand will incentivize automobile manufacturers to respond by creating new models that appeal to consumers.¹⁹⁶ In Brazil, FFVs have grown extensively in popularity,¹⁹⁷ and as of 2010, there were 59 models of FFVs produced by 9 different auto manufacturers.¹⁹⁸ Thus, as demonstrated by their success in Brazil, FFVs need not necessarily restrict a consumer's ability to purchase a vehicle that suits his or her tastes.

Especially in light of the current technological barriers associated with the “blend wall,” relying predominately upon the RFS is likely to be insufficient to dramatically increase use of biofuels.¹⁹⁹ Therefore, developing targets or incentivizing the sale of FFVs may be yet another way to improve the cost-competitiveness of biofuels, while simultaneously encouraging

that “I decided [] that if GM and Chrysler and their stakeholders were willing to sacrifice for their companies’ survival and success, if they were willing to take the difficult but necessary steps to restructure and make themselves stronger, leaner, and more competitive, then the United States Government would stand behind them”). Accordingly, pushing the industry to redevelop vehicles that can more effectively operate on biofuels could be a way to simultaneously help to promote the revitalization and competitiveness of the domestic auto industry.

¹⁹⁶ *See Id.*

¹⁹⁷ *See* Wilkinson, *supra* note 120, at 99-100 (discussing Brazil’s ethanol policy, the author notes that the turning point occurred when FFVs were introduced, “which in the five years since 2003 have soared from zero to over 80% of total car sales.” One notable factor is that “differently from the previous ethanol program, choice of fuel can now be made at the petrol pump and not, more irrevocably, at the moment of purchase”).

¹⁹⁸ McDermott et al., *supra* note 25.

¹⁹⁹ Blonz, Vejjhala, & Safirova, *supra* note 149.

innovation within the domestic automobile industry.²⁰⁰ By giving customers the ability to decide which fuel to use depending upon the relative price of ethanol compared to gasoline, FFVs can support consumer preferences while reducing gasoline consumption.²⁰¹

D. The U.S. should work to increase consumer awareness of biofuels.

Due to limited marketing initiatives, U.S. consumers often lack awareness of the option to purchase biofuels or biofuel-powered vehicles.²⁰² One way to promote consumer awareness of alternative fuels is to require oil producers and retailers to sell biofuel blends alongside conventional gasoline products and market these products comparably. Furthermore, policymakers could demand that a certain fixed percentage of a large fuel company's revenue or total sales be derived from retailing biofuel blends, and impose penalties if these targets are not met.

Coupled with increased marketing efforts, large oil producers, which also own a significant number of fueling stations in the U.S., should be required to employ initiatives that will help to prevent consumers

²⁰⁰ GAO-07-713, *supra* note 100, at 7.

²⁰¹ See McDermott et al., *supra* note 25.

²⁰² Amanda Peterka, *Survey Shows Low Consumer Awareness of E15*, GOVERNORS' BIOFUELS COALITION (2013), <http://www.governorsbiofuelscoalition.org/?p=631>

9 (citing a 2012 study by the National Association of Convenience Stores). Pursuant to the study, "[o]nly 26 percent of surveyed fuel consumers were aware of E15. After survey takers described E15 to consumers, 59 percent, or three out of five consumers, said they would consider purchasing the fuel if it were the same price as gasoline. Three out of five of those consumers, though, had primary vehicles with model years for which it's illegal to fuel up with E15."

from “misfueling” their vehicles.²⁰³ Correspondingly, stringent labeling requirements should be imposed at fueling stations in order to help avoid damage to older vehicles that cannot operate on higher biofuel concentrations.²⁰⁴ Though some efforts at mandating the use of these labels to prevent “misfueling” are already underway, these policies will become increasingly important as a variety of different biofuel blends begin to appear on the market.²⁰⁵ Even more, further labeling requirements may have the ancillary effect of promoting consumer awareness of, and likely consumer interest in, biofuels.

E. The U.S. should bolster infrastructure supports and expand geographic locations of biofuel production facilities.

Currently, most U.S. biofuel production is concentrated in the Midwest and is undertaken by a small number of producers, which has reduced its efficacy and viability outside of the region.²⁰⁶ Because the

²⁰³ See GAO-11-513, *supra* note 113, at 30 (“Because the EPA has only allowed E15 for use in model year 2001 and new automobiles, representatives from several industry associations stated that consumers may not be aware of the distinction between approved and unapproved engines, or they may be confused about which fuel to use”); see also Automobile Fuel Ratings, Certification and Posting, 75 Fed. Reg. 12,470 (Mar. 16, 2010) (to be codified at 16 C.F.R. pt. 306) (proposing labeling for ethanol blends as a way to reduce consumer confusion).

²⁰⁴ GAO-11-513, *supra* note 113, at 30.

²⁰⁵ *Id.* Because only a small percentage of U.S. cars are currently powered predominately by biofuels, this initiative will need to be developed concomitant to other policies, such as increasing the number of FFVs or predominately ethanol-powered vehicles on the road.

²⁰⁶ Annette Hester, *A Strategy Brief on U.S. Ethanol Markets and Policies*, CENTRE FOR INT’L GOVERNANCE INNOVATION 1, 2 (2007) (stating that “data from the Renewable Fuels Association shows that

transport expenses for ethanol and other biofuels are relatively costly, incentivizing the development of new biofuel production facilities on the East and West Coasts, where a significant number of potential consumers reside, will help to reduce biofuels' price- markup over conventional fuels.²⁰⁷ Since high transport costs have been a major factor reducing the cost-competitiveness of biofuels,²⁰⁸ increasing geographic dispersion of production facilities, and thereby reducing the distances traveled, will help to lower these costs until reduced-cost transport options become available.

In order to intertwine this initiative with promoting economic development in rural areas, these biofuel production facilities could be located in rural locations on the Coasts, such as in South Carolina and Oregon. Moreover, expanding ethanol production facilities geographically can also help to buffer supply shocks caused by unfavorable weather conditions that sharply diminish the fuel crop.²⁰⁹ Therefore, as the industry expands, increasing geographic dispersion of biofuel production facilities need not necessarily detract from the initiatives focused upon promoting growth of the biofuels industry in the Midwest, and can help to spur economic growth in other areas.

Simultaneously, policymakers should strive to foster increased trade relationships between the U.S. and Brazil, as well as with other international producers, to

the top ten producers account for almost 50% of total production. Archer Daniels Midland (ADM) alone accounts for 20% of this capacity”).

²⁰⁷ See BOSSELMAN ET. AL., *supra* note 151, at 1093.

²⁰⁸ *Id.*

²⁰⁹ See Joseph Cooper, *Agricultural Commodity Support and Biofuels Policy*, RESOURCES FOR THE FUT. (July 18, 2011), <http://www.rff.org/Publications/WPC/Pages/Agricultural-Commodity-Support-and-Biofuels-Policy.aspx> (noting the problems associated with price shocks).

help prevent crises during times of shortage.²¹⁰ Although the U.S. has begun importing biofuels from other nations, policymakers remain cautious due to concerns over protecting the nascent biofuel industry. Nevertheless, as biofuels are progressively incorporated into the nation's energy framework, this interdependence will become more important and can serve as another way to help reduce the nation's dependence on foreign oil.

Furthermore, as demonstrated recently, forging a stronger relationship with ethanol-producing nations need not exclusively result in increased imports into the U.S. For instance, in 2011, Brazil was faced with a sharp decline in sugarcane ethanol availability. However, Brazil maintained its relatively high ethanol blend requirement, and was unable to produce enough ethanol to meet demand.²¹¹ As a result, Brazil chose to import ethanol from the U.S., even though ethanol produced in the U.S. is typically more expensive than Brazil's sugarcane ethanol.²¹² Consequently, strengthening trade relationships for alternative fuels need not be one-sided, and may ultimately benefit the U.S.

²¹⁰ See *Energy Analysis: International Trade of Biofuels*, NAT'L RENEWABLE ENERGY LAB., U.S. DEP'T ENERGY (2013) (describing biofuels trade).

²¹¹ See Isis Almeida & Tony Dreibus, *Brazil to Become Net Importer of U.S. Ethanol, Czarnikow Says*, BLOOMBERG BUSINESSWEEK, Nov. 22, 2011, available at <http://www.businessweek.com/news/2011-11-22/brazil-to-become-net-importer-of-u-s-ethanol-czarnikow-says.html>.

²¹² *Id.*

F. The U.S. should increase the regulatory authority of its agencies to play an active role in overseeing the nation's biofuels initiatives.

As demonstrated by the success of DOE's Clean Energy Program, enabling government agencies to play a much more directive role can help to ensure that current funding initiatives are effective at increasing biofuels' viability.²¹³ Accordingly, federal agencies such as EPA and USDA should undertake a more active approach to ensure that the aims of these programs and funding initiatives are met.²¹⁴ For example, because USDA has already begun undertaking a substantial investment through the Advanced Biofuel Payment Program,

²¹³ See *Clean Cities Goals*, *supra* note 81. The DOE has a number of successful biofuel programs, which demonstrates that a more active role by federal agencies can be viable and need not encroach upon the authority of producers. For instance, DOE has created almost 100 "Clean Cities Coalitions," which help to promote biofuels on a local level. See *Coalitions*, U.S. DEP'T ENERGY (Dec. 17, 2013), <http://www1.eere.energy.gov/cleancities/coalitions.html>. Similarly, pursuant to the "Clean Cities National Parks Initiative," DOE works with national parks to increase use of biofuel-powered vehicles in parks. See *Clean Cities National Parks Initiative*, U.S. DEP'T ENERGY (Dec. 17, 2013) http://www1.eere.energy.gov/cleancities/national_parks.html. Although these and similar initiatives by DOE have been largely successful, additional agencies could devise additional biofuel programs without overlapping upon DOE's authority.

²¹⁴ See *id.* Expanding upon previous efforts, agencies could work more closely with local governments to convert public transportation and other city machinery to operate on biofuel blends, especially in cities that lack sufficient funding to foster this transition. Agencies could also help to promote consumer awareness of biofuels through partnerships with local organizations and community groups. Moreover, agencies could take a much more active role in ensuring that biofuel pumps are installed at fueling stations by working with station operators to help ensure that appropriate infrastructure supports, such as storage tanks, are available.

engaging in additional oversight of the biofuels industry is merely another way to help ensure its efficacy.²¹⁵

Currently, federal agencies employ many efforts that are reactive and research-oriented, while enabling producers to shape the biofuels market. For instance, USDA employees presently analyze market data for biofuel feedstocks and other inputs, and they conduct some outreach and educational initiative.²¹⁶ Nonetheless, in tandem with existing initiatives, USDA could influence the market by helping to link retailers with suppliers. USDA could engage in additional oversight over producers as well. Although USDA has already begun some of these efforts, by bolstering these initiatives, the agency can ensure that federal funds are effectively utilized.²¹⁷

Instead of continuing to allow the biofuels market to be producer-led, increasing the authority of federal agencies can help to promote biofuels' long-run viability. Because the U.S. has already undertaken a significant investment to support biofuels cultivation through payments programs and conversion incentives,

²¹⁵ *USDA Announces Support for Producers of Advanced Biofuel*, U.S. DEP'T AGRIC. (Sept. 12, 2013), <http://usda.gov/wps/portal/usda/usdahome?contentid=2013/09/0177.xml>. There, USDA notes that the payments are part of its efforts to "support the research, investment and infrastructure necessary to build a strong biofuels industry that creates job and broadens the range of feedstocks used to promote renewable fuel." Accordingly, enabling agencies to play a more directive role in shaping the industry will help to ensure that these aims are achieved.

²¹⁶ *Biofuel Feedstock & Coproduct Market Data*, U.S. DEP'T AGRIC. ECON. RES. SERV. (Dec. 17, 2013), <http://www.ers.usda.gov/topics/farm-economy/bioenergy/biofuel-feedstock-coproduct-market-data.aspx>.

²¹⁷ See e.g., *Rural Development: Technical Assistance*, U.S. DEP'T AGRIC., (Dec. 17, 2013), http://www.rurdev.usda.gov/Subject_RD (outlining technical assistance endeavors).

granting federal agencies increased regulatory authority may help to increase the efficacy of these initiatives.

V. Conclusion

To conclude, Brazil's ethanol framework demonstrates that increased use of ethanol and similar biofuels can be a viable route for nations seeking to reduce their reliance on foreign oil. As in Brazil, gasoline and alternative fuels can be simultaneously utilized to propel the U.S.'s automobiles and machinery. In this transition, the U.S. must shift the thrust of its policies from production-side factors to promoting consumer and market demand for biofuels. Thus, perhaps Brazil's largest contribution to renewable energy is to foster awareness that a number of elements determine whether an alternative fuels policy will be viable, yet nonetheless demonstrates that the increased use of biofuels can be a sustainable option for the U.S.

**APPENDIX A: SUMMARY OF ISSUES AND
RECOMMENDATIONS EXPLANATION**

COMPARING U.S. AND BRAZILIAN POLICIES

1. Brazil's ethanol-blend mandates have nearly always been more stringent than the U.S.'s RFS, and biofuels are mixed into a greater proportion of Brazil's conventional fuel supply.
2. Brazil has encouraged carmakers to produce and retail FFVs to much greater extent, which has increased FFVs' popularity with consumers.
3. While Brazil has mandated ethanol's sale at fueling stations, the U.S. has not undertaken sufficient efforts to ensure that consumers have access to biofuel blends.
4. While Brazil has carefully monitored the price of ethanol, the U.S.'s policies are producer-oriented and often only indirectly influence the consumer price of affordable biofuel blends.
5. Brazil's policies incorporate comprehensive infrastructure supports, while the U.S.'s initiatives are more modest and rely upon investment from the private sector to improve distribution networks.
6. Though it is viable for Brazil to rely heavily on a single input, the U.S. has been unable to replicate these results with policies centered upon corn ethanol because it lacks a similar advantage in corn production.

7. Brazil has played a much more directive role in shaping the biofuels industry, while the U.S. has enabled producers to dictate the market's development.
8. Brazil's ethanol policies have been more sustainable because many of these initiatives are motivated by dual aims, though the U.S.'s biofuels policies have recently incorporated ancillary goals.

RECOMMENDATIONS

1. The U.S. should work to more effectively promote private competition within the biofuel industry in order to expand the competitiveness of advanced biofuels.
2. The U.S. should promote biofuels' cost-competitiveness and develop a price-ratio formula to help ensure the price-competitiveness of biofuels.
3. The U.S. should mandate that a certain number of FFVs are sold in the nation per year. The U.S. should work to increase consumer awareness of biofuels.
4. The U.S. should bolster infrastructure supports and expand geographic locations of biofuel production facilities.
5. The U.S. should increase the authority of its agencies to play an active role in overseeing the nation's biofuel initiatives.

