

Raising Cane: Cuban Sugarcane Ethanol's Economic and Environmental Effects on the United States

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In the coming decades the United States will need to change its energy policy to face two immense challenges: adjusting to peak oil, and halting the advance of climate change. Liquid biofuels — made from renewable, biologically-based sources of energy, rather than finite and climate change-inducing fossil fuels — will be an important component of any strategy to deal with the twin challenges of peak oil and climate change. While the United States has encouraged the production of biofuels in recent decades, the domestic ethanol industry, which is almost entirely corn-based, has a number of major flaws, among them its environmental effects. Other legal scholarship has focused on the environmental problems of the domestic ethanol industry and on the possibility of importing ethanol from countries with more environmentally-friendly ethanol production. One possibility that has thus far largely been ignored, however, is the possibility of the United States importing sugarcane-based ethanol from Cuba. This Article attempts to close that gap in the legal literature. This Article begins with an overview of the U.S. corn-based ethanol industry and demonstrates that its growth has been driven to a large degree by domestic politics. The Article then shifts its focus to Cuba, describing the potential for that country to develop a sugarcane-based ethanol industry as well as the challenges such an industry will face. The remainder of this Article discusses the environmental and economic effects that the growth of such an industry would have on the United States. In concluding, this Article asserts that while Cuban sugarcane-based ethanol will not be a complete solution to either peak oil or climate change, it can and should be included in future U.S. energy policy. It further concludes, when the post-Castro era begins, the United States should move quickly to encourage the growth of a Cuban sugarcane-based ethanol industry.

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I. INTRODUCTION

“The United States of America cannot afford to bet our long-term prosperity and security on a resource that will eventually run out.”¹ This dramatic quote from President Obama opens the White House’s forty-four page *Blueprint for a Secure Energy Future*.² The resource referred to, oil, is indeed finite. “[T]he output of conventional oil will peak in 2020,” according to estimates from the chief economist for the International Energy Agency.³ The transportation sector has increased its oil consumption over the past thirty years in the United States while residential, commercial, and electric utilities have decreased consumption.⁴ Simply put, America’s oil problem is an automobile problem.

¹ WHITE HOUSE, BLUEPRINT FOR A SECURE ENERGY FUTURE 3 (2011), available at http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf.

² *Id.*

³ 2020 Vision, ECONOMIST, Dec. 10, 2009, <http://www.economist.com/node/15065719>. “Peak oil” is the point at which global oil production is at its highest. From that point onwards, total global oil output will be in decline. It should be noted that this is a later date for peak production than many others have predicted, and is used because it comes from a widely respected source. For other project peak production dates, see Phil Hart, *Looking in the Rear View Mirror*, THE OIL DRUM, May 18, 2011, <http://www.theoil Drum.com/node/7909>.

⁴ Bureau of Trans. Statistics, *Domestic Demand for Refined Petroleum Products by Sector*, US DEP’T OF TRANSP. (June 1, 2011), http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/2011/html/table_04_03. A key reason for this fact is that even while cars have gotten more fuel efficient in recent decades, Americans have been driving more. As Joseph B. White noted in a 2008 *Wall Street Journal* column: “From 1977 to 2001, the number of miles driven every year by Americans rose by 151% — about five times faster than the growth in population. . . .” Joseph B. White, *Next Car Debate: Total Miles Driven*, WALL ST. J., Feb. 5, 2008, <http://online.wsj.com/article/SB120190455899936509.html>. As White explains, this growth derives both from people living further from where they work and from the way new communities are physically laid out. “New neighborhoods often had street layouts cluttered with cul de sacs that forced people to drive farther to get to main roads or stores. Local zoning laws — reflecting the

There are a number of ways the U.S. transportation sector could reduce the amount of oil it consumes: raising vehicle fuel efficiency standards further; increasing and improving light rail and other public transportation options; building more walkable communities so daily errands could be made without using an automobile; encouraging people to live closer to where they work; and increasing the availability of electric cars.⁵

Yet, even using all of these strategies comprehensively will not change a fundamental fact of our oil-based transportation system — in certain areas (like rural communities and outer suburbs) the automobile is essential for transportation, and liquid fuel is extremely convenient for automobiles. With a liquid fuel engine, a driver can “re-charge” his or her car in a few minutes with a substance that is widely available from Boston to Boise and everywhere in between. With the conveniences of oil, however, come costs. Oil is a finite resource, and its consumption pollutes the air and contributes to climate change. Furthermore, it is expensive⁶ and will only get more expensive in the future.⁷ However, any realistic plan for dealing with a future of reduced oil use must include liquid fuels that are similar in convenience and availability to gasoline, given the geography of the United States, the state of the current domestic transportation system,⁸ and the ease of using liquid fuel for the personal automobile.

This does not mean, however, that corn-based ethanol, thus far the major liquid-fuel petroleum alternative pursued by the United States, is the best answer. While it has benefitted the Midwest economically, the domestic ethanol industry has also contributed to a number of negative environmental effects. There is, however, another liquid fuel option other than fossil-fuel based

preferences of residents — tended to separate commercial and residential uses, and single family from multi-family dwellings.” *See id.*

In other words, because of the way they are designed, many American communities are completely auto-dependent: residents cannot buy a cup of coffee without starting an internal combustion engine.

⁵ It should be noted that while electric cars would reduce petroleum demand, they are not a panacea for America’s energy and environmental issues. Much of the United States still gets its electricity from coal, so re-charging cars with electricity would in large part just transfer demand from one fossil fuel, oil, to another, coal. As of 2011, forty-six percent of the United States was getting its electricity from coal. *See* CONSTANTINE SAMARAS, JEFFREY A. DREZNER, HENRY H. WILLIS & EVAN BLOOM, RAND CORP., CHARACTERIZING THE U.S. INDUSTRIAL BASE FOR COAL POWERED ELECTRICITY, at xv (2011), available at http://www.rand.org/content/dam/rand/pubs/monographs/2011/RAND_MG1147.pdf.

⁶ Oil cost over ninety dollars a barrel as of December 2012. *Energy and Oil Prices*, BLOOMBERG, Dec. 29, 2012, <http://www.bloomberg.com/energy/>.

⁷ *See* Jeff Rubin, *Only a Recession Stands in the Way of \$200 Oil*, JEFFRUBINSMALLERWORLD.COM (Mar. 2, 2011), <http://www.jeffrubinssmallerworld.com/2011/03/02/only-a-recession-stands-in-the-way-of-200-oil/>.

⁸ Unlike Western Europe, the United States has population centers that are geographically dispersed, and, for better or for worse, most U.S. transportation infrastructure investment for the past fifty years has been in highways rather than in high speed rail or local public transportation. *See* White, *supra* note 4.

gasoline and corn-based ethanol. The Obama Administration's energy plan includes a wide range of strategies to reduce U.S. fossil fuel consumption, yet one strategy is notably absent from the *Blueprint*: replacing a percentage of U.S. gasoline with ethanol imported from outside the United States.⁹ A number of influential commentators, such as Thomas Friedman¹⁰ and *The Economist*,¹¹ have called for the United States to encourage the importation of sugarcane-based ethanol from countries like Brazil. But the possibility of importing ethanol from Cuba has been largely ignored by influential opinion-makers as well as the United States government.¹² While by no means a silver bullet for solving the United States' energy problems, importing ethanol made from sugarcane grown in Cuba would bring a number of environmental and economic benefits — partially offset by regionalized economic harms — to the United States. This possibility, at the very least, deserves much greater consideration and evaluation than it has thus far received.

This Article attempts to close this gap in the debate. It explains which specific combination of federal law and policy in the fields of agriculture, energy, and trade would encourage the growth of a sugarcane-based ethanol industry in Cuba. It also examines some of the barriers that must be overcome before such an industry can grow. Finally, it evaluates the environmental and economic changes that would occur in the United States as a result of the growth of such an industry. The Article is divided into four parts. Part II presents an overview of the U.S. ethanol industry. It argues that, because of national politics, the United States has promoted the growth of the domestic corn-based ethanol industry at the expense of promoting imports of sugarcane-based ethanol. Part III shifts the focus to Cuba. It explores the prospects for Cuba to develop a sugarcane-based ethanol industry and corresponding challenges.

The remainder of this Article considers possible environmental and economic effects that the growth of a successful Cuban sugarcane-based ethanol industry would have on the United States. Part IV identifies the environmental effects.

⁹ For an argument in favor of the United States importing sugarcane-based ethanol from Brazil, see Sean Charles Starr, *Sweet Rewards: How U.S. Trade Liberalization and Penetration of Brazilian Ethanol into the U.S. Market Can Stimulate America's Domestic Economy and Strengthen America's International Influence*, 8 DEPAUL BUS. & COM. L.J. 275 (2010). For an argument in favor of the United States importing jatropha-based ethanol from Mexico, see Sasha Glassman, *Proposed Amendments to Multilateral Trading Agreements to Encourage U.S.-Mexico Trade in Biofuels*, 17 U. BALT. J. ENVTL. L. 107 (2010).

¹⁰ Thomas L. Friedman, *Dumb as We Wanna Be*, N.Y. TIMES, Sept. 20, 2006, at A27.

¹¹ See Riberio Preto, *Lean, Green, and Not Mean*, ECONOMIST, June 26, 2008,

<http://www.economist.com/node/11632886> (discussing the benefits and downsides to producing ethanol from Brazilian sugarcane and finding that the U.S. should remove its tariff on imported ethanol).

¹² A search of Lexis Nexis for articles in major newspapers containing the terms "Cuba" and "ethanol" revealed just three editorial columns (along with a number of brief reader comments) calling for the United States to import sugarcane-based ethanol from Cuba.

Based on an evaluation of several factors, it demonstrates that ethanol from sugarcane grown in Cuba would be one of the most environmentally-friendly biofuels possible for the United States. Part V identifies the economic effects. Part V shows that the biggest economic impacts of Cuban sugarcane-based ethanol would be felt in two regions of the United States, the Midwest and the Southeast. Part V evaluates the effects on these two regions and on the United States generally. Before concluding, Part V evaluates how the U.S. drought of 2012 relates to the future of ethanol in the United States. The Article concludes that in order to achieve both environmental and economic benefits, the United States in the post-Castro era should encourage the development of a Cuban sugarcane-based ethanol industry.

II. THE DOMESTIC ETHANOL INDUSTRY

Ethanol currently makes up a relatively small portion of U.S. fuel usage. As of 2011, domestically produced ethanol was replacing about ten percent of U.S. gasoline consumption.¹³ The vast majority of this ethanol is produced from corn. Currently, in the United States, domestically produced ethanol is virtually synonymous with corn-based ethanol.¹⁴ “[I]n the world of U.S. bio-ethanol corn is king.”¹⁵

The domestic ethanol industry grew in large part due to governmental support. At the end of 2011, however, the federal tax credit for ethanol expired,¹⁶ and the future of federal involvement in promoting ethanol remains in doubt pending the passage of a new Farm Bill. Before the end of 2011, ethanol was, as Senator Dianne Feinstein said, “the only industry that benefits from a triple crown of government intervention: its use is mandated by law, it is protected by tariffs, and companies are paid by the federal government to use it.”¹⁷ Although there have also been too many smaller federal and state incentives for the industry to list¹⁸ (e.g. loan guarantees for refinery

¹³ U.S. Dep’t of Agric. Econ. Research Serv., *Bioenergy: Background*, U.S. DEP’T OF AGRIC. (May 27, 2012), <http://www.ers.usda.gov/topics/farm-economy/bioenergy/background.aspx>.

¹⁴ For a discussion of and criticism of the U.S. corn-based ethanol industry and the policies that support it, see Jonathan Volinski, *Shucking Away the Husk of a Crop Gone Wrong: Why the Federal Government Needs to Replant its Approach to Corn-Based Ethanol*, 25 TUL. ENVTL. L. J. 507 (2012).

¹⁵ Brent Erickson & Matthew T. Carr, *Bio-Ethanol Development in the USA*, in WILEY SERIES IN RENEWABLE RESOURCES, BIOFUELS 39, 43 (Wim Soetaert & Erick J. Vandamme eds., 2009).

¹⁶ Robert Pear, *After Three Decades, Tax Credit for Ethanol Expires*, N.Y. TIMES, Jan. 1, 2012, www.nytimes.com/2012/01/02/business/energy-environment/after-three-decades-federal-tax-credit-for-ethanol-expires.html.

¹⁷ *Senators Coburn, Feinstein Introduce Bill to Eliminate Ethanol Subsidy and Tariff*, TOM COBURN, M.D., US SENATOR FROM OKLA. (May 3, 2011), http://coburn.senate.gov/public/index.cfm/pressreleases?ContentRecord_id=d814a8d6-32bd-46d8-89bc-c61d65373f45.

¹⁸ For a discussion of state incentives for the ethanol industry, see Volinski, *supra* note 14, at

construction), the three policies mentioned by Senator Feinstein were the primary means by which the government fostered the growth of the domestic ethanol industry. These three policies were the Renewable Fuel Standard (RFS),¹⁹ the Volumetric Ethanol Excise Tax Credit (VEETC),²⁰ and the tariff on imported ethanol.²¹ Of these three, only the RFS is law as of January 2013.

These three policies worked together in the 2000s to encourage the domestic ethanol industry and protect it from foreign competition. The RFS was established in 2007 as part of the Energy Independence and Security Act of 2007.²² In the words of a USDA Economic Research Service report summary, the RFS “specifies not just the total level of [U.S.] biofuels to be used until 2022, but also target levels for fuels produced from major feedstock categories.”²³ The Volumetric Ethanol Excise Tax Credit, or VEETC, gave those who blended or marketed ethanol a forty-five cent per gallon tax credit for every gallon of ethanol blended with gasoline.²⁴ Finally, the ethanol tariff was a fifty-four cent tariff on each gallon of ethanol that was imported into the United States.²⁵ While these provisions may be re-instated in a future Farm Bill passed by a more ethanol-friendly Congress, through 2012 bi-partisan pressure against federal support for the ethanol industry was enough to keep them from being revived.²⁶

The degree to which the federal government decided to support the corn-based ethanol industry may have reflected more on the industry’s ability to influence national politics than on its merits as an endeavor. “The emergence of corn as the primary feedstock for U.S. ethanol is the product of its abundance and political prowess.”²⁷ The domestic ethanol industry has very strong ties to one region of the United States, the Midwest. More than eighty-five percent of U.S. ethanol bio-refineries are in the twelve states of the Midwest, the premier

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¹⁹ Alternative Fuels Data Ctr., *Renewable Fuels Standard (RFS) Program*, U.S. DEP’T OF ENERGY, <http://afdc.energy.gov/laws/law/US/390> (last updated Feb. 26, 2013).

²⁰ Alternative Fuels Data Ctr., *Expired, Repealed, and Archived Federal Incentives and Laws*, U.S. DEP’T OF ENERGY, http://afdc.energy.gov/laws/laws_expired/ (last updated Feb. 26, 2013).

²¹ *Id.*

²² Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1493 (codified as amended in scattered sections of 42 U.S.C.).

²³ US DEP’T OF AGRIC., *ETHANOL AND A CHANGING LANDSCAPE I (2009)*, available at <http://www.ers.usda.gov/media/153816/err86.pdf>.

²⁴ *Conflicting Congressional Action on Ethanol Subsidies*, NAT’L SUSTAINABLE AGRIC. COAL. BLOG (June 17, 2011), <http://sustainableagriculture.net/blog/ethanol-votes/>.

²⁵ *Id.*

²⁶ The bi-partisan anti-ethanol coalition of Tea Party-identified Republicans wary of governmental intervention in the free market and Democrats from non-ethanol producing states is exemplified by the cooperation between Senators Feinstein (D-CA), and Coburn (R-OK). See *supra* note 17.

²⁷ Erickson & Carr, *supra* note 15, at 46.

corn growing region of the United States.²⁸ According to the most recent data from the U.S. Energy Information Administration, there are 172 ethanol plants in the Midwest and just twenty-two plants in all other regions of the United States combined.²⁹ U.S. corn production is concentrated in the Midwest, with just Iowa and Illinois together providing about one third of the annual United States crop.³⁰

Due to a number of circumstances, some of them coincidental, the states with the most to gain from federal policies supporting corn-based ethanol have in recent years been some of the most politically influential states. Iowa's disproportionate political influence as the home of the country's first presidential nominating contest is a notorious idiosyncrasy of the U.S. political process,³¹ but this is far from the only political quirk that has benefitted the domestic ethanol industry. In the twenty-year period between 1985 and 2005, the Senate Majority or Minority Leader of either the Republican or Democratic parties was from the Midwest.³² In the eight-year period between 1999 and 2007, the Speaker of the House³³ was from Illinois, the number two state for corn production. Additionally, during the six-year period from 1989 and 1995, the House Democratic Leader³⁴ not only represented Missouri, a top ten corn producer state,³⁵ but also represented the congressional district containing the headquarters for Monsanto, a major global agricultural corporation heavily involved in U.S. corn production.³⁶ Thus, in the two-decade period between the mid-1980s and mid-2000s, the U.S. corn industry had a "perfect storm" of circumstances giving it political influence and the opportunity to favorably

²⁸ *Id.*

²⁹ See U.S. Fuel Ethanol Plant Production Capacity, U.S. ENERGY INFO. ADMIN., <http://www.eia.gov/petroleum/ethanolcapacity/> (last visited Aug. 17, 2012).

³⁰ U.S. Dep't of Agric. Econ. Research. Serv., *Corn: Background*, U.S. DEP'T OF AGRIC., <http://www.ers.usda.gov/topics/crops/corn/background.aspx> (last updated Jan. 17, 2013).

³¹ Peter S. Canellos, *Iowans Bring Special-Interest Agenda to Caucuses*, BOS. GLOBE, Nov. 27, 2007, at A2.

³² Senator Bob Dole of Kansas was Senate Republican leader from 1985-1996, and Senator Tom Daschle of South Dakota was Senate Democratic Leader from 1995-2005. See U.S. Senate: *Majority and Minority Leaders and Party Whips*, U.S. SENATE [hereinafter *Majority and Minority Leaders and Party Whips*], http://www.senate.gov/artandhistory/history/common/briefing/Majority_Minority_Leaders.htm (last visited Aug. 19, 2012).

³³ *Speakers of the House (1789 to present)*, HISTORY, ART & ARCHIVES: U.S. HOUSE OF REPS., http://artandhistory.house.gov/house_history/speakers.aspx (last visited Aug. 17, 2012).

³⁴ *Majority Leaders of the House (1899-Present)*, HISTORY, ART & ARCHIVES: U.S. HOUSE OF REPS., [hereinafter *Majority Leaders of the House*], <http://artandhistory.house.gov/househistory/leaders.aspx> (last visited Aug. 17, 2012).

³⁵ See U.S. DEP'T OF AGRIC., NAT'L AGRIC. STATISTICS SERVICE, 2012 ACREAGE REPORT 6 (2012) [hereinafter 2012 ACREAGE REPORT], available at <http://www.usda.gov/nass/PUBS/TODAYRPT/acrg0612.pdf> (reporting area planted for corn in each state).

³⁶ *Company History*, MONSANTO, <http://www.monsanto.com/whoware/Pages/monsanto-history.aspx> (last visited Aug. 17, 2012).

shape U.S. agricultural policy.

In the 2010 elections, however, corn-based ethanol suffered a dramatic reversal of its political fortunes. Neither the current Senate Majority Leader nor Senate Minority Leader³⁷ is from a major (that is, top ten) corn producing state.³⁸ While the Speaker of the House³⁹ is from a major corn producing state,⁴⁰ neither the House Majority Leader nor Minority Leader⁴¹ is from a state with significant corn production.⁴² Additionally, and perhaps much more significantly, the composition of the House Agriculture Committee changed in a number of ways with the 2010 election.

In the 2010 election, the Democratic Party narrowly retained control of the U.S. Senate, while the Republican Party took control of the U.S. House of Representatives. While congressional party shifts are a routine occurrence in American politics, the 2010 elections were notable in two respects. They brought a large number of freshmen to the House of Representatives, as well as a large number of representatives who campaigned on platforms explicitly opposing government spending and government action in general.⁴³ This shift in the larger House of Representatives was reflected in the change in composition of the House Agriculture Committee. Half of the members of the current committee — sixteen of the Republicans and seven of the Democrats — were new to the committee.⁴⁴ Characterized by a desire to cut government spending wherever possible, these new committee members pushed for reductions in all forms of federal agricultural subsidies in debates over the 2012 Farm Bill. Their opposition prevented the House of Representatives from passing a final version of the Farm Bill before the end of 2012.⁴⁵ Because of the U.S. budget deficit, it is certain that the next Farm Bill — a final version of which had not been agreed to by Congress as of January 2013 — will cut federal agricultural spending. The unanswered questions are which programs will be cut, and by how much.

³⁷ *Majority and Minority Leaders and Party Whips*, *supra* note 32 (listing Senators Harry Reid (D-NV) and Mitch McConnell (R-KY), respectively).

³⁸ 2012 ACREAGE REPORT, *supra* note 35, at 6.

³⁹ *Majority Leaders of the House*, *supra* note 34 (listing Representative John Boehner (R-OH)).

⁴⁰ 2012 ACREAGE REPORT, *supra* note 35, at 6.

⁴¹ *Majority Leaders of the House*, *supra* note 34 (listing Representatives Eric Cantor (R-VA) and Nancy Pelosi (D-CA), respectively).

⁴² 2012 ACREAGE REPORT, *supra* note 35, at 6.

⁴³ Cf. Mara Liasson, *Tea Party Clout: How Will It Affect Congress, 2012?*, NPR (Nov. 4, 2010), <http://www.npr.org/templates/story/story.php?storyId=131068694> (discussing the importance of the Tea Party to the 2010 elections and the party's avid opposition to government spending).

⁴⁴ See *Committee Members*, U.S. HOUSE COMM. ON AGRIC., <http://agriculture.house.gov/about/membership> (last visited Aug. 17, 2012).

⁴⁵ Ron Nixon, *New Effort in Congress to Extend Disputed Farm Bill*, N.Y. TIMES, Dec. 28, 2012, <http://www.nytimes.com/2012/12/29/us/politics/new-effort-in-congress-to-extend-disputed-farm-bill.html>.

The political landscapes of both the United States and Cuba may shift quickly over the course of the coming years, and changes in one may be influential in the other. The most obvious example of such cross-border political influence, under Castro, U.S. agricultural relations with Cuba have been implemented as ad hoc responses to changes in the bilateral status quo. If Castro were to die before Congress agrees upon the final version of the next Farm Bill, it is much more likely that changes to U.S. agricultural relations with Cuba would be implemented on a structured, longer-term basis. Thus, it is essential to consider the prospects for a Cuban sugarcane-based ethanol industry and the potential policy implications for the United States of such an industry.

III. THE POTENTIAL CUBAN ETHANOL INDUSTRY

To speak of a Cuban sugarcane-based ethanol industry is, at this point, largely a matter of speculation.⁴⁶ Because of the anti-ethanol views of Fidel Castro (who has said that ethanol should be discouraged because it diverts crops from food to fuel),⁴⁷ Cuba currently has almost no ethanol industry. In the words of Ronald Soligo and Amy Myers Jaffe of the Brookings Institution, “Despite the fact that Cuba is dependent on oil imports and is aware of the demonstrated success of Brazil in using ethanol to achieve energy self-sufficiency, it has not embarked on a policy to develop a larger ethanol industry from sugarcane.”⁴⁸ There is, however, no reason why such an industry cannot be developed. As Soligo and Jaffe wrote, “In addition, Cuba has large land areas that once produced sugar but now lie idle. These could be revived to provide a basis for a world-class ethanol industry. We estimate that if Cuba achieves the yield levels attained in Nicaragua and Brazil and the area planted with sugarcane approaches levels seen in the 1970s and 1980s, Cuba could produce up to 2 billion gallons of sugar-based ethanol per year.”⁴⁹

The ideal domestic policy scenario for the creation of a robust Cuban sugarcane ethanol industry would be a situation in which: the U.S. trade embargo on Cuba is ended; U.S. tariff barriers are removed (in the case of sugar) or not revived (in the case of ethanol); and the RFS requiring that a certain percentage of U.S. fuel come from ethanol remain in place. Of course, changes in United States policy alone, even those that ensure a steady source of demand

⁴⁶ For an evaluation of Cuba's potential sugarcane-based ethanol industry, see generally Christian Santiago Putiño, *The Cuban Sugar Dilemma: The Prospect for a Green Future*, in CUBA IN TRANSITION 299 (2009), available at <http://www.ascecuba.org/publications/proceedings/volume19/pdfs/patino.pdf>.

⁴⁷ Andres Oppenheimer, *Surprise! Chavez and Castro May be Partly Right*, ORLANDO SENTINEL, Apr. 29, 2007, at A11.

⁴⁸ Ronald Soligo & Amy Myers Jaffe, *Energy Balances and the Potential for Biofuels in Cuba*, in CUBA'S ENERGY FUTURE 80, 94 (Jonathan Benjamin-Alvarado ed., 2010).

⁴⁹ *Id.* at 80.

for Cuban sugarcane-based ethanol, would not be enough to create an ethanol industry from scratch. Cuba will need to foster the industry as a key goal of the post-Castro era and shape its domestic policies to encourage the growth of the industry.

Given that the Cuban sugar industry lived and died by its ties with the Soviet Union for several decades of the Twentieth Century,⁵⁰ Cuba will likely be quite wary of investing too much in the creation of a sugarcane ethanol industry that it perceives as being largely a creature of U.S. energy and agricultural policy. Therefore, the creation of a significant sugarcane ethanol industry in Cuba will require a large increase in domestic demand for ethanol. One way that Cuba could encourage domestic demand for ethanol would be to follow the Brazilian model of encouraging the purchase of Flex Fuel vehicles, which can run on any blend of fuel between 100% gasoline and 100% ethanol.⁵¹ Given the relative poverty of Cuba's population, as indicated by the number of vehicles in the country that are several decades old,⁵² expecting new vehicles to provide a source of demand for ethanol may be an extremely unrealistic prospect. On the other hand, potential pent-up demand for new automobiles, alongside sufficient and well-directed government incentives, could accelerate demand for Flex Fuel vehicles relative to other countries.

Like all new capitalist industries to emerge in the post-Castro era, whatever ethanol industry arises will have to deal with the painful transition from socialism to capitalism. The Cuban sugarcane ethanol industry will face similar challenges to other private sector industries that arise in the post-Fidel era. One of these challenges will be simply a lack of people with skills necessary for any industry. According to Edward Gonzalez and Kevin McCarthy of the RAND Corporation, "[A]s a result of 40-plus years of communism, the labor force lacks the kinds of trained managers, accountants, auditors, bankers, insurers, etc., that a robust market economy requires."⁵³ While these challenges will not be unique to Cuba's ethanol industry, they will put the country at a competitive disadvantage *vis-à-vis* existing ethanol exporters such as Brazil. This will be especially true if there is a significant lag time between the expiration of the ethanol tariff barriers at the end of 2011 and the eventual removal of the United

⁵⁰ Cuba's sugar industry was especially hit hard by the collapse of the USSR in 1991, as the latter country had paid inflated prices for Cuban sugar. See Marc Frank, *Cuba Eyes Foreign Investment to Halt Sugar Decline*, REUTERS, Mar. 25, 2010, <http://www.reuters.com/article/2010/03/25/cuba-sugar-investment-idUSN2415938820100325/>.

⁵¹ Arnaldo Walter, *Bio-Ethanol Development(s) in Brazil*, in WILEY SERIES IN RENEWABLE RESOURCES, BIOFUELS, *supra* note 15, at 55, 55.

⁵² Paul Haven, Associated Press, *Cuba Makes it Official: Ordinary Citizens Can Buy and Sell Cars*, MACLEANS (Sept. 28, 2011), <http://www.macleans.ca/article.jsp?content=w9574231>.

⁵³ EDWARD GONZALEZ & KEVIN F. MCCARTHY, RAND CORP., CUBA AFTER CASTRO: LEGACIES, CHALLENGES, AND IMPEDIMENTS, at xxi (2004), available at http://www.rand.org/content/dam/rand/pubs/monographs/2004/RAND_MG111.pdf.

States trade embargo against Cuba.

Additionally, because Cuba's ethanol industry is currently almost non-existent, it will need a great deal of foreign expertise and investment to get started. However, such investments are unlikely to be made unless Cuba makes fundamental changes in its business climate. In the words of Gonzalez and McCarthy, "[C]apital investment, which Cuba's economy desperately needs and which is most likely to be supplied by foreign investors, will be difficult to attract without enforceable contracts, access to neutral adjudication of disputes, and a degree of predictability that has heretofore been lacking."⁵⁴ Any post-Castro government will likely begin to make such changes to increase the appeal of the island nation to foreign investment. However, implementing these changes will take time and trial and error, which will slow the creation of a sugarcane-based ethanol industry.

IV. ENVIRONMENTAL EFFECTS OF ETHANOL

Assuming that Cuba is able to meet all the challenges standing in the way of creating a sugarcane-based ethanol industry, including the removal of U.S. legal barriers, and it begins importing ethanol to the United States, the United States would benefit environmentally in two ways. First, Cuban sugarcane-based ethanol would directly benefit the United States by reducing the negative environmental effects of corn-based ethanol production, to the extent to which it replaced domestically produced corn-based ethanol.⁵⁵ Second, by reducing greenhouse gas emissions, Cuban sugarcane-based ethanol would indirectly benefit the United States as well as the rest of the world by reducing the speed of global climate change.⁵⁶

A. *Environmental Effects of Corn-Based Ethanol*

A chief argument in favor of the domestic corn-based ethanol industry is that it is environmentally beneficial because it reduces greenhouse gas emissions.⁵⁷ Scientists, industry advocates, and critics hotly contest the degree to which greenhouse gas emissions are reduced by replacing a percentage of U.S. gasoline consumption with domestically-produced corn-based ethanol. It is beyond the scope of this Article to weigh in on which evaluation is correct.⁵⁸

⁵⁴ *Id.* at 103.

⁵⁵ As will be discussed below, imported ethanol is likely to displace at least some domestic ethanol and dampen its production. *See infra* Part V.

⁵⁶ For purposes of simplified organization, the environmental effects of the domestic ethanol industry, including climate change effects, will be discussed together.

⁵⁷ *Ethanol Facts: Environment*, RENEWABLE FUELS ASS'N, <http://www.ethanolrfa.org/pages/ethanol-facts-environment> (last visited Aug. 18, 2012).

⁵⁸ *See e.g.*, MICHAEL WANG & ZIA HAO., LETTER TO SCIENCE 1-3 (2008), available at http://www.afdc.energy.gov/afdc/pdfs/letter_to_science_andoe_03_14_08.pdf; Bruce Babcock et

Nonetheless, the factors that go into these scientific evaluations, are important for understanding the larger picture of the ethanol issue, and thus will be discussed.

Using any form of ethanol as a transportation fuel combats climate change because the carbon released when ethanol is burned was captured out of the atmosphere by the plants used to make the ethanol. Contrastingly, the carbon released when gasoline is burned had been stored in the earth for millennia in the form of crude oil.⁵⁹ This simple fact is complicated by the reality that the entire process of getting ethanol into the fuel tanks of drivers — from growing crops, to creating a refined product, to delivering blended ethanol to gas stations — is reliant on fossil fuels. According to one report, “If corn growth required only photosynthesis, if ethanol were produced using solar power, if corn were instantly transported to ethanol plants, and if no land use changes were needed to grow the corn, then displacing a gallon of gasoline with ethanol would reduce greenhouse gas emissions by approximately [the equivalent of] 11.2 kilograms of [carbon dioxide]. However, fossil fuels are used to grow corn and produce ethanol.”⁶⁰

The debit side of the domestic ethanol industry’s climate-change ledger begins to subtract from the credit side before the corn it uses is even planted. “America’s corn crop might look like a sustainable, solar-powered system for producing food, but it is actually a huge, inefficient, polluting machine that guzzles fossil fuel.”⁶¹ While advocates for corn production would dispute this characterization of the industry as “inefficient” and “polluting,” it is undeniable that conventional corn production techniques use large amounts of climate change-exacerbating fossil fuels. Conventional (non-organic) corn production techniques involve annual applications of fertilizers and pesticides, both largely derived from fossil fuels.⁶²

The process by which incentives for ethanol production change land use patterns and thereby impact climate change, known as indirect land use change (ILUC), happens roughly as follows.⁶³ By increasing demand for corn, corn-based ethanol production drives up the price of corn. As the price of corn

al., IOWA AG REV. ONLINE, *Is Corn Ethanol a Low-Carbon Fuel?*, CNTR. FOR AGRIC. & RURAL DEV. (2007), http://www.card.iastate.edu/iowa_ag_review/fall_07/article1.aspx; David Biello, *Biofuels are Bad for Feeding People and Combating Climate Change*, SCI. AM., (Feb. 7, 2008), <http://www.scientificamerican.com/article.cfm?id=biofuels-bad-for-people-and-climate>.

⁵⁹ See Michael Pollan, *The Great Yellow Hope* (May 24, 2006) [hereinafter Pollan, *The Great Yellow Hope*], <http://michaelpollan.com/articles-archive/the-great-yellow-hope/>.

⁶⁰ Babcock et al., *supra* note 58.

⁶¹ Michael Pollan, *When a Crop Becomes King* (July 19, 2002), <http://michaelpollan.com/articles-archive/when-a-crop-becomes-king/>.

⁶² Non-organic fertilizers are largely derived from natural gas, while pesticides are largely derived from petroleum. Pollan, *The Great Yellow Hope*, *supra* note 59.

⁶³ For a thorough discussion of indirect land use change, see Daniel A. Farber, *Indirect Land Use Change, Uncertainty, and Biofuels*, 2011 U. ILL. L. REV. 381 (2011).

increases, farmers want to grow more of it. By making corn more appealing to farmers to grow than other crops, and thereby increasing national levels of corn-production, the corn-based ethanol industry makes the negative environmental effects of corn production more widespread. Conventional corn-growing techniques involve applying more pesticides and fertilizers to corn than is usually applied to other row crops such as soybeans.⁶⁴ This effect is exacerbated when high corn prices disincentivize crop rotation.⁶⁵ A common technique in American agriculture today is rotating corn and soybeans.⁶⁶ Because soybeans are a nitrogen-fixing crop (that is, they take nitrogen out of the atmosphere and release it into the soil), corn grown on land that was used to grow soybeans the year before requires a lesser input of nitrogen fertilizer.

By boosting the price of corn relative to other crops like soybeans, however, the domestic ethanol industry encourages farmers to use the same piece of land to grow corn year after year. Growing corn on the same land in successive years rather than rotating it with soybeans significantly increases the climate change effects of corn production because “nitrogen fertilizer applications are typically fifty pounds per acre higher for corn planted after corn” and “nitrous oxide has a global warming potential more than 300 times that of [carbon dioxide].”⁶⁷ Additionally, the application of fossil fuel-derived nitrogen fertilizer has other environmental impacts beyond exacerbating climate change. The collective nitrogen runoff of the Mississippi River basin has caused a process called hypoxia, which kills off most marine life, in a region of the Gulf of Mexico. Scientists have linked the so-called Dead Zone to corn production and, thus, to the domestic ethanol industry.⁶⁸

Incentivizing farmers to grow consecutive corn crops instead of alternating with soybean crops is only the least damaging of the environmentally detrimental land use changes that the domestic ethanol industry encourages. Land is primarily converted to corn production in one of three ways: land that is already used to grow another crop is converted to corn production, land that is used for pasture or is enrolled in a program like the Conservation Reserve Program⁶⁹ is converted to cropland, or native habitat is plowed and converted to

⁶⁴ REBECCA BROOKE ET AL., CORN ETHANOL AND WILDLIFE: HOW INCREASES IN CORN PLANTINGS ARE AFFECTING THE PRAIRIE POTHOLE REGION 7 (2009), *available at* <http://www.nwf.org/~media/PDFs/Wildlife/01-13-10-Corn-Ethanol-Wildlife.pdf>.

⁶⁵ Because different crops take different types and amounts of nutrients out of the soil, the technique of crop rotation — growing different crops on the same piece of land in successive years — has been used since the Middle Ages to boost agricultural yields.

⁶⁶ Babcock et al., *supra* note 58.

⁶⁷ *Id.*

⁶⁸ Carolyn Lochhead, *Dead Zone in Gulf Linked to Ethanol Production*, S.F. CHRON., July 6, 2010, www.sfgate.com/politics/article/Dead-zone-in-gulf-linked-to-ethanol-production-3183032.php.

⁶⁹ The Conservation Reserve Program, first authorized in 1985, is a voluntary federal program in which farmers take cropland or certain marginal pastures out of production and plant them with long-term cover (e.g. grasses) in order to protect soil and water and to provide habitat for wildlife. In

cropland.⁷⁰ Each of these has varying levels of negative environmental effects. All three types of land use conversions are underway in the Great Plains states, which have ramped up corn production in response to demand from the ethanol industry.⁷¹ While it is not the only reason corn production is increasing in these states,⁷² the corn-based ethanol industry and thus the governmental policies encouraging it are clearly factors driving land use conversion. “While many factors influence land-use changes, the relationship between ethanol incentives and habitat destruction is fairly clear. Ethanol incentives increase demand for corn, which in turn increases corn prices. Increased corn prices lead to land being converted from other uses to corn production.”⁷³

Converting pasture or Conservation Reserve Program Land to cropland causes more damage than changing crop rotation patterns in already cropped land.⁷⁴ Yet, the most environmentally damaging way of converting land to crop production is to plow native habitat and plant it with row crops.⁷⁵ This process is underway now in the Great Plains, with devastating environmental effects. Although the most recent data is from 2007, the USDA’s census of agriculture (published every five years) provides a clear picture of the trend lines of U.S. agricultural production. This picture is one of greatly increased corn production in the Great Plains states. According to the Census of Agriculture, the number of acres of corn production in North Dakota has increased from 592,078 acres in 1997 to 991,390 acres in 2002⁷⁶ to 2,348,171 acres in 2007,⁷⁷ representing more

return, The USDA provides the farmers with annual rental payments. The program has been successful at both helping to reduce soil erosion and providing habitat for wildlife, including threatened species like the prairie chicken. See U.S. DEP’T OF AGRIC., CONSERVATION RESERVE PROGRAM AND CONSERVATION RESERVE ENHANCEMENT PROGRAM 1-2 (2009), available at http://www.usda.gov/documents/CONSERVATION_RESERVE_PROGRAM_AND_CONSERVATION_RESERVE.pdf.

⁷⁰ BROOKE ET AL., *supra* note 64, at 5.

⁷¹ See *id.* at 1, 5; Farber, *supra* note 63, at 389.

⁷² Significant factors driving land use changes in the region are, according to a report from the National Wildlife Federation, “high commodity prices, the limited profitability of ranching, new farming technologies and genetically modified crop varieties that make new land suitable for production, economic incentives offered by crop insurance and disaster payments, and the lack of disincentives to discourage the plowing of prairie.” BROOKE ET AL., *supra* note 64, at 5.

⁷³ *Id.* at 1.

⁷⁴ *Id.* at 5.

⁷⁵ Cf. Les G. Firbank, *Assessing the Ecological Impacts of Bioenergy Projects*, 1 BIOENERGY RES. 12 (2008) (discussing the pressures and impacts bioenergy crops exert on various ecosystems); Stuart L. Pimm et al., *Can We Defy Nature’s End?*, 293 SCI. 2207, 2207-08 (2001) (connecting the loss of tropical forests with increased croplands and stating “[b]iodiversity can be depleted if property rights give ownership to those whose ‘economic use’ translates into short-term forest clear-cutting, transient crops or grazing, and longer-term land degradation”).

⁷⁶ U.S. DEP’T OF AGRIC., 2002 CENSUS OF AGRICULTURE: NORTH DAKOTA STATE AND COUNTY DATA 26 (2004), available at http://www.agcensus.usda.gov/Publications/2002/Volume_1,_Chapter_1_State_Level/North_Dakota/NDVolume104.

⁷⁷ U.S. DEP’T OF AGRIC., 2007 CENSUS OF AGRICULTURE: NORTH DAKOTA STATE AND

than a doubling over five years and close to a quadrupling over ten years. Similarly, in South Dakota, the number of acres in corn grew from 3,165,190 in 2002 to 4,455,368 in 2007,⁷⁸ an increase of forty-one percent over five years. In Nebraska, the number of acres in corn (for grain) increased from 7,344,715 in 2002 to 9,192,656 in 2007,⁷⁹ a more modest but still significant increase of twenty-five percent over five years.

While a major portion of this increase in corn production in the Great Plain states is attributable to farmers converting land already used to grow other crops or pasture to corn production,⁸⁰ much of it also derives from plowing native habitat. "Recent dramatic increases in corn plantings have been heavily concentrated in the Prairie Pothole Region, displacing other crops as well as sensitive prairie pothole habitat."⁸¹ The trend of replacing native habitat with fields of corn is an extremely worrying development, and is arguably the strongest reason for displacing at least some domestic corn-based ethanol with Cuban sugarcane-based ethanol. Therefore, this trend will be discussed in some depth.

Increased corn production is degrading two environmentally significant habitats in the Great Plains, grasslands and wetlands. According to The Nature Conservancy, "grasslands and prairies are the world's most imperiled ecosystem."⁸² While grasslands once stretched across the entire central portion of the United States, it has lost between eighty-three and ninety-nine percent of its original tall grass prairie habitat.⁸³ U.S. grasslands are the native habitat of a number of threatened and endangered species, such as the greater prairie

COUNTY DATA 27 (2009) [hereinafter 2007 CENSUS: NORTH DAKOTA], *available at* http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/North_Dakota/ndv1.pdf.

⁷⁸ U.S. DEP'T OF AGRIC., 2007 CENSUS OF AGRICULTURE: SOUTH DAKOTA STATE AND COUNTY DATA 27 (2009), *available at* http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/South_Dakota/st46_1_033_033.pdf.

⁷⁹ See U.S. DEP'T OF AGRIC., 2007 CENSUS OF AGRICULTURE: NEBRASKA STATE AND COUNTY DATA 26 (2009) [hereinafter 2007 CENSUS: NEBRASKA], *available at* http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Nebraska/nev1.pdf; U.S. DEP'T OF AGRIC., 2002 CENSUS OF AGRICULTURE: NEBRASKA STATE AND COUNTY DATA 26 (2004), *available at* http://www.agcensus.usda.gov/Publications/2002/Volume_1,_Chapter_1_State_Level/Nebraska/NEVolume104.

⁸⁰ While the number of North Dakota acres planted with corn increased from 2002 to 2007, during this same time period the number of acres planted with canola, flaxseed, and oats decreased, pointing to crop rotation shifts in favor of corn. See 2007 CENSUS: NORTH DAKOTA *supra* note 77, at 27.

⁸¹ BROOKE ET AL., *supra* note 64, at 4.

⁸² *Grasslands and Prairies: Conserving These Crucial but Endangered Habitats*, THE NATURE CONSERVANCY (2011), <http://www.nature.org/ourinitiatives/habitats/grasslands/index.htm>.

⁸³ BROOKE ET AL., *supra* note 64, at 4; U.S. DEP'T OF INTERIOR, FISH & WILDLIFE SERV., FINDING SOLUTIONS TO HABITAT LOSS 1 (2002), *available at* <http://www.fws.gov/birds/documents/HabitatLoss.pdf>.

chicken,⁸⁴ which cannot live in cornfields.⁸⁵ In addition to reducing the overall amount of habitat available to native species, the process of plowing grassland to grow crops fragments habitat by splitting it into disconnected segments.⁸⁶ The negative effects on wildlife of converting grasslands to corn fields, and thereby also fragmenting what habitat remains, are well-documented. “[I]n counties with high corn [production] increases, the average number of grassland [bird] species was found to decline significantly from 2005 to 2008.”⁸⁷

Furthermore, in addition to providing habitat for wildlife, grasslands act as a carbon sink, keeping centuries’ worth of accumulated atmospheric carbon in underground root systems.⁸⁸ When native grassland is plowed to grow crops like corn, the carbon stored in its soil is released into the atmosphere, further exacerbating climate change and counterbalancing the greenhouse gas benefits of replacing fossil fuel-based gasoline with corn-based ethanol.⁸⁹ Taken together, the environmental costs of increasing domestic corn-based ethanol production by plowing native grasslands in the Great Plains starkly outweigh their benefits. “Plowing up our nation’s last remnants of native grasslands to grow more corn for ethanol is like burning the Mona Lisa for firewood.”⁹⁰

Along with grasslands, wetlands are the other major habitat type in the Great Plains that are being damaged by the domestic corn-based ethanol industry. The draining of wetlands to convert them to agricultural production is a practice in American agriculture that predates the domestic ethanol industry.⁹¹ This trend has been exacerbated by a number of legal and policy factors unrelated to ethanol production (including a 2001 Supreme Court decision interpreting the

⁸⁴ *The Greater Prairie Chicken*, THE NATURE CONSERVANCY (2011), <http://www.nature.org/newsfeatures/specialfeatures/animals/birds/greater-prairie-chicken.xml>.

⁸⁵ It should not be surprising that a corn field can support less species diversity than a grassland, given that the goal of conventional corn production is to use chemical pesticides and herbicides to reduce the number of species in a corn field to one — *Zea mays*. See BROOKE ET AL., *supra* note 64, at 6.

⁸⁶ See Bill Allen, *An Interview with Dr. Marissa Ahlering*, THE NATURE CONSERVANCY, <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/northdakota/explore/interview-with-dr-marissa-ahlering.xml> (last visited Aug. 17, 2012).

⁸⁷ See BROOKE ET AL., *supra* note 64, at 11.

⁸⁸ FAO Corp. Document Repository, *Chapter 4: Biophysical Aspects of Carbon Sequestration in Drylands*, in CARBON SEQUESTRATION IN DRYLAND SOILS (2004), <http://www.fao.org/docrep/007/y5738e/y5738e08.htm>.

⁸⁹ BROOKE ET AL., *supra* note 64, at 3.

⁹⁰ *Protecting Wildlife and a Way of Life*, THE NAT’L WILDLIFE FED’N (Sept. 30, 2011), <http://blog.nwf.org/wildlifepromise/2011/09/protecting-wildlife-and-a-way-of-life-americas-grasslands-conference/>.

⁹¹ Cf. MARC RIBAUDO ET AL., U.S. DEP’T OF AGRIC., ECON. RESEARCH SERV., THE USE OF MARKETS TO INCREASE PRIVATE INVESTMENT IN ENVIRONMENTAL STEWARDSHIP 6, 30 (2008), available at http://www.ers.usda.gov/media/202800/err64_1_.pdf (noting that historically large amounts of wetlands were developed for agriculture and that “until the 1980s, USDA provided financial support for draining and filling wetlands”).

Clean Water Act).⁹² To the extent that it increases demand for corn and thus the price of corn, however, the domestic ethanol industry is clearly a factor driving the conversion of wetlands to corn production. This conversion process is a land use change with wide-ranging environmental consequences. The Prairie Pothole region of the Dakotas and surrounding states — which is composed of a mixture of grasslands and wetlands — is a habitat of international significance.⁹³ Nearly forty percent of all species of migratory birds in North America — over 300 species — utilize this habitat at some point in their life cycles or yearly migrations.⁹⁴ The region is where “millions of ducks and geese are born each year.”⁹⁵ The two greatest threats to North American ducks are the destruction of wetlands and the degradation of prairies, both of which are being driven by the expansion of U.S. corn production.⁹⁶ In addition to providing habitat for wildlife, both grasslands and wetlands help to clean up pollution and prevent flooding.⁹⁷ “Those areas with native vegetation, and the soils beneath their surface, also retain the water longer throughout the season and use up the water through evapotranspiration.”⁹⁸ Thus, converting grasslands and wetlands to cropland for corn increases the risk of flooding.⁹⁹

Taken together, the consequences of converting grasslands and wetlands in the Great Plains to increase corn production for the domestic ethanol industry are devastating.

If we proceed along the current trajectory without changing federal policies [including those promoting corn-based ethanol], the prairie pothole ecosystem may be further degraded and fragmented, and the many services it provides will be impossible to restore. The region will no longer be able to support the waterfowl cherished by hunters and wildlife enthusiasts across the country. Grassland bird populations, already declining, will be unable to rebound as

⁹² *Solid Waste Agency of N. Cook Cnty v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 167 (2001) (holding that federal jurisdiction under the Clean Water Act does not extend to non-navigable, isolated, inland waterways regardless of the presence of migratory birds).

⁹³ See BROOKE ET AL., *supra* note 64, at 3 (noting the critical role the Prairie Pothole ecosystem plays in supporting migration and breeding of North American birds).

⁹⁴ *Id.*

⁹⁵ *Prairies Under Siege*, DUCKS UNLIMITED, <http://www.ducks.org/conservation/prairie-pothole-region/prairies-under-siege---four-part-series> (last visited Aug. 17, 2012).

⁹⁶ See generally Jim Ringelman, *Prairies Under Siege: The Future of the Prairie Pothole Region*, DUCKS UNLIMITED, <http://www.ducks.org/conservation/prairie-pothole-region/prairies-under-siege-the-future-of-the-prairie-pothole-region> (last visited Aug. 17, 2012).

⁹⁷ Kevin O'Hagan, Comment, *Pumping with the Intent to Kill: Evading Wetlands Jurisdiction under Section 404 of the Clean Water Act through Draining*, 40 DEPAUL L. REV. 1059, 1064 (1991).

⁹⁸ *Voice from the Field: An Interview With Freshwater Ecologist, Dr. Kristen Blann*, THE NATURE CONSERVANCY [hereinafter THE NATURE CONSERVANCY, *Voice from the Field*], <http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/northdakota/explore/voice-from-the-field-an-interview-with-freshwater-ecologist-dr-kristen-blann.xml> (last visited Aug. 17, 2012).

⁹⁹ See *id.* (stating wetlands retain more water than developed land and act as flood control).

nesting sites are turned into row crops. Water will become increasingly polluted and costly to clean as the grasslands and wetlands that once filtered contaminants disappear.¹⁰⁰

Increased water consumption is another environmental consequence resulting from the expansion of corn production in Great Plains states. The approximate line dividing the portion of the United States that requires irrigation for agriculture and the portion that has sufficient rainfall for non-irrigated agriculture, the 100th Meridian West of longitude,¹⁰¹ runs through the Dakotas and Nebraska. Therefore, unlike agriculture in the states that form the center of the Corn Belt, Iowa and Illinois,¹⁰² agriculture in Nebraska and the Dakotas depends to significant degree upon irrigation. The difference in water consumption between the corn growers of Nebraska, on one hand, and those of Iowa and Illinois, on the other, is dramatic. In 2007, of 9,192,656 acres of total corn production in Nebraska, 5,839,067 acres were irrigated, representing 63% of the total acreage.¹⁰³

This fact is particularly significant because much of Nebraska gets its water from the Ogallala Aquifer, a resource of vital environmental and economic importance to the United States that stretches from Texas to South Dakota.¹⁰⁴ Aquifers¹⁰⁵ continue to provide water as long as the amount of water that flows into them exceeds the amount of water that is withdrawn. If the amount of water withdrawn from an aquifer exceeds the amount of water that recharges an aquifer, however, the aquifer will be depleted. Completely depleting the Ogallala Aquifer would have devastating consequences for the United States. Losing the ability to irrigate land from the Ogallala Aquifer would cause \$20 billion worth of agricultural losses, and re-filling the aquifer would take 6,000 years.¹⁰⁶ Because the industry encourages increased corn production in areas irrigated with water from the Ogallala Aquifer, the depletion of this aquifer must

¹⁰⁰ BROOKE ET AL., *supra* note 64, at 19.

¹⁰¹ See *Along the 100th Meridian*, U.S. GEOLOGICAL SURVEY (July 6, 2011), <http://www.usgs.gov/newsroom/article.asp?ID=2847>.

¹⁰² In 2007, just 330,642 acres of Illinois corn were irrigated, compared to 12,765,589 acres of corn that were not irrigated. U.S. DEP'T OF AGRIC., 2007 CENSUS OF AGRICULTURE: ILLINOIS STATE AND COUNTY DATA 26 (2009), available at http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Illinois/ilv1.pdf. Similarly, in 2007 just 126,232 acres of Iowa corn were irrigated, compared with 13,716,050 acres that were not irrigated. U.S. DEP'T OF AGRIC., 2007 CENSUS OF AGRICULTURE: IOWA STATE AND COUNTY DATA 26 (2009), available at http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_1_State_Level/Iowa/iav1.pdf.

¹⁰³ See 2007 CENSUS: NEBRASKA, *supra* note 79, at 26.

¹⁰⁴ *High Plains Regional Ground Water (HPGW) Study*, U.S. GEOLOGICAL SURVEY (Aug. 26, 2011), http://co.water.usgs.gov/nawqa/hpgw/HPGW_home.html.

¹⁰⁵ Aquifers are geological formations that store water underground.

¹⁰⁶ *The Ogallala Aquifer: Saving a Vital US Water Source*, SCI. AM., (Mar. 30, 2009), available at <http://www.scientificamerican.com/article.cfm?id=the-ogallala-aquifer>.

be counted as another detrimental environmental effect of the domestic corn-based ethanol industry.

As damning as the list of environmental consequences of the domestic corn-based ethanol industry may seem, advocates for the industry will point out that the gasoline replaced by corn-based ethanol comes with its own set of dramatic consequences, environmental and otherwise: carbon emissions, pollution from petroleum refining, and dependence on unstable foreign regimes.¹⁰⁷ This is certainly true,¹⁰⁸ and any fair evaluation of whether or not the domestic corn-based ethanol industry is a worthy endeavor must consider all these factors. However, the question of whether corn-based ethanol or petroleum-based gasoline is the least environmentally harmful fuel source for the United States is a false dichotomy — or at least it would be if U.S. law and policy were changed to encourage the importation of sugarcane-based ethanol.

B. *Environmental Effects of Sugarcane-Based Ethanol*

If future legislation does not revive the United States ethanol tariff that expired at the end of 2011 and the trade embargo against Cuba is kept in place, Brazil will likely be the primary beneficiary.¹⁰⁹ The argument can be made that Brazilian sugarcane-based ethanol is a more environmentally beneficial fuel source than domestic-corn based ethanol, because of the nature of sugarcane-based ethanol (discussed below).¹¹⁰ Brazilian sugarcane-based ethanol comes, however, with its own set of environmental consequences.

The full debate over the environmental consequences of the Brazilian biofuel production¹¹¹ is largely beyond the scope of this Article. Still, the primary issue in this dispute is worth noting, because it accentuates one of the most significant differences between the U.S. corn-based ethanol industry and the potential Cuban sugarcane-based ethanol industry. In Brazil, the expansion of sugarcane production to meet demand for ethanol production has led to land use changes

¹⁰⁷ See *What is Ethanol?*, AMERICAN COAL. FOR ETHANOL, <http://www.ethanol.org/index.php?id=34&parentid=8#Environment> (last visited Mar. 15, 2013).

¹⁰⁸ As for the economic consequences of oil dependence, according to a report written for the U.S. Department of Energy in 2000, there is a tie between high oil prices and the onset of recessions, as shown by the events of 1973-74, 1979-80, and 1990-91. DAVID L. GREEN & NATALIYA I. TISHCHISHYNA, COSTS OF OIL DEPENDENCE: A 2000 UPDATE 9 (2000), available at http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2000_152.pdf.

¹⁰⁹ Brazil has an extremely well developed ethanol infrastructure and is a global leader in ethanol production. For a discussion of Brazilian biofuel production, including its social and environmental effects, focusing primarily on palm oil-based biodiesel production rather than sugarcane-based ethanol production, see Mark S. Langevin, *Social Inclusion, Environmental Sustainability, and Brazil's National Biodiesel Production and Use Policy: The Critical Case of Agropalma*, 3 RENEWABLE ENERGY L. & POL'Y REV. 223 (2011).

¹¹⁰ See *infra* notes 113, 116-21 and accompanying text.

¹¹¹ See generally Langevin, *supra* note 109, at 229-30 (discussing Brazil's biofuel production, including its social and environmental effects).

that parallel the expansion of corn production for ethanol in the United States. Clearing portions of the Amazon rainforest — one of the most significant repositories of carbon on Earth¹¹² — would represent an environmental cost of ethanol production that outweighs its benefits. The Amazon region, however, is largely unsuitable for sugarcane production.¹¹³ But, sugarcane production is contributing to destruction of another sensitive habitat, the bio-diverse Cerrado savannah region of Brazil.¹¹⁴

Cuban sugarcane-based ethanol would have the environmental benefits of Brazilian sugarcane-based ethanol without its most obvious negative factor, damaging habitat in the Cerrado. The environmental effects of biofuels depend on a number of factors. Whether or not a given type of biofuel is environmentally beneficial “depends on what the fuel is, how and where the biomass was produced, what else the land could have been used for, how the fuel was processed and how it is used.”¹¹⁵ Taken together, these factors point to sugarcane-based ethanol grown in Cuba as one of the most environmentally friendly biofuels possible.

The environmental benefits of using sugarcane to produce ethanol are numerous. First, it is much more energy efficient to derive ethanol from sugarcane than corn. Making ethanol from corn only creates approximately 1.3 times the amount of energy used to produce it, but making ethanol from sugarcane creates approximately eight times the amount of energy used to produce it.¹¹⁶ Second, unlike much of the corn presently grown in Great Plains states, sugarcane grown in Latin America does not need to be irrigated.¹¹⁷ Third, sugarcane requires relatively small amounts of chemical fertilizers, herbicides, and pesticides.¹¹⁸ Fourth, whereas most U.S. ethanol refineries are powered by coal or natural gas,¹¹⁹ sugarcane ethanol refineries can be powered by *bagasse*, a natural product left over from the sugar refining process.¹²⁰ In fact, refineries powered with *bagasse* can even produce more electricity than they need and sell

¹¹² *Impact Zones — Amazon Rain Forest*, SELECT COMM. ON ENERGY INDEPENDENCE AND GLOBAL WARMING, <http://globalwarming.markey.house.gov/impactzones/amazon> (last visited Aug. 24, 2012).

¹¹³ See Friedman, *supra* note 10, at A27.

¹¹⁴ Glenn Hurowitz, *Soros, Goldman Sachs Financing Destruction of Brazilian Forests*, GRIST (Aug. 2, 2007), <http://www.grist.org/article/george-soros-vs-the-planet>. Thanks to new agricultural technology, the Cerrado is, according to *The Economist*, becoming “the new Midwest.” *The Miracle of the Cerrado*, *ECONOMIST*, Aug. 26, 2010, <http://www.economist.com/node/16886442>.

¹¹⁵ Keith Carpenter, *Clearing the Biofuels Smokescreen*, STRAITS TIMES (Singapore), Mar. 15, 2008.

¹¹⁶ See Friedman, *supra* note 10, at A27.

¹¹⁷ Walter, *supra* note 51, at 68.

¹¹⁸ *Id.* at 69.

¹¹⁹ Mark Clayton, *Carbon Cloud Over a Green Fuel*, CHRISTIAN SCI. MONITOR, Mar. 23, 2006, <http://www.csmonitor.com/2006/0323/p01s01-sten.html>.

¹²⁰ Walter, *supra* note 51, at 65.

power back to the electric grid.¹²¹ Fifth, although corn can only be planted and harvested once a year, in tropical climates sugarcane can be cut from the same stalks multiple times per year.¹²²

Each of these factors in favor of sugarcane ethanol is true of ethanol from Brazil as well as of any potential ethanol from Cuba. However, there are additional environmental factors that clinch Cuban sugarcane-based ethanol as one of the most environmentally friendly fuel sources available to the United States under current technology.¹²³ First, because Cuba is closer to the United States, transporting ethanol from Cuba to the United States would require less energy than transporting ethanol from Brazil to the United States (especially if it is used in Florida, an option further explored in the section on economic effects).¹²⁴

Another reason Cuban sugarcane-based ethanol could be one of the most environmentally friendly fuels possible is that Cuba could produce a significant amount of ethanol without any negative impacts on native habitat. A striking amount of Cuban agricultural land — fifty five percent as of 2007 — is simply lying fallow and is not cultivated with anything.¹²⁵ Although its character may have changed due to years of neglect, this land is not virgin native habitat like the grasslands of North Dakota or the Cerrado of Brazil. Cuba therefore could greatly increase its production of sugarcane, and thus its production of sugarcane-based ethanol, without negative impacts on wildlife habitat. While it is not environmentally perfect — no form of energy is — Cuban sugarcane-based ethanol would raise fewer environmental concerns than the fuel sources it would displace: petroleum, domestic corn-based ethanol, and Brazilian sugarcane based ethanol. Therefore, from a purely environmental perspective, changing U.S. law and policy in order to promote the importation of Cuban sugarcane-based ethanol should be encouraged.

V. ECONOMIC EFFECTS OF CUBAN SUGARCANE-BASED ETHANOL

This seemingly easy recommendation is, however, complicated by an evaluation of the economic effects that would likely result from its implementation. The economic and, thus, political interests of the Midwestern states will likely try to keep demand for imported ethanol from growing, but the seeds of U.S. demand for such ethanol may have already been planted by the

¹²¹ *Id.*

¹²² *Id.* at 63.

¹²³ Soligo & Jaffe, *supra* note 48, at 98-99 (noting the lower transportation costs of importing ethanol from Cuba). Using less energy in transportation would mean both lower costs for production and a lesser environmental impact from the energy source.

¹²⁴ *See infra* Part V.B.

¹²⁵ Marc Lacey, *Cuba to Grant Private Farmers Access to Land*, N.Y. TIMES, July 19, 2008, http://www.nytimes.com/2008/07/19/world/americas/19cuba.html?_r=0.

RFS. The Energy Independence and Security Act of 2007, while providing a big boost to the corn-based ethanol industry, also tried to ensure that U.S. biofuel production moves away from near exclusive reliance on corn by requiring 21 billion gallons of total annual U.S. ethanol production come from sources other than cornstarch by 2022.¹²⁶ For both scientific and economic reasons, however, American efforts to transition domestic ethanol production away from near-complete dependence on corn have so far fallen short.¹²⁷ As a 2008 USDA report acknowledges, “Corn will continue to be the primary feedstock for the biorefinery platform for the next 10 to 20 years.”¹²⁸

The RFS called for production of 6.5 million gallons of cellulosic ethanol in 2010 (lowered from an earlier target of 100 million gallons).¹²⁹ That target was not met, and no cellulosic ethanol was blended into gasoline in the second half of that year.¹³⁰ Cellulosic ethanol production has slowly begun to develop in the United States, with the first commercial-scale cellulosic ethanol plant under construction as of the end of 2012 and scheduled to begin operations in 2013.¹³¹ However, the further growth of cellulosic ethanol production may be slowed by political developments in the United States.¹³² The first commercial refinery of this type was made possible by a \$105 million federal loan guarantee from the Department of Energy.¹³³ Despite President Obama’s re-election, his administration may be reluctant to make further such guarantees in the wake of the Solyndra scandal¹³⁴ and greater scrutiny of Department of Energy actions by Republicans in the House of Representatives.¹³⁵

¹²⁶ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1493, (codified as amended in scattered sections of 42 U.S.C.).

¹²⁷ See Cindy Zimmerman, *Cellulosic Ethanol Still Needs to Get Cheaper*, DOMESTICFUEL.COM (Nov. 8, 2011), <http://domesticfuel.com/2011/11/08/cellulosic-ethanol-still-needs-to-get-cheaper/>.

¹²⁸ OFFICE OF ENERGY POL’Y & NEW USES, OFFICE OF THE CHIEF ECONOMIST, U.S. DEP’T OF AGRIC., U.S. BIOBASED PRODUCTS MARKET POTENTIAL AND PROJECTS THROUGH 2025, at 257 (2008), available at <http://www.usda.gov/oce/reports/energy/BiobasedReport2008.pdf>.

¹²⁹ RANDY SCHNEPF & BRENT D. YACOBUCCI, RENEWABLE FUEL STANDARD (RFS): OVERVIEW AND ISSUES 3 (2012), available at www.fas.org/sgp/crs/misc/R40155.pdf.

¹³⁰ Dina Fine Maron, *Much Touted Cellulosic Ethanol Is Late in Making Mandated Appearance*, N.Y. TIMES, Jan. 11, 2011, <http://www.nytimes.com/cwire/2011/01/11/11climatewire-much-touted-cellulosic-ethanol-is-late-in-ma-13070.html?pagewanted=all>.

¹³¹ The plant, in Emmetsburg, IA, will use corn stover — leftover leaves and stalks — to produce ethanol. *Cellulosic Ethanol*, POET, <http://poet.com/cellulosic> (last visited Aug. 24, 2012).

¹³² For a discussion of another possible second generation biofuel source, algae-based biofuels, see Heather Hunziker, *Finding Promise in Pond Scum: Algal Biofuels, Regulation, and the Potential for Environmental Problems*, 42 TEX. ENVTL. L.J. 59 (2011).

¹³³ *Energy Department Finalizes \$105 Million Loan Guarantee for First-of-its-kind Cellulosic Bio-Refinery in Iowa*, DEP’T OF ENERGY (Sept. 23, 2011), <http://energy.gov/articles/energy-department-finalizes-105-million-loan-guarantee-first-its-kind-cellulosic-bio>.

¹³⁴ See Roberta Rampton & Ayesha Rascoe, *Analysis: Energy Secy Chu Faces Showdown on Solyndra*, REUTERS, Nov. 16, 2011, <http://www.reuters.com/article/2011/11/16/us-solyndra-chu-idUSTRE7AF1MC20111116>.

¹³⁵ Matthew L. Wald, *Report Calls for Changes In the Energy Department*, N.Y. TIMES, Nov.

Imported ethanol from non-corn sources may be an increasingly popular means of reducing U.S. fossil fuel dependence for two reasons in particular. First, the transition from corn-based to cellulosic ethanol is difficult. Second, the RFS caps the amount of ethanol from corn that can be blended into U.S. fuel at 15 billion gallons per year by 2022.¹³⁶ In coming years the amount of ethanol imported into the United States is likely to increase by a significant amount unless Congress revives the ethanol tariff. If both U.S. ethanol import restrictions and the ethanol blending tax credit were eliminated (as happened at the end of 2011), imports of ethanol into the United States would more than double.¹³⁷

Unless Congress raises the RFS by a sufficient degree to absorb all domestic ethanol production on top of these new imports, the increase in such imports would likely damage the domestic ethanol industry. "Whatever the level or type of biofuel, increased imports (holding other factors constant) would reduce the quantity of domestically produced biofuels, which would reduce the demand for biofuel feedstocks."¹³⁸ Because very little ethanol is currently imported into the United States, law and policy changes that successfully fostered the development of a Cuban sugarcane-based ethanol industry would have a significant economic impact on the United States. Such a change would have the largest economic effect on two regions: the Midwest, which is currently the primary source of ethanol production in the United States, and the Southeast, especially Florida. This Part of the Article will discuss the likely economic effects of such policy changes first on the Midwest, then on Florida, then on the United States generally.

A. *Economic Effects of Cuban Ethanol on the Midwest*

Absent a scenario in which the RFS was raised at the same time as U.S. consumption of ethanol from Cuban sugarcane increased, it is likely that importing Cuban sugarcane ethanol would have a negative economic effect on the Midwestern United States. The worst case economic scenario for the United States that could possibly arise out importing ethanol from Cuba would be that such ethanol largely supplants rather than supplements the domestic ethanol industry. This could lead to ethanol plant closures, job losses, and a regionalized

16, 2011, at A24, *available at* <http://www.nytimes.com/2011/11/16/science/earth/report-calls-for-broad-restructuring-of-energy-department.html>.

¹³⁶ Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1493 (codified as amended in scattered sections of 42 U.S.C.).

¹³⁷ ECON. RESEARCH SEV., U.S. DEP'T OF AGRIC., SUGAR AND SWEETENERS OUTLOOK 10 (2010), *available at* <http://usda01.library.cornell.edu/usda/ers/SSS//2010s/2010/SSS-11-15-2010.pdf>.

¹³⁸ BIOMASS RESEARCH AND DEV. BD., INCREASING FEEDSTOCK PRODUCTION FOR BIOFUELS: ECONOMIC DRIVERS, ENVIRONMENTAL IMPLICATIONS, AND THE ROLE OF RESEARCH 40 (2008), *available at* http://www.usbiomassboard.gov/pdfs/8Increasing_Biofuels_Feedstock_Production.pdf.

economic slowdown across the Midwestern United States. This regionalized economic slowdown would be made worse if a drop in demand for corn-based ethanol led to a significant decline in corn prices and a resulting loss of purchasing power by corn farmers (whose spending in times of high commodity prices boosts small-town economies).¹³⁹

The likelihood of this worst-case economic scenario depends on a number of factors. The U.S. ethanol industry, like other ethanol industries around the world, is largely affected by two major variables: governmental policy and commodity prices. While it has not received anything close to the level of support granted to the Brazilian ethanol industry,¹⁴⁰ the U.S. ethanol industry has received major boosts from the federal government.¹⁴¹ The future strength of the domestic ethanol industry will depend on whether it continues to receive the backing of the federal government. “Growth in the U.S. ethanol industry is directly related to Federal and State policies and regulations.”¹⁴² According to a 2006 economic analysis, “[T]he most likely scenario is that renewable fuels continue to compete with petrofuels only on the basis of government incentives and/or mandates.”¹⁴³

How important such governmental support will be to the survival of the domestic ethanol industry, however, will depend on the other major external factor affecting the ethanol industry: commodity prices. According to one economic analysis, if oil prices stay at or above \$105 per barrel, even with low levels of governmental support, the U.S. ethanol industry will “move into high gear.”¹⁴⁴ Besides petroleum prices, the other major commodity price variable with an effect on American ethanol production is the price of corn.¹⁴⁵ Market conditions are most favorable for U.S. ethanol producers when corn prices are low and petroleum prices are high, as was the case in the United States between 2001 and 2006.¹⁴⁶ For both policy and market reasons, the 2000s were a good decade for U.S. ethanol producers. In the first five years of that decade, both

¹³⁹ Jason Henderson & Maria Akers, Fed. Reserve Bank of Kan. City, *Recession Catches Rural America*, ECONOMIC REVIEW, First Quarter 2009, at 65, available at <http://www.kansascityfed.org/PUBLICAT/ECONREV/PDF/09q1Henderson.pdf>

¹⁴⁰ See Langevin, *supra* note 109, at 229-30.

¹⁴¹ For all federal incentives, laws, regulations, and programs benefitting the domestic ethanol industry, see Alternative Fuels Data Center, *Federal Laws and Incentives*, U.S. DEP'T OF ENERGY, http://www.afdc.energy.gov/laws/fed_summary/ (last updated Feb. 26, 2013).

¹⁴² U.S. DEP'T OF AGRIC., *THE ECONOMIC FEASIBILITY OF ETHANOL PRODUCTION FROM SUGAR IN THE UNITED STATES 2* (2006), available at <http://www.usda.gov/oce/reports/energy/EthanolSugarFeasibilityReport3.pdf>.

¹⁴³ INFORMA ECONOMICS, *THE EMERGING BIOBASED ECONOMY 137* (2006), available at <http://www.auri.org/assets/2012/08/Biobased-Study-Infoma.pdf>.

¹⁴⁴ *Id.* at 295.

¹⁴⁵ See *id.* at 114.

¹⁴⁶ *Id.*

production and consumption of ethanol doubled in the United States.¹⁴⁷ In 2012, however, corn prices rose sharply as a result of that summer's drought, reducing profitability for ethanol producers. This commodity price shift leaves the future of domestic corn-based ethanol production in question. The shift was particularly damaging because it followed the expiration of policies favoring domestic ethanol production at the end of 2011 and also because Congress has yet to pass a new Farm Bill.

Over the past thirty years, ethanol has become a greater and greater factor in the economics of corn production, and thus the economy of the Midwestern United States. In this time period, the amount of U.S. corn production used for ethanol has dramatically increased. In 1980, less than 1% of the U.S. corn crop went to ethanol production.¹⁴⁸ By 2011, that amount rose to approximately one-third of the annual U.S. corn crop.¹⁴⁹ The success of the ethanol industry has been one reason¹⁵⁰ that much of the Corn Belt¹⁵¹ has weathered the most recent economic recession relatively well.¹⁵² According to the Bureau of Labor Statistics, as of March 2013, North Dakota¹⁵³ (with 3.2%), Nebraska (with 3.8%), South Dakota (with 4.43%), and Iowa (with 5.0%) had four of the six lowest state unemployment rates in the United States.¹⁵⁴ Two other states with significant ethanol production, Minnesota and Kansas,¹⁵⁵ were also in the bottom fifteen states for unemployment.¹⁵⁶

¹⁴⁷ U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2011, at 287 (2012), available at <http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf>.

¹⁴⁸ BIOMASS RESEARCH & DEV. BD., *supra* note 138, at 16.

¹⁴⁹ John Keefe, *Farm Report: More Corn Going to Cars Than Cows*, CBSNEWS (July 18, 2011), http://www.cbsnews.com/8301-505123_162-36743675/farm-report-more-corn-going-into-cars-than-cows/?tag=mwuser.

¹⁵⁰ For other reasons that the Corn Belt has weathered the recession relatively well, see Derek Thompson, *How the Great Plains Won the Recession*, ATLANTIC, Aug. 10, 2010, <http://www.theatlantic.com/business/archive/2010/08/how-the-great-plains-won-the-recession/61280/>.

¹⁵¹ That is, the part of the United States with high levels of corn production, running from western Ohio in the East to Nebraska and the Dakotas in the West. U.S. DEP'T OF AGRIC., CORN FOR GRAIN 2010 PRODUCTION BY COUNTY FOR SELECTED STATES (2011), available at http://www.nass.usda.gov/Charts_and_Maps/Crops_County/pdf/CR-PR10-RGBChor.pdf.

¹⁵² According to a study by the Nebraska Public Power District, cited in a publication from Ethanol Across America, ethanol production added over \$240 billion in household income to Nebraska, and directly or indirectly created around 3,000 jobs in that state. ETHANOL ACROSS AM., ISSUE BRIEF: ECONOMIC IMPACTS OF ETHANOL PRODUCTION 3 (2011), http://www.ethanolacrossamerica.net/pdfs/11CFDC_IssueBrief.pdf.

¹⁵³ It should be noted that a boom in petroleum and natural gas production is a very significant factor in the economic health of North Dakota. Mark Peters & Ben Lefebvre, *Riding the Dakota Oil Boom*, WALL ST. J., Nov. 2, 2011, at B1.

¹⁵⁴ Bureau of Labor Statistics, *Unemployment Rates for States*, U.S. DEP'T OF LABOR, <http://www.bls.gov/web/laus/laumstrk.htm> (last modified Mar. 1, 2013).

¹⁵⁵ *Top 10 Ethanol States Vary Little in Six Months*, ETHANOL PRODUCER MAG. (Mar. 6, 2007), <http://www.ethanolproducer.com/articles/2818/top-10-ethanol-states-vary-little-in-six-months/>.

¹⁵⁶ Bureau of Labor Statistics, *supra* note 154. It should be noted that another state with

While it may be true that the Corn Belt region is currently doing well economically (that is, aside from the effects of the drought of 2012), especially relative to other parts of the country, this has not always been the case. During the 1980s, when commodity prices were very low, the Corn Belt region suffered economic stress from sharply reduced farm profits.¹⁵⁷ By providing a certain source of demand for corn, domestic ethanol production sets a floor on the price of corn, preventing this type of regional disaster from repeating. Additionally, the population of the rural Midwest has been declining for years.¹⁵⁸ As President Obama acknowledged in a 2010 speech, in an era of outsourcing and downsizing that began long before the most recent economic recession, the domestic corn-based ethanol industry stands out as one of the few sectors that is bringing jobs to rural America and allowing towns that might otherwise die to survive.¹⁵⁹

For roughly two decades, the domestic ethanol industry has relied on the promise of continued government support in some form in order to expand facilities and ratchet up production.¹⁶⁰ For years policy-makers have promoted the goals of reducing carbon dioxide emissions, cutting back on fossil fuel usage, and reducing U.S. dependence on foreign countries for its energy needs.¹⁶¹ Although the degree to which the domestic ethanol industry actually meets these goals is disputed,¹⁶² it does contribute to achieving each goal to some degree. While importing ethanol from Cuban sugarcane would meet the

significant ethanol production, Illinois, had one of the highest unemployment rates in the United States as of December, 2012, at 8.6%. Unlike the states of the Great Plains, however, Illinois is heavily reliant on manufacturing.

¹⁵⁷ See Jason Henderson et al., FED. RESERVE BANK OF KAN. CITY, *Agriculture's Boom-Bust Cycles: Is This Time Different?*, ECONOMIC REV., Fourth Quarter 2011, at 83, 88, available at <http://www.kansascityfed.org/publicat/econrev/pdf/11q4HendersonGloyBoehlje.pdf>.

¹⁵⁸ Mark Mather, *Population Losses Mount in U.S. Rural Areas*, POPULATION RESEARCH BUREAU (Mar. 2008), <http://www.prb.org/Articles/2008/populationlosses.aspx>.

¹⁵⁹ See White House, *Remarks of President Barack Obama at POET Biorefining in Macon, Missouri*, WHITEHOUSE.GOV (Apr. 28, 2010), <http://www.whitehouse.gov/the-press-office/remarks-president-barack-obama-poet-biorefining-macon-missouri>.

¹⁶⁰ See FRANCES B. SMITH, COMPETITIVE ENTER. INST., CORN-BASED ETHANOL: A CASE STUDY IN THE LAW OF UNINTENDED CONSEQUENCES 4 (2007), available at <http://cei.org/sites/default/files/Fran%20Smith%20-%20Corn-Based%20Ethanol.pdf> (noting that federal support for the domestic industry started in the 1970s and was increased in the 1990s). In the words of Senator Chuck Grassley (R-IA), a prominent supporter of the corn-based ethanol industry: "We need to continue the current supportive policies of the domestic industry. By maintaining these policies, we'll ensure the growth of the domestic industry." *Id.* at 5.

¹⁶¹ See WHITE HOUSE, *supra* note 1, at 3. On the issue of reducing the dependence of the U.S. on imported energy, the Obama's Administration's *Blueprint for a Secure Energy Future* states: "We need to deploy American assets, innovation, and technology so that we can safely and responsibly develop more energy here at home and be a leader in the global energy economy." *Id.* at 4. For a discussion of the Obama Administration's actions on combating climate change and reducing U.S. fossil fuel usage, see generally Jody Freeman, *The Obama Administration's National Auto Policy: Lessons from the "Car Deal"*, 35 HARV. ENVTL. L. REV. 343 (2011).

¹⁶² See *supra* Part IV.A.

first two national policy goals, it would detract from the third. It would seem perverse for policy-makers to enact policies that would severely damage an industry that helped meet the national policy goals they had espoused, especially after the policy-makers had supported the industry.

Whether or not policy and law advancements successfully encouraging the growth of a Cuban sugarcane ethanol industry would, in fact, severely damage the domestic ethanol industry and the Midwestern economy would depend on a number of factors. Perhaps the most important of these factors is whether the RFS of the Energy Independence and Security Act of 2007 remains in place or is repealed by a future act of Congress. The RFS “will serve [as] a floor for the future trajectory of renewable fuels consumption, including ethanol.”¹⁶³ Thus, because it mandates that a certain percentage of U.S. fuel comes from corn-based ethanol, the RFS will provide a source of U.S. demand for ethanol even if other forms of federal support are not revived.

Additionally, while exposing the domestic ethanol industry to competition from imported ethanol might bring down corn prices, it would likely not be enough to reduce them enough to bring a 1980s-style farm crisis to the Midwest. There are many sources of demand for corn in addition to ethanol. Contrary to popular perception, the majority of U.S. corn production does not become food for people — at least not directly. The largest percentage of the annual U.S. corn crop — between forty-eight and fifty-nine percent in the mid years of the 2000s — goes to animal feed.¹⁶⁴ In addition, about one fifth of the annual U.S. corn crop is exported.¹⁶⁵ The remaining percentage of the crop is mostly processed in a number of ways. The products from corn processing include corn sweeteners (high fructose corn syrup), corn oil, corn starch, and biodegradable plastics.¹⁶⁶

Even if corn-based ethanol production were to decline, U.S. corn prices are likely to remain relatively high for the near-to-midterm future. This is mainly due to global rise of the middle class, a resource-intensive phenomenon that is especially pronounced in countries like India and China and is driving up prices for a large number of commodities.¹⁶⁷ For example, if the Chinese economy continues to grow and more Chinese citizens move from rural areas to cities, join the middle class, and therefore start eating more pork,¹⁶⁸ there will be

¹⁶³ See OFFICE OF ENERGY POL’Y & NEW USES, *supra* note 128, at 34.

¹⁶⁴ RENEWABLE FUELS ASS’N, ETHANOL AND THE US CORN CROP 1 (2008), available at http://www.ethanolrfa.org/page/-/objects/documents/1898/corn_use_facts.pdf.

¹⁶⁵ *Id.*

¹⁶⁶ *Products Made From Corn*, CORN REFINERS ASS’N (2011), <http://www.corn.org/products/>.

¹⁶⁷ See Ken Dilanian, *Study Predicts Rise of a Global Middle Class*, L.A. TIMES, Dec. 10, 2012, articles.latimes.com/2012/dec/10/business/la-fi-intelligence-economy-china-20121211/.

¹⁶⁸ Demand for pork has surged in China in recent years, putting a strain on that country’s pork supply. See Uri Friedman, *China Has a Pork-Flation Problem*, ATL. WIRE (Jul. 15, 2011), <http://www.theatlanticwire.com/global/2011/07/china-has-pork-flation-problem/40028/>.

upward pressure on demand for U.S. corn and therefore on U.S. corn prices.¹⁶⁹ Thus, because of factors outside of the entire debate over importing ethanol from elsewhere in the Western Hemisphere (and indeed, outside anything in the Western Hemisphere) a reduction in demand for corn-based ethanol would not necessarily lead to low corn prices.

B. *Economic Effects of Cuban Ethanol on Florida*

If the Corn Belt is the most likely regional economic loser from the changes in U.S. law and policy encouraging the growth of a Cuban sugarcane ethanol industry, Florida is the most likely regional economic winner. In the broader economic context, Florida has the most to gain of any state from free and open relations between the United States and Cuba.¹⁷⁰ The degree to which Florida would gain from the growth of a Cuban sugarcane ethanol industry would depend how U.S. legal and policy changes designed to encourage this industry were structured.

Although Cuba was never mentioned as a possible source of ethanol,¹⁷¹ the goal of making Florida a center for international trade in ethanol has been pursued by American policymakers before. Between 2006 and 2008, the Bush Administration and two gubernatorial administrations in Florida promoted the cause of ethanol, both within the state and from abroad. In the spring of 2007, President Bush pursued an agreement with Brazil on importing ethanol.¹⁷² While Florida did its part to promote the ethanol industry within the state, the international side of the initiative went nowhere. Congress refused to change ethanol tariff policy in the 2008 Farm Bill. Moreover, the subsequent Obama Administration has been uninterested in pursuing such an agreement with Brazil or any other country to increase imports of ethanol.¹⁷³

¹⁶⁹ The price of corn — a major feedstock — is a significant factor in the cost of pork production. See generally *The Story Behind China's Rising Pork Prices*, THEPIGSITE.COM (Aug. 21, 2007), <http://www.thepigsite.com/articles/2014/the-story-behind-chinas-rising-pork-prices> (discussing the controversial nature of using agricultural land for fuel production and policy concerns that increased competition for crops will “inevitably increase[] prices”).

¹⁷⁰ As a Congressional Research Service report on the future of U.S. policy on Cuba said, the nation’s population and level of trade with other countries “point to the country becoming the largest U.S. trade partner in the Caribbean absent economic sanctions.” Mark P. Sullivan, CONG. RESEARCH SERV., CUBA AFTER FIDEL CASTRO: U.S. POLICY IMPLICATIONS AND APPROACHES 19 (2006), available at http://digital.library.unt.edu/ark:/67531/metacrs9519/m1/1/high_resd/RL336222006Sep01.pdf. Because it is the closest state to Cuba, Florida is the most logical center for future U.S.-Cuba trade.

¹⁷¹ For the obvious reason that Cuba has been, to U.S. policymakers, *patria non grata* since 1960.

¹⁷² See, Tim Hirsch, *Brazilian Biofuels' Pulling Power*, BBC NEWS (Mar. 8, 2007), <http://news.bbc.co.uk/2/hi/science/nature/6430563.stm>.

¹⁷³ Laura Meckler, *Obama Faces Policy Obstacles in Latin America*, WALL ST. J., Mar. 23, 2011, <http://online.wsj.com/article/SB10001424052748704050204576218660358953094.html>.

While the previous initiative was directed towards ethanol from Brazil, Colombia, and other Latin American nations, the economic benefits to Florida of a hemispheric ethanol trade would apply equally if this trade included Cuba (and perhaps more strongly, as Cuba is close to Florida, especially as compared to Brazil). The international ethanol trade's economic boost to the state would include increased traffic at Florida's ports, increased activity at Florida banks financing international trading arrangements, and perhaps even the creation of an international ethanol exchange in Miami similar to the Chicago Mercantile Exchange.¹⁷⁴

Florida has a large population, coastal location, and is a great distance from other East Coast population centers further north (as well as from the Midwestern center of U.S. ethanol production). Given those circumstances, it would be practical for as much imported ethanol as possible to be used within Florida if Cuban sugarcane became a source for U.S. ethanol consumption. Florida represents a large potential market for ethanol. As of 2006, drivers in the state consumed 8.37 billion gallons of gasoline per year,¹⁷⁵ and ethanol has only recently begun to be marketed in Florida (it was first blended into gasoline in the state in 2007). One way to greatly increase the state's ethanol consumption would be to widen the availability of Flex Fuel Vehicles and gas stations that sell E-85 (a blend of gasoline that is eighty-five percent ethanol). According to the U.S. Department of Energy's Alternative Fuels and Advanced Vehicles Data Center, forty-four Florida gas stations now sell E85 blends.¹⁷⁶ Though this represents a rapid increase in availability, given that ethanol has only been marketed in the state for five years, it is still a relatively small number. (Iowa, which has a fraction of Florida's population, has over 100 more stations selling E-85).¹⁷⁷

Ethanol from Cuban-grown sugarcane could enter the gasoline supply of Florida in one of two ways: sugar could be refined into ethanol in Cuba and then shipped to the United States, or Cuban sugar could be shipped to the United States and refined into ethanol domestically. Which method would be more economical would depend on commodity prices and, especially, which law and policy changes the United States had made to encourage the development of Cuban sugarcane ethanol. Depending on the difficulty of Cuba's post-Castro

¹⁷⁴ Doreen Hemlock, *Florida's Ethanol Future*, FORT LAUDERDALE SUN-SENTINEL, Feb. 3, 2008, at 3F, available at <http://articles.sun-sentinel.com/2008-02-03/features/08013104561ethanol-industry-latin-ameria-blend>.

¹⁷⁵ U.S. Dep't of Trans. Fed. Highway Admin., *Fuel Consumption by State*, 2006, U.S. DEP'T OF TRANS., http://www.fhwa.dot.gov/policyinformation/pubs/pl08021/excel/Fig5_2.xls (last visited Jan. 27, 2013).

¹⁷⁶ U.S. Dep't of Energy Alternative Fuels Data Center, *Alternative Fueling Station Locator*, U.S. DEP'T OF ENERGY, <http://www.afdc.energy.gov/afdc/locator/stations/state> (last visited Mar. 5, 2013).

¹⁷⁷ *Id.*

transition and ability to attract foreign investment for creating an ethanol industry, refining Cuban sugar into ethanol in Florida could represent a mid-term stage in the development of U.S. utilization of Cuban sugar as a fuel source.

According to a report from the U.S. Biomass Board, “The attractiveness of one [biofuel] feedstock over another will also be determined by the cost of delivering that feedstock from ‘root to refinery.’ That cost will be a function of harvesting and collecting costs, which vary with the weight and bulk of the feedstock, and distance to the biofuel plant. Transportation costs are a major issue for many ethanol producers.”¹⁷⁸ Shipping Cuban sugar by sea to an ethanol refinery in Florida would be a low cost transportation option.¹⁷⁹ Additionally, according to a 2006 report from the USDA’s Office of the Chief Economist, the capital expenditure costs of building a new sugarcane ethanol plant would be substantially reduced if it were built adjacent to an existing sugar production facility.¹⁸⁰ Thus, some of Florida’s existing sugar refineries could also become ethanol refineries at a lower cost than building a completely new ethanol refinery.

Looking further into the future, a dedicated ethanol pipeline has been proposed to bring ethanol from the corn-producing Midwest to the fuel-hungry East Coast.¹⁸¹ If a stable and consistent international ethanol trade arises with Florida as its U.S. entrepôt, eventually a dedicated ethanol pipeline could be built from Florida to Atlanta (a major fuel consuming city).¹⁸² This would be

¹⁷⁸ BIOMASS RESEARCH AND DEV. BD., *supra* note 138, at 15.

¹⁷⁹ See JEAN-PAUL RODRIGUE, CLAUDE COMTOIS & BRAIN SLACK, *THE GEOGRAPHY OF TRANSPORT SYSTEMS* 105 (2006), available at http://geonas.at.ua/_ld/0/34_The_Geography_o.pdf (stating shipping rates can be very low compared to other modes of transportation). Water transportation — as opposed to land or air transportation — is the most energy efficient form of transportation. *Id.* at 206. This fact is particularly salient in the context of the ethanol issue, given the methods of transportation currently used by the domestic ethanol industry. See *infra* note 181.

¹⁸⁰ See U.S. DEP’T OF AGRIC., *THE ECON. FEASIBILITY OF ETHANOL PRODUCTION FROM SUGAR IN THE UNITED STATES* 34 (2006), available at <http://www.usda.gov/oce/reports/energy/EthanolSugarFeasibilityReport3.pdf>.

¹⁸¹ See *Potential Ethanol Pipeline to Create U.S. Jobs*, POET (Jan. 13, 2010), <http://www.poet.com/pr/potential-ethanol-pipeline-to-create-u-s-jobs>. Because ethanol is corrosive to ordinary petroleum pipelines, it is almost exclusively transported by truck, rail, and barge, which removes one of the usual advantages of liquid fuels: their ability to be transported via pipeline. Brett Clayton, *Ethanol On Rise, But Moving It is a Challenge*, HOUS. CHRON., Apr. 8, 2007, at B1.

¹⁸² There are just twenty-six gas stations selling E-85 within a seventy-five mile radius of downtown Atlanta, Georgia. For purposes of comparison, there are thirty-three gas stations selling E-85 within a seventy-five mile radius of McGregor, Iowa (which had a population of 871 as of the 2000 census and is the home town of the author of the article). See U.S. Dep’t of Energy Alternative Fuels Data Center, *supra* note 176. As Peak Oil drives up the cost of petroleum, access to biofuels will become a particularly important issue in Atlanta. This is because Atlanta is one of the most prominent examples in the United States of a metropolitan area that is strongly auto-dependent. In 2010, just five percent of Atlanta commuters rode to work via train or bus, while eighty-two percent of commuters drove to work by themselves. GA. DEP’T OF TRANSP., *2010 ATLANTA REGIONAL COMMUTER SURVEY*, 1 (2010), available at

beneficial both in stimulating Atlanta's fledgling ethanol market and bringing construction jobs to the states of Florida and Georgia.

C. Economic Effects of Cuban Ethanol on the United States Generally

Outside of the Midwest and Florida, from a purely economic (rather than environmental and economic) perspective, the question of whether the United States should replace a portion of its gasoline with domestic corn-based ethanol or Cuban sugarcane-based ethanol would appear to largely be a wash. On one hand, the U.S. trade deficit would increase to the extent that a domestically produced product was replaced by imports. On the other, opening trade relations with Cuba generally would open many opportunities for exports from the United States to that country. This could include exports of corn and other products from the Midwest. Perhaps the primary U.S. beneficiaries of replacing a portion of domestic corn-based ethanol with Cuban sugarcane-based ethanol, outside of Florida, would be livestock farmers and ranchers. The primary economic considerations for whether a given dairy, beef, pork, or chicken operation can be profitable are the costs of feed and the price of the product sold (milk, beef, pork, or chicken). By driving up the cost of corn, the domestic corn-based ethanol industry threatens the profitability of U.S. livestock operations.¹⁸³ Thus, importing sugarcane-based ethanol from Cuba could actually benefit a sector of the U.S. agricultural industry — including the portion of it in the Midwest — by lowering demand for corn and thus the price of corn

D. Ethanol and the Drought of 2012

Events in the summer of 2012 highlighted both the potential risks of continuing to center U.S. biofuels policy on domestic corn production and the potential benefits of promoting the growth of a Cuban sugarcane-based ethanol industry. In the summer of 2012, the U.S. Midwest experienced its worst drought since 1956.¹⁸⁴ In the middle of August 2012, more than twenty-two percent of the contiguous United States was considered to be in one of the two

http://www.dot.ga.gov/informationcenter/programs/environment/airquality/Documents/reports/2010_atlanta_regional_commuter_survey.pdf. Given the widely geographically dispersed nature of suburban Atlanta — it almost doubled in width, measured from north to south, in just the 6 years between 1990 and 1997, from 68 miles wide to 121 miles wide — the difficulty of reducing fossil fuel use by encouraging public transportation use becomes apparent. See Tony Giarusso, *Combating Urban Sprawl in Georgia*, ARCUSER (2003), <http://www.esri.com/news/arcuser/1003/sprawl1of2.html>.

¹⁸³ Philip Brasher, *Livestock Producers Face Ethanol Makers Over Cost of Corn*, USA TODAY, Sept. 15, 2011, <http://www.usatoday.com/money/industries/food/story/2011-09-18/corn-prices-ethanol-mandate/50417146/1>.

¹⁸⁴ Alyssa Botelho & Joel Achenbach, *Drought Intensifies in Most-Parched Areas of the US*, WASH. POST, Aug. 2, 2012, http://www.washingtonpost.com/national/health-science/drought-intensifies-in-most-parched-areas-of-us/2012/08/02/gJQAc334RX_story.html.

most severe categories of drought.¹⁸⁵ High temperatures and lack of rain combined to devastate productivity of U.S. crops, especially corn, 40 million acres of which were in drought areas.¹⁸⁶ According to a USDA report, the U.S. corn crop of 2012 was projected to be the smallest since 2006,¹⁸⁷ despite the fact that significantly more acres of land were planted with corn in 2012 as compared to 2006.¹⁸⁸

As a result of anticipated lower supplies, corn prices shot up to record levels in the summer of 2012.¹⁸⁹ In response to these high prices, livestock producers affected by high grain prices and others, including members of Congress and four state governors, called on the Obama Administration to temporarily suspend the RFS, and thereby reduce pressure on commodity prices by the ethanol industry.¹⁹⁰ Criticism of current U.S. ethanol policy was not limited to livestock producers – Jozé Graziano da Silva, head of the U.N. Food and Agriculture Organization, also called for a temporary suspension of the RFS.¹⁹¹ As critics of U.S. ethanol policy pointed out, the drought of 2012 and the destruction it inflicted on corn production in the United States show the danger of relying on a single crop as a source for fuel production.

VI. CONCLUSION

The drought of 2012 not only highlighted the drawbacks of the U.S. ethanol status quo, but also the importance of not abandoning biofuels in general. The 2012 drought substantiated criticisms that the current corn-based system of ethanol production is flawed. Yet, policy-makers should not automatically respond by withdrawing federal government support for the creation of bio-based alternatives to fossil fuels. Given that the RFS would be critical for future

¹⁸⁵ *Id.*

¹⁸⁶ *Id.*

¹⁸⁷ U.S. DEP'T OF AGRIC., CROP PRODUCTION 1 (Oct. 2012), available at http://www.nass.usda.gov/Publications/Todays_Reports/reports/crop1012.pdf.

¹⁸⁸ In 2006, the year of comparison, just 70.6 million acres of corn were harvested. U.S. DEP'T OF AGRIC., NAT'L AGRIC. STATISTICS SERVICE, CROP PRODUCTION 2006 SUMMARY 1 (2007), available at <http://usda01.library.cornell.edu/usda/nass/CropProdSu//2000s/2007/CropProdSu-01-12-2007.pdf>. In 2012, 87,361,000 acres of corn were projected to be harvested, up from 83,981,000 in 2011. See Ron Sterk, *U.S. Corn Crop at 10,779 Million Bus*, FOOD BUS. NEWS (Aug. 10, 2012), [http://www.foodbusinessnews.net/articles/news_home/Purchasing_News/2012/08/US_2012_corn_cr op_10779_millio.aspx?ID=%7B18A906CB-63D3-4514-B777-FCBBD9111A31%7D](http://www.foodbusinessnews.net/articles/news_home/Purchasing_News/2012/08/US_2012_corn_crop_10779_millio.aspx?ID=%7B18A906CB-63D3-4514-B777-FCBBD9111A31%7D).

¹⁸⁹ Garry White, *Food Crisis Fears Mount as Corn Prices Hit Record High*, THE TELEGRAPH (LONDON), Aug. 10, 2012, <http://www.telegraph.co.uk/finance/commodities/9467123/Food-crisis-fears-mount-as-corn-price-hits-record-high.html>.

¹⁹⁰ John H. Cushman, Jr., *In Drought, a Debate over Quota for Ethanol*, N.Y. TIMES, Aug. 16, 2012, <http://www.nytimes.com/2012/08/17/business/energy-environment/ethanol-quota-debated-by-corn-farmers-and-meat-industry.html>.

¹⁹¹ Zach Coleman, *UN Official: US Must Cut Back on Biofuels*, THE HILL (Aug. 10, 2012), <http://thehill.com/blogs/e2-wire/e2-wire/243053-un-us-must-cut-back-on-biofuels>.

development of a Cuban sugarcane-based ethanol industry, the abolition of this standard that some have called for would have long-lasting effects.

While it is currently impossible to blame any single climatological event on climate change, even one as large as a major regional drought, scientists have long predicted that such droughts as the Midwest experienced in 2012 are the type of events that will result from climate change.¹⁹² Adding to the already overwhelming evidence that climate change is occurring (and should no longer be a matter of debate),¹⁹³ July 2012 was the hottest month the United States has experienced in 118 years of meteorological records.¹⁹⁴ The key to halting (or at least slowing) climate change will be to keep as large an amount as is possible of the carbon stored in fossil fuels — coal, oil, and natural gas — in the ground and out of the atmosphere.¹⁹⁵ By providing an alternative to petroleum, biofuels can help to reduce oil consumption and therefore aid in the extremely important challenge of keeping carbon underground.

As the United States faces the twin challenges of climate change and peak oil, biofuels must be a part of the solution. However, it is imperative that policies promoting biofuels are capable of accomplishing the United States' environmental and energy goals. Neither a wholesale abandonment of federal involvement in the development of biofuels nor a continuation of the corn-centric status quo is an acceptable way forward. The development of a Cuban sugarcane-based ethanol industry is part of a potential solution. Whether the former incentives for the domestic ethanol that expired at the end of 2011 will be revived by a future Farm Bill remains to be seen. Even if they are not, as long as the U.S. trade embargo against Cuba continues there will be little chance of that country making a substantial investment in the development of an entire new industry. It is understandable, for face-saving reasons, that United States

¹⁹² In fact, as long ago as 1988 (the year of the last major Midwestern drought), climatologists were warning that carbon emissions-driven climate change would increase the likelihood of droughts in the United States. See Philip Shabecoff, *Global Warming Has Begun, Expert Tells Senate*, N.Y. TIMES, June 24, 1988, <http://www.nytimes.com/1988/06/24/us/global-warming-has-begun-expert-tells-senate.html?pagewanted=all&src=pm>. In the words of the 1988 *New York Times* story: “[Dr. Syukuro Manabe of NOAA] added that the current drought was a foretaste of what the country would be facing in the years ahead.” *Id.*

¹⁹³ See Bill McKibben, *Global Warming's Terrifying New Math*, ROLLING STONE (July 19, 2012), <http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719?print=true>,

¹⁹⁴ Nat'l Climatic Data Ctr., *National Overview — Annual 2012*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <http://www.ncdc.noaa.gov/sotc/national/2012/13> (last visited Aug. 24, 2012). Statistically, July 2012 was the “329th consecutive month with a global temperature above the 20th century average.” Nat'l Climatic Data Ctr., *NCDC Releases July 2012 Global Monthly Climate Report*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <http://www.ncdc.noaa.gov/news/ncdc-releases-july-2012-global-monthly-climate-report> (last visited Mar. 27, 2013).

¹⁹⁵ McKibben, *supra* note 193. According to McKibben: “We have five times as much oil and coal and gas on the books as climate scientists think is safe to burn. We'd have to keep 80 percent of those reserves locked away underground to avoid that fate.” *Id.*

policy-makers would not consider ending the decades-long trade embargo against Cuba as long as Fidel Castro remains alive.¹⁹⁶ But, as soon as possible after a governmental transition begins in Cuba, United States policy-makers should consider taking steps to encourage the creation of such an industry.

Although they represent different regions of the country, when Congress and the president make decisions in Washington, they are supposed to act in the best interests of the entire country. Thus, it would seem improper to suggest that the federal government should implement legal and policy changes that would clearly economically favor one part of the country, Florida, to the detriment of another part, the Midwest. Arguably, however, through its policies encouraging the corn-dominated domestic ethanol industry and (until the end of 2011, at least) discouraging ethanol imports, the federal government has already answered this question, in favor of benefitting the Midwest to the detriment of Florida. As the effects of the drought of 2012 illustrate, this has been a policy decision fraught with wide-ranging consequences.¹⁹⁷

The possibility of importing ethanol from Cuba has been almost completely ignored in U.S. political discourse.¹⁹⁸ Yet, it will almost certainly become a more prominent issue after the Castro era ends and the United States moves toward normalizing trade relations with Cuba. Sooner or later, it is likely that the issue will even come up in presidential campaigns. It is thus particularly salient that the two states that would arguably have the most to lose or gain from the importation of Cuban sugarcane-based ethanol, Iowa¹⁹⁹ and Florida, are the archetypal political battleground states in presidential elections.²⁰⁰

The difficulty of weighing a decision to implement policy changes that would have a number of positive environmental effects and (regionally, at least) some negative economic effects is made more difficult by the fact that the free market system does not put a direct monetary value or cost on many environmental effects. “Some people are uncomfortable with the idea of trying to figure out the

¹⁹⁶ Somewhat remarkably, as of April 2013, Fidel Castro is still alive.

¹⁹⁷ See *supra* Part V.D.

¹⁹⁸ See *supra* Part I.

¹⁹⁹ Although Illinois is close to Iowa in the amount of corn it produces, the fact that Illinois contains the third largest city in the United States means its state economy is much less dependent upon the ethanol industry and agriculture in general than the state economy of Iowa. Therefore, Iowa should be considered the state that has the most to gain from policies favoring corn-based ethanol and the most to lose from policies favoring imported ethanol.

²⁰⁰ Iowa and Florida are important to both the primary and general election stages of a presidential campaign. Iowa’s first-in-the-nation caucuses are legendarily influential in the presidential primary process, as the fact that both President Obama and former President Bush spring-boarded to their parties’ respective nominations after winning the Iowa caucuses attests. Florida’s role as a battleground state in the 2000, 2004, and 2008 elections is similarly well-known in general election politics. Additionally, Florida has an early primary, and Iowa has been a “swing state” in presidential politics in recent years. See, Jonathan Easley, *Snapshot: The Crucial Swing States*, THE HILL (Nov. 5, 2012), <http://thehill.com/homenews/campaign/266049-a-snapshot-of-the-crucial-swing-states>.

economic value of ecosystem services such as clean water . . . [T]he problem is right now we take those free services for granted despite their obvious value to society.”²⁰¹ Just as positive ecosystem services (like water filtration provided by a wetland) do not yet have positive economic values attached to them, negative environmental decisions like burning coal or plowing a native grassland to plant corn do not yet have negative economic values attached to them.

This does not necessarily need to be the case. For example, if the United States put a tax on greenhouse gas emissions, there would be a greater correlation between the economic and environmental costs of utilizing a given resource (such as coal or ethanol from corn grown on former native grassland). However, given that the House of Representatives still disputes whether climate change is happening,²⁰² the likelihood of a carbon tax or even a cap and trade system for carbon emission credits becoming law in the immediate future is improbable. There is a greater likelihood of the United States unilaterally ending its trade embargo against Cuba while Fidel Castro is still alive.

This does not mean, however, that the decision-makers will not weigh the climate change effects of different fuel sources. As is often the case in American politics, a state government has acted before the federal government on the issue of climate change.²⁰³ In 2007, Governor Arnold Schwarzenegger signed an executive order directing California to set a goal of reducing the “carbon intensity of California’s transportation fuels by ten percent by 2020.”²⁰⁴ This standard, known as the Low Carbon Fuel Standard (LCFS), applies “to all refiners, blenders, producers, or importers . . . of transportation fuels in California” and is measured on a “full fuels cycle basis.”²⁰⁵ The full fuels cycle basis looks at the carbon consequences of a type of fuel’s entire production process and not just of burning the fuel.²⁰⁶ Assuming California’s LCFS survives the constitutional challenge brought against it²⁰⁷ and Cuban sugarcane-

²⁰¹ See THE NATURE CONSERVANCY, *Voice from the Field*, *supra* note 98.

²⁰² Brad Johnson, *House Committee Votes to Deny Climate Change*, GRIST (Mar. 16, 2011), <http://www.grist.org/article/2011-03-15-house-committee-votes-to-deny-climate-change>.

²⁰³ For more on state-level actions on climate change, see generally Gabriel Weil, *Subnational Climate Mitigation Policy: A Framework for Analysis*, 23 COLO. J. INT’L ENVTL. L. & POL’Y 285 (2012).

²⁰⁴ Cal. Exec. Order S-01-07 at 2 (Cal. 2007), available at <http://www.arb.ca.gov/fuels/lcfs/eos0107.pdf>.

²⁰⁵ *Id.*

²⁰⁶ See CAL. ENERGY COMM’N, FULL FUEL CYCLE ASSESSMENT: WHEEL TO WHEEL ENERGY INPUTS, EMISSIONS, AND WATER IMPACTS, at ES-4 (2007), available at <http://www.energy.ca.gov/2007publications/CEC-600-2007-004/CEC-600-2007-004-REV.PDF>.

²⁰⁷ In December 2011, the U.S. District Court for the Eastern District of California granted a preliminary injunction preventing enforcement of the LCFS. See *Rocky Mountain Farmers Union v. Goldstene*, 843 F. Supp. 2d 1071 (2011) (granting preliminary injunction against enforcement of California’s LCFS on dormant Commerce Clause grounds). In April 2012, however, the Ninth Circuit Court of Appeals granted a stay of the injunction while it considers the case. See CAL. AIR RES. BD., LCFS ENFORCEMENT INJUNCTION IS LIFTED 1 (2012), available at <http://www.arb.ca.gov/>

based ethanol produced fewer carbon emissions than domestic corn-based ethanol, California may then exert pressure on federal policy-makers to encourage the growth of an ethanol industry. California is geographically remote from both the Corn Belt and Florida, and, therefore, has relatively little at stake economically in the debate between deriving ethanol from domestic corn or Cuban sugarcane. Thus, California could point to itself as a neutral decision-maker, interested primarily in reducing the fossil fuel consumption and greenhouse gas emissions of its vehicles.²⁰⁸

It must be stressed that sugarcane-based ethanol, from Cuba or anywhere else, is not *the* solution to the energy and climate change problems faced by the United States. Replacing just ten percent of global gasoline usage with sugarcane-based ethanol would require a tenfold increase in global sugarcane production.²⁰⁹ To address the problems of both peak oil and climate change, the United States must do much more to reduce its fossil fuel consumption. It should primarily do this by using the strategies highlighted in the introduction of this Article: higher fuel efficiency standards, electric cars (powered with electricity from renewable energy sources, not coal), more public transportation, more walkable neighborhoods, and shorter commutes. To the extent to which there will inevitably still be high demand for liquid fuels for automobiles, ethanol from Cuban-grown sugarcane can, and should, be part of the solution to both problems.

Whether one supports or opposes the U.S. trade embargo against Cuba, it should be universally agreed that the post-Castro era ought to mark a new beginning in relations between the United States and Cuba. It can also mark a new beginning for U.S. energy policy. With the help of sensible legal and policy decisions in both countries and an infusion of foreign investment and expertise from the United States and elsewhere, Cuba may be able to develop a sugarcane ethanol industry. This will help to revitalize Cuba's economy, help the United States reduce its dependence on fossil fuels, and provide environmental benefits for the world.

fuels/lcfs/LCFS_Stay_Granted.pdf.

²⁰⁸ Cf., CAL. CODE REGS. tit. 17, § 95480 (West 2013) (enacting a low carbon fuel standard for the purpose of reducing transportation greenhouse gas emissions pursuant to the California Global Warming Solutions Act). While it is not considered a "swing state" in presidential elections (having consistently voted for the Democratic presidential nominee since 1992), California does have the ability to influence national policy with its enormous Congressional delegation of fifty-five members of the United States House of Representatives and Senate. See *California, 270 TO WIN*, <http://www.270towin.com/states/California> (last visited Mar. 28, 2013).

²⁰⁹ Walter, *supra* note 51, at 73.