The Reprise of Biofuels: Breaking Down the Barriers

Bradley G. Bodiford[*] & Jacob T. Cremer[‡]

Abstract

When the automobile was young, biofuels were a viable competitor to petroleum-based fuels. Then anticompetitive forces and government intervention pushed them out of the market. Recently, biofuels are getting another look. Despite their benefits, biofuels face serious barriers to entry. Many states are anxious to overcome these barriers but have difficulties crafting local policies that can affect national markets. For a truly competitive market to emerge for consumers, state legislatures should craft policies that increase the competitiveness of biofuels.

This Article presents three unique policies to do so. First, a biofuels exchange will stimulate market transactions by strengthening market infrastructure. Second, modification to the renewable fuel standard will help biofuels achieve economies of scale. Third, a strategic ethanol reserve will increase public acceptance of biofuels. These policies are given a context by examining Florida, which some experts have predicted will become

[*] J.D., Florida State University, College of Law, 2010; B.B.A., Business Administration, Mercer University, 2007.

[‡] Editor-in-Chief, *Florida State University Business Review*, 2009-10. J.D., Florida State University, College of Law, 2010; M.S.P, Florida State University, Department of Urban and Regional Planning, 2010; B.A., Economics & Business Administration, Rhodes College, 2006.

the next leader in biofuels production. These policies have also been crafted considering the current realities of an economic recession, state budget deficits, and relatively low fuel prices.

Table of Contents

I. An Introduction to Biofuels

"I foresee the time when industry shall no longer denude the forests which require generations to mature, nor use up the mines which were ages in the making, but shall draw its raw material largely from the annual products of the fields."[1]

These words were uttered by industrialist and iconic businessman Henry Ford, who was discussing the momentous changes he foresaw in America as agriculture industrialized. Ford, ever a believer in a closer relationship between the farmer and the scientist, put tens of thousands of acres into use in

[1] Glenn F. Jenkins, *Henry Ford Discusses America's Industrial Future*, MODERN MECHANIX & INVENTIONS, Dec. 1934, at 38 (quoting Henry Ford), *available at* http://blog.modernmechanix.com/2007/10/30/henry-ford-discusses-americas-industrial-future/.

experimental agriculture.[2] One of the uses he put his land to was producing fuel for transportation.

Ford was interested in producing ethyl alcohol, known today as ethanol. Ethanol, along with biodiesel, is probably the most well known fuel from a biological source. These aptly named biofuels can be made from many sources, such as urban and household wastes, or from plant products like corn, soybeans, and biomass.[3] Although Ford called his fuel by a different name, his enthusiasm was even more fervent than today's most ardent promoters of biofuels.[4] As one commentator put it:

> When Henry Ford told a *New York Times* reporter in 1925 that ethyl alcohol was 'the fuel of the future,' he was expressing an opinion that was widely shared in the automotive industry. 'The fuel of the future is going to come from fruit like that sumach out by the road, or from apples, weeds, sawdust — almost anything,' he said. 'There is fuel in every bit of vegetable matter that can be fermented. There's enough alcohol in one year's yield of an acre of potatoes to drive the machinery necessary to cultivate the fields for a hundred years.'[5]

---

[2] ARGONNE NAT'L LAB, ENVIRONMENTAL CONSEQUENCES OF, AND CENTRAL PROCESSES FOR, ENERGY TECHNOLOGIES 342 (1990) ("Between 1935 and 1937, [Ford] sponsored three major conferences on industrial uses of farm products, including grain, soybean, and peanuts.").

[3] *See* Christine C. Benson, *Putting Your Money Where Your Mouth Is: The Varied Success of Biofuel Incentive Policies in the United States and the European Union*, 16 TRANSNAT'L L. & CONTEMP. PROBS. 633, 637-39 (2007) (defining biomass as plant material that is useful for producing energy, such as sugarcane pulp left over after sugar processing).

[4] *See* Bill Kovarik, *Henry Ford, Charles F. Kettering and the 'Fuel of the Future,'* 32 AUTO. HIST. REV. 7, 7 (Spring 1998) (noting that Ford saw biofuels as a way to stimulate the economy by giving ailing depression-era farms a new market), *available at* http://www.radford.edu/~wkovarik/papers/fuel.html.

[5] *Id.* at 7 (quoting *Ford Predicts Fuel from Vegetation*, N.Y. TIMES, Sept. 20, 1925, at 24).

Ford put the full weight of his industrial genius behind biofuels. In fact, "Ford was so convinced . . . that he built an ethanol production plant in the Midwest."[6] Ford also built some of his Model T's and Model A's to run using either ethanol or gasoline.[7] In addition to Ford, Alexander Graham Bell, Thomas Edison, and General Motors's famous researcher Charles Kettering all vocally supported biofuels.[8] Yet, even these inimitable innovators could not prevail when the political winds turned against them.

Ford had partnered his plant with Standard Oil Company, and by the 1920s, the plant represented twenty-five percent of the petroleum giant's Midwestern sales.[9] Standard Oil eventually turned its focus to eliminating the competition, including biofuels, and although Ford tried to persevere, he was forced to close his plant by the 1940s.[10] The combination of low priced petroleum-based fuels and the effects of Prohibition had beaten

---

[6] GREG PAHL, BIODIESEL: GROWING A NEW ENERGY ECONOMY 196-97 (2d ed. 2008).

[7] *See* Benson, *supra* note 3, at 636; Jamie Lincoln Kitman, *The Secret History of Lead*, THE NATION, Mar. 20, 2000, at 11, 17, *available at* http://www.thenation.com/doc/20000320/kitman.

[8] Kovarik, *supra* note 4, at 8.

[9] PAHL, *supra* note 6, at 197.

[10] JOSHUA TICKELL ET AL., BIODIESEL AMERICA 102 (2006) ("Threatened by the success of the farmer-run [biofuels], Standard Oil soon began undercutting the price of ethanol by selling gasoline below cost."); *see also* PAHL, *supra* note 6, at 197.

Henry Ford.[11] Standard Oil did not stop there: when ethanol production seemed to be on the rise after the government lifted Prohibition, Standard Oil used a number of tactics to push ethanol out of the market, including an advertisement warning that national biofuels legislation would "make alcoholics out of America's twenty-two million motor cars."[12]

Ford's story, and this Article's understanding of the government's heavy-handed involvement in fuels markets, is undoubtedly surprising to many. Yet, the renewable energy industry can trace its roots to Ford, its visionary "icon."[13] Ford's failure was not the only time the United States missed an opportunity to take advantage of biofuels. During the Civil War, a tax on alcohol greatly impaired the use of industrial alcohol, which supplied fuel for lamp oil.[14] The biofuels industry began to recover after repeal of the alcohol tax in 1906, but Ford's effort ultimately failed.[15]

During World War II, the production of the alcohol industry in the United States increased six-fold, but this was just

---

[11] *See* PAHL, *supra* note 6, at 197; Kovarik, *supra* note 4, at 12.

[12] TICKELL, *supra* note 10, at 102.

[13] Associated Press, *Renewable Energy Has an Icon: Henry Ford*, MSNBC, Oct. 12, 2006, http://www.msnbc.msn.com/id/15233556/.

[14] PAHL, *supra* note 6, at 196.

[15] *Id.* at 196-97.

another false start.[16] After the war, the industry was virtually dead until interest was renewed by the oil shocks of the 1970s, as well as the removal of lead as an octane booster.[17] During the 1970s, a number of problems within the fuel and automotive industries led to a consumer backlash against ethanol, but eventually this changed and production began a slow increase in the 1980s, which has continued through today.[18]

This Article aims to inject fresh thinking into a fuels debate that has repeated many times. If this Article stimulates new ideas in a policy realm that has stagnated for one hundred years, its goals will be achieved. It takes as given that truly free fuel markets are not close, but an incremental approach may be useful. Part I gives the reader context for the issues at hand, serving as a primer to biofuels and fuel markets.[19] Part II discusses three of the most serious barriers biofuels face. Part III proposes three legislative solutions intended to break those barriers and open the fuel markets to more competition from biofuels. These solutions include a biofuels information

[16] *See* ARGONNE NAT'L LAB, *supra* note 2, at 342.

[17] *See* PAHL, *supra* note 6, at 197; TICKELL, *supra* note 10, at 102.

[18] TICKELL, *supra* note 10, at 103.

[19] *See generally* Kovarik, *supra* note 4 (detailing the history of ethanol and biofuels); Barry D. Solomon et al., *Grain and Cellulosic Ethanol: History, Economics, and Energy Policy*, 31 BIOMASS & BIOENERGY 416 (2007) (providing a brief technical history of ethanol and biofuels).

exchange, renewable fuel standard amendments, and a state ethanol reserve.

This Article aims to aid this understanding using the state of Florida for context. Florida's potential for biofuels production exceeds almost every other state in the nation, making it a good example for this Article.[20] It has a broad agricultural base, which includes wood pulp in North and Middle Florida; sugarcane and promising grasses in South Florida; and citrus and other agriculture waste across most of the state.

II. Barriers to a Competitive Fuels Market

At least three major barriers must be overcome for a competitive fuels marketplace to emerge: a lack of market infrastructure, insufficient economies of scale, and consumer psychological resistance.

A. Lack of Market Infrastructure

The first barrier is a lack of a basic piece of market infrastructure: information. Information is a valuable—and undervalued—resource.[21] Nobel laureate F.A. Hayek explained, "[t]he economic problem of society is . . . a problem of the

[20] *See, e.g.*, GOVERNOR'S ACTION TEAM ON ENERGY & CLIMATE CHANGE, FLORIDA'S ENERGY & CLIMATE CHANGE ACTION PLAN C-6 (Oct. 15, 2008) [hereinafter GOVERNOR'S ACTION TEAM], *available at* http://www.flclimatechange.us/documents.cfm.

[21] *See* George J. Stigler, *The Economics of Information*, 69 J. POL. ECON. 213, 213 (1961).

utilization of knowledge not given to anyone in its totality."[22] Since knowledge about the current and the particular, about time and place, is dispersed among many people, the best way for society to benefit from this knowledge is by allowing people to make their own decisions.[23] This type of dispersed knowledge is incapable of being aggregated, parsed, and utilized by a "central authority."[24] Markets are important because society sufficiently allocates a wealth of information through the simple mechanism of people acting in their own best interests.[25] Consequently, rather than grand plans imposed by a government, society is generally more efficient when markets are allowed to signal information through prices in an open forum, such as an exchange.[26]

Though markets are the best way for society to exchange resources and signal information, they are not immune from problems. When markets alone fail to encourage an activity that society wants to promote, then government assistance may be helpful.[27] One common problem is high search costs—those costs

[22] F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 519-20 (1945).

[23] *Id.* at 521-22.

[24] *See id.* at 523-25.

[25] *See id.* at 525-28.

[26] *Id.*

borne by buyers and sellers attempting to find each other.[28] This problem is particularly acute for buyers and sellers of unique goods, or goods with a high degree of heterogeneity, because it is difficult to discover potential participants for the opposite side of the transaction.[29] For these goods, search costs are so high that most transactions, if they occur, are localized.[30]

An alternative, however, would be for someone to provide potential buyers and sellers with a meeting place.[31] This would achieve economies of scale through numerous transactions, allowing for a more stable price to emerge.[32] "By reducing the search time associated with identifying buyers and sellers, and by improving the flow of information between parties, finding the optimal market price for a product becomes less costly and more efficient."[33] Consequently, an exchange would reduce the

---

[27] *See generally* Laura Choi, *Creating a Marketplace: Information Exchange and the Secondary Market for Community Development Loans*, CMTY. DEV. INV. REV. (2007) (describing how lack of knowledge among buyers and sellers hurts the market for community development loans, and steps government might take to create a more functional market), *available at* http://www.frbsf.org/publications/community/review/122007/choi.pdf; Roberta G. Gordon, *Legal Incentives for Reduction, Reuse, and Recycling: A New Approach to Hazardous Waste Management*, 95 YALE L.J. 810, 826-27 (1985) (discussing reasons government should support creation of markets for hazardous waste).

[28] Stigler, *supra* note 21, at 213.

[29] *Id.* at 216.

[30] *Id.*

[31] *Id.*

[32] *See id.* at 217-18.

[33] Choi, *supra* note 27.

costs of searching for another participant, and after participants find each other the costs of bargaining for the correct price would decrease. Electronic meeting places like an exchange would further reduce costs. They offer the opportunity to reduce search costs, decrease the chance of unproductive searches, and allow buyers to locate better products for their needs.[34]

The market for biofuels encounters some of these risk and information problems. First, information may prove prohibitively expensive for investors to collect and analyze in the early and most unorganized stages. Exchanges could help disseminate information and reduce the costs of obtaining it. Second, many crops being contemplated for biofuels are not marketable for anything else, and would be grown solely as energy crops. For farmers, this is a risky proposition. Based on this theoretical underpinning, an information exchange for biofuels would be an excellent aid to states pursuing stronger biofuels policies. If the correct incentives were used, biofuels market imperfections might be cured.

---

[34] *Id.* (citing J. Bakos, *Information Links and Electronic Marketplaces: The Role of Interorganizational Information Systems in Vertical Markets*, 8 J. MGMT. SYS. 2 (1991)).

B. Economies of Scale

The second barrier is that biofuels producers have not achieved economies of scale.[35] Imagine that creating a barrel of biofuel is like making a Model T car. Initially, Model T cars were not commonly used because they were not affordable for the majority of Americans.[36] Although the first cars were built in 1885, it was not until 28 years later when the Model T was built on an assembly line that the car became more common than the horse and buggy.[37] The Model T took years of mass production to become cheap enough, and attractive enough, to significantly shift the market.[38] As the Model T was mass-produced, it became

[35] For example, there are no commercially sized cellulosic biofuels plants in the United States. Press Release, Emerson Helps Range Fuels Bring First Next-Generation U.S. Biofuels Plant into Commercial Production, Emerson (Mar. 4, 2009) (announcing the first commercial cellulosic plant, most commonly defined at one million gallons per year, is not expected to start production until 2010), *available at* http://www.emerson.com/en-US/news_center/news_releases/Pages/Emerson_Helps_Range_Fuels.aspx.

There is a stark difference between the efficiency and productivity of corn ethanol (the most common ethanol in 2009), and cellulosic ethanol (the future of ethanol). "Corn ethanol . . . generates at best thirty percent more energy than is required to grow and process the corn — hardly worth the trouble." In contrast, "cellulosic ethanol yields roughly eighty percent more energy than is required to grow and convert it." Evan Ratliff, *One Molecule Could Cure Our Addiction to Oil*, WIRED MAGAZINE 15:10, Sept. 24, 2007, *available at* http://www.wired.com/science/planetearth/magazine/15-10/ff_plant?currentPage=all.

[36] Rich Stezowski, *A Kid's Introduction to the Model T Ford*, Model T Ford Club, http://www.modelt.org/kidintro.html (last visited Apr. 30, 2009).

[37] Who Invented the Automobile?, Library of Congress, http://www.loc.gov/rr/scitech/mysteries/auto.html (last visited Apr. 30, 2009); Stezowski, *supra* note 36.

[38] Stezowski, *supra* note 36.

easier to fix, faster to build, and cheaper to buy.[39] Over only eight years the price of the Model T dropped from around $1000 to $360 dollars.[40] Like the early Model T, biofuels have room for improvement, such as reducing machine downtime, lessening water usage, minimizing input energy, increasing reliability, and most importantly, lowering production cost.[41] Once these things are done, biofuels will achieve economies of scale and have an opportunity for success in the way the Model T did.

To achieve economies of scale, states should adopt a renewable fuel standard that requires an amount of biofuels to be sold each year. The requirement would make biofuels ten percent of all retail fuel sales, unless the price difference between biofuels and petroleum products became unreasonable. Brazil overcame this barrier with similar policies over thirty years ago.[42] Now Brazil enjoys ethanol that is cheaper than gas on a per mile basis.[43]

---

[39] *Id.*

[40] Mass Production, http://www.spartacus.schoolnet.co.uk/USAmass.htm (last visited Apr. 30, 2009).

[41] Emerson, *supra* note 35.

[42] Don Hofstrand, *Brazil's Ethanol Industry* (pt. 2), AG DECISION MAKER (Iowa State University), Feb. 2009, at 1.

[43] Amy S. Clark, *In Brazil, the Driving Is Sweeter*, CBS NEWS, Mar. 29, 2006, http://www.cbsnews.com/stories/2006/03/29/eveningnews/main1454613.shtml?source=search_story (last visited Apr. 30, 2009).

C. Consumer Psychological Resistance

The third barrier is consumer psychological resistance: the consumer's fear of biofuels and lack of knowledge about them. Some economists argue that people are not always rational and do not always make the decision that seems best objectively.[44] Moreover, consumer knowledge and fear can be an important part of the valuation process.[45] Thus, classical economic models do not always describe markets accurately because "homo economicus" is not always rational.[46]

Some fear of biofuels stems from criticisms of biofuels.[47] The bigger barrier, however, seems to be that consumers lack knowledge about biofuels. A national 2007 survey, intending to uncover the extent of this lack of knowledge, found that a primary barrier to biofuels use was basic consumer knowledge:

> When asked why they don't currently use biofuels, a majority of drivers said they didn't think their car could run on biofuels (57 percent). These results suggest that consumers may not know

---

[44] *See* Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69(1) Q. J. ECON. 99, 99 (1955) (discussing the author's assumption that many others were already engaged in this research).

[45] *See generally*, GORDON R. FOXALL, EXPLAINING CONSUMER CHOICE 170 (2007) (describing various behavioral and scientific theories of predicting consumer preferences).

[46] *See generally*, Richard H. Thaler, *From Homo Economicus to Homo Sapiens*, 14 J. ECON. PERSP. 133 (2000) (providing background information on the ways economic decision-making differs from human decision-making, which can be quasi-rational and emotion-based).

[47] *See, e.g.*, Kovarik, *supra* note 4, at 8, ("Opponents have seen ethyl alcohol fuel as a scheme for robbing taxpayers to enrich farmers, as turning food for the poor into fuel for the rich, as compounding soil erosion problems, and as a marginally useful enhancement or replacement fuel . . . .").

> that most cars on the road today can run on ethanol blends of up to 10 percent without modification, and some drivers may already be using gasoline with some blend of ethanol. Furthermore, one in four drivers who don't use biofuels indicated that they don't know what biofuels are. More than two in five drivers (44 percent) admit they don't understand the difference between ethanol-blended gasoline and conventional gasoline.
>
> . . . Nearly half of respondents indicated the other main reason they don't buy biofuels, is that they don't know where to buy them (47 percent).[48]

The researchers inferred from their findings that increased awareness and comfort with biofuels would increase sales.[49]

One way to increase awareness and comfort is to use biofuels as a helpful tool during emergencies. Similar to the U.S. Strategic Oil Reserve, states should consider storing finished ethanol at refineries, in order to have a buffer fuel source for emergencies. During emergencies, when fuel is running low, people will gladly use the ethanol they may have been nervous about days earlier. This would bring biofuels one step closer to marketplace acceptance.

III. Increasing Competition in the Transportation Fuels Market

This Article presents three unique policies—one to address each barrier. First, a biofuels exchange will overcome the lack of market infrastructure and stimulate market transactions by

[48] Amy George & Mike Bounama, *Survey Says: U.S. Drivers Want More Ethanol*, ETHANOL PRODUCER MAG., Mar. 2007; *see also* NIELSEN CO., UNDERSTANDING THE MOTIVATORS AND BARRIERS TO USING BIOFUELS BLENDS (2008) (reporting an instance in New Zealand with similar results), *available at* http://www.eeca.govt.nz/eeca-library/renewable-energy/biofuels/summary/nielsen-consumer-research-08.pdf.

[49] George & Bounama, *supra* note 48.

lowering the costs of doing business. Second, a renewable fuel standard will allow biofuels producers to achieve economies of scale by closing statutory loopholes. Third, a strategic ethanol reserve will overcome consumers' psychological resistance to biofuels by increasing acceptance of the alternative fuel source.

A. Biofuels Exchange[50]

One innovative solution that will increase biofuel production is a biofuels exchange. The exchange will bring all biofuels market participants to one central trading forum, coordinating the biofuels supply from farm to pump. Operating like an eBay for energy, this exchange will be an online system that facilitates market transactions, while lowering costs, by providing information to buyers and sellers of materials used to produce biofuels.

That is, "[l]ike personals listings, . . . exchanges are primarily information services, linking suppliers with buyers. The listings usually include materials wanted and materials available, subdivided into categories [and] sales, and transportation [is] worked out by the companies involved without the exchange's involvement."[51] Exchanges facilitate speedy

[50] The kernel of this idea came from Dana Weber, Exec. Dir., Fla. Biofuels Assoc., Inc., Tallahassee, Fla.

[51] Ben Chadwick, *Waste Not, Want Not: Waste Exchanges Save Energy, Money and Landfill Space*, E: THE ENVTL. MAG. (Mar.-Apr. 2000),

transactions through online hubs.[52] Although there is great variance in how these exchanges work, they all share an online catalogue of market participants and a system for posting needed and wanted materials and services.

Exchanges differ. The services that the exchanges provide vary significantly:

> While some exchanges simply manage these listings and respond to requests for information, others are proactive in seeking companies which might need their services, matching [waste] generators with companies that need materials, providing outreach through workshops, bulletins, and advertising, providing on-site plant assessments of reuse and recycling opportunities, [and] referring [waste] generators to state technical assistance centers to evaluate waste reduction opportunities.[53]

A great deal of flexibility in institutional structure is possible. Some exchanges are nonprofits, focused mostly on diverting materials with a low market value from landfills.[54] An EPA study found that historically, "exchanges that specialized in higher value materials could survive without government funding; exchanges working to create transactions with impure,

---

http://findarticles.com/p/articles/mi_m1594/is_2_11/ai_94775446/pg_1?tag=artBody;col1 (last visited Apr. 30, 2009).

[52] Information acquisition is costly in terms of time and money.

[53] WASTE MIN. BRANCH, OFFICE OF SOLID WASTE, U.S. ENVTL. PROT. AGENCY, A REVIEW OF INDUST. WASTE EXCHANGES EPA-530-K-94-003 (1994) *available at* http://www.p2pays.org/ref/10/09222.htm (noting that waste exchanges work best when companies are within 250 miles of each other).

[54] *Id.* Others are for-profit ventures, speculating and buying materials from companies to sell them for a small profit. *Id.*

low value, or hard-to-place materials required ongoing government support."[55]

These exchanges are often funded through federal subsidy programs and corporate sponsorships, and have yielded spectacularly successful returns, sometimes saving waste generators $30 for each dollar invested in the exchange operations.[56] They tend to be small, with budgets of $10,000 and $200,000 and employ only a fraction of one person's time to six full-time people.[57]

No exchanges are dedicated to biofuels yet, but the exchange proposed here will be modeled on today's waste and materials exchange systems, which are already trading some materials that could be used for biofuels.[58] In the United States, two especially successful waste exchanges provide interesting insights at what a biofuels exchange could resemble.

First, the Iowa Waste Exchange (IWE), established in 1990 by the Iowa State Legislature, actively bills itself as a facilitator that brings companies together so that they can "save money, increase efficiency and tackle difficult waste

---

[55] *Id.*

[56] *Id.*

[57] *Id.*

[58] *See* Claudia H. Deutsch, *Letting Little Go to Waste; An Enterprise Evolves from the Byproducts of Industry*, N.Y. TIMES, Mar. 17, 1999, at C1.

management issues."[59] This effort has lead to great successes: IWE has matched 5,700 byproducts and materials, in turn diverting more than 875,000 tons of waste from landfills.[60] Participating businesses have realized savings from avoided disposal costs, avoided materials purchases, transportation cost reductions, and freed storage space.[61]

IWE has been structured to best serve its mostly private sector users. For example, it does not charge a service fee but does accept donations through partnerships with governmental organizations, community colleges, solid waste agencies, and business entities.[62] Otherwise, funding comes from a percentage of solid waste tonnage fees.[63]

The exchange provides a number of services to participants. Like any modern exchange, IWE provides searchable online materials listings.[64] This database allows for posting of materials for sale, as well as materials wanted, and highlights

---

[59] *See* Iowa Code. § 455E.11(2)(d) (2008); IOWA WASTE EXCHANGE, IOWA WASTE EXCHANGE: PROVIDING OPPORTUNITIES FOR IOWA BUSINESS TO REUSE, RECYCLE AND SAVE 2 (2008), *available at* http://www.iowalifechanging.com/business/downloads/IWE05.pdf.

[60] IOWA WASTE EXCHANGE *supra* note 59, at 2.

[61] *Id.*

[62] *Id.*

[63] *Id.*

[64] *Id.* at 3; Search Materials—Iowa Dept. of Natural Res. Waste Mgmt., http://programs.iowadnr.gov/iwe/searchmaterials.aspx (last visited Apr. 30, 2009).

difficult to find, highly unusual, or time sensitive materials through the IWE Hot List.[65]

A second successful exchange is the Southern Waste Information eXchange (SWIX), "a non-profit clearinghouse and repository for industry" information on the availability and demand for waste materials, market development, and waste management services and products, among other things.[66] This exchange, one of North America's oldest, has also been successful, having matched 88,728 tons of materials in fiscal year 2005-06 alone, after fielding over 47,000 information requests that year.[67]

Although SWIX is not a government-created exchange like IWE, the two share a number of similarities. Like IWE, SWIX has an online database of materials listings and needs.[68] Also like IWE, SWIX has grown from a simple posting-board model to a full-featured information exchange, with additional services, such as, a job board, an industry publications collection, and a laws

---

[65] Iowa Dept. of Natural Res.: Iowa Waste Exchange, http://www.iowadnr.gov/waste/iwe/index.html (last visited Apr. 30, 2009).

[66] Southern Waste Information eXchange (SWIX), http://wastexchange.org (last visited Apr. 30, 2009).

[67] REVIEW OF INSDUST. WASTE EXCHANGES, *supra* note 53; SWIX: Results, http://wastexchange.org (click Results on left) (last visited Apr. 30, 2009).

[68] SWIX, *supra* note 66.

and administrative rule collection.[69] In addition to online information services, SWIX maintains a print catalog and a toll-free hotline for assisting with waste management needs.[70] SWIX also treats information confidentially and declines to warrant materials or provide legal opinions.[71]

SWIX, however, does not charge for its services. It derives income from sponsorships by public and private organizations, such as the Florida Department of Environmental Protection, Florida State University, the Florida Chamber of Commerce, and several consultancies.[72]

For this proposal, the biofuels exchange would start as a passive information exchange that would be completely accessible to the public on the Internet. Biofuels producers would post needed materials, and potential producers would post the probable resource needs of plants being researched or planned. Landowners would signal interest in growing biofuels. This could signal other landowners in the same region, who could then band together as a consortium to raise enough capital for a biofuels plant.

---

[69] *Id.*

[70] *See id.*

[71] SWIX: Disclaimer, http://wastexchange.org (click Disclaimer on left) (last visited Apr. 30, 2009).

[72] *See* SWIX: Sponsors, http://wastexchange.org (click Sponsors on left) (last visited Apr. 30, 2009).

Funding needs would be minimal. One full-time program administrator would keep costs down and have incentives through a financial bonus to keep trade secrets confidential, and also to attract as many participants as possible, keeping the exchange viable.[73] Having a gatekeeper is preferable to allowing Craigslist-style anonymous posting, where the user gets an anonymous email account, since it allows the administrator to identify and work with the posting entity, possibly acting as a problem solver. It would also ease the transition for a better-funded exchange to offer more extensive matching and consultation services, such as those provided by IWE.

Most importantly this model can and has succeeded. One waste exchange in Jamaica was built over a relatively short time period, and with very limited resources. The program used an entirely web-based system in a community that had no prior experience with exchanges.[74]

B. Renewable Fuel Standard

The renewable fuel standard (RFS) is a principal means to accelerate biofuels production, ensuring demand by requiring that biofuels represent a certain percentage of fuels sold in a

[73] This is "the 'liquidity trap' problem: that many companies will not be attracted into an exchange until it is already large enough to provide good liquidity," meaning it already has a wide range of raw materials. Anthony Clayton et al., *Enabling Industrial Symbiosis Through a Web-Based Waste Exchange*, 40 GREENER MGMT. INT'L 93, 106 (2002).

[74] *See generally, id.* at 101-06 (describing the creation and management of the WasteX exchange in the West Indies).

region. RFSs are gaining momentum politically. At the federal level, the Energy Independence and Security Act of 2007 required that thirty-six billion gallons of biofuels be sold as part of the nation's fuel source by 2022.[75] At the state level, as of March 2009 twelve states had renewable fuel standards (RFS) to encourage ethanol use.[76] Like eleven other states, Florida recently created an RFS.[77] While the current Florida RFS is a good start, three improvements are necessary for maximum effectiveness.

The first improvement would be to amend the RFS to enforce the Governor of Florida's goal of "10 by 10," requiring a ten percent ethanol mix in all fuel by 2010. Current law allows gas retailers to purchase only gasoline if the price of ethanol is higher than or equal to gasoline.[78] To strengthen this requirement, the state should create a "reasonable cost cap" at one hundred and five percent of the current regular grade

---

[75] Renewable Fuels Association—Renewable Fuels Standard, http://www.ethanolrfa.org/resource/standard/ (last visited Apr. 30, 2009).

[76] Mandates and Incentives Promoting Biofuels—Pew Center on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/map_ethanol.cfm (last visited Apr. 30, 2009) (identifying these states as Massachusetts, Florida, Louisiana, Missouri, Minnesota, Hawaii, California, Oregon, Washington, New Mexico, Montana, and Iowa).

[77] § 526.203(1)(b), Fla. Stat. (2008) (requiring the "10 by 10" standard, meaning E10 gasoline with ten percent ethanol content, by 2010).

[78] § 526.204(1), Fla. Stat. (2008).

gasoline price as many other states have done.[79] A reasonable cost cap ensures that in the case of extreme unforeseen market conditions fuel retailers can withdraw from the RFS. This buffer will allow the biofuels production facilities to gain investment backers and increase production. This cost cap balances the interest of the private market with the state's interest in promoting fair competition.

The second improvement would be to enhance the RFS over a period of years, increasing the required percentage over time. For Florida to initiate competition in the fuel market, the fuel requirement will be increased by one percent each year, for ten years, until the RFS reaches twenty percent.[80] This secures automatic demand for biofuels, stabilizing the industry and allowing biofuels farmers, producers, blenders, and other members of the supply chain to help ensure investor confidence through economies of scale. An automatic sunset provision of twenty years will drive biofuels to eventually prove themselves in the free market.[81]

---

[79] *See* H.R. 218, 48th Leg., 1st Sess., 2007 N.M. 4-5 (requiring the RFS to stay in place at all times, unless the New Mexico Energy Director determines a temporary waiver should be granted).

[80] To preserve market stability, the statute will also require any changes to this yearly increase to be given one year in advance.

[81] The idea is to promote self-sufficiency in the long run.

The third and final improvement adds better enforcement and flexibility to the current RFS. The RFS should hold each retailer accountable for meeting the ten percent biofuels sales requirement of all annual fuel sales, rather than for every single gallon sold.[82] The same amount of biofuels will be sold but with more flexibility for production requirements and retail sales exceptions, such as for lawnmowers and boats.[83] A second benefit of increased flexibility is that it would statutorily redefine "biofuels" to include biodiesel in the RFS as a number of other states have done.[84] Biodiesel is ignored in Florida's current regime, but this amendment would treat biodiesel equal to ethanol.

The RFS is not an original concept. Brazil, the world's leader in ethanol production, faced oil shortages in 1973, but took a different course of action than the United States.[85] In

---

[82] § 526.203, Fla. Stat. (2008) (requiring every gallon of gasoline sold to contain at least ten percent ethanol, an inflexible standard).

[83] As one might imagine, there is some cyclical supply to biofuel crops, like other crops. This means that Florida's biofuel supply may dwindle during the winter months. This proposal provides flexibility for such a situation.

[84] Mandates and Incentives Promoting Biofuels, *supra* note 76**Error! Bookmark not defined.** (showing Iowa law enacted in 2006 requires that twenty-five percent of motor fuel to come from renewable sources defined as E10, E85, or biodiesel by 2020; Louisiana law enacted in 2006 requires that two percent of all diesel be biodiesel, and for this to go into effect six months after there are fifty million gallons of ethanol in annual production, or ten million gallons of biodiesel in the state; Washington law enacted in 2006 requires that two percent of all diesel sold be biodiesel by 2008, and be increased to five percent if there is sufficient in-state biodiesel production).

1975, Brazil adopted the "National Alcohol Program," which required a minimum of twenty-two percent ethanol to be blended in all fuel within a few years of becoming law.[86] Brazil began blending increasing quantities of ethanol into its gasoline supply until it reached E22, similar to what is proposed in this Article.[87] Eventually, Brazil became the world leader in ethanol production.[88] Brazil has also enjoyed its energy independence since 2006.[89] Now, Brazil enjoys ethanol that is thirty percent cheaper than gasoline. Although ethanol gets slightly less mileage, it still remains cheaper on a per mile basis.[90] It took Brazil thirty-one years to gain energy independence, and now is the time for the United States to begin similar comprehensive investments and policies in favor of energy independence, in favor of biofuels.

---

[85] Nancy I. Potter, *How Brazil Achieved Energy Independence and the Lessons the United States Should Learn from Brazil's Experience*, 7 WASH. U. GLOBAL STUD. L. R. 331, 331 (2008).

[86] Hofstrand, *supra* note 42, at 1.

[87] Clark, *supra* note 43.

[88] *Task 40 Sustainable Bio-energy Trade; Securing Supply and Demand* 13 (2007), http://www.bioenergytrade.org/downloads/finalreportethanolmarkets.pdf (last visited Apr. 30, 2009).

[89] Hofstrand, *supra* note 42, at 1, 4 (defining energy independence as having at least fifty percent of a nation's fuel sources come from within the nation).

[90] Clark, *supra* note 43.

C. Strategic Ethanol Reserve[91]

Florida and other states should create a strategic ethanol reserve to address and overcome consumer mental inertia to regular ethanol use. The reserve would introduce consumers to more biofuels during emergency shortages, which would provide awareness and positive association to biofuels. Helping people realize that biofuels are a large part of the solution to our current energy crises would be half the battle. Currently, many people are skeptical about investing in the foreign concept of "growing oil."

In addition to addressing the psychological barrier, the strategic ethanol reserve would also assist two other significant problems. First, by requiring more production up-front, the ethanol reserve would immediately increase ethanol production allowing producers to operate on larger economies of scale, bringing the per gallon price of ethanol even lower. Cheaper prices and more production directly benefit ethanol's economies of scale, which helps ethanol to better confront petroleum's large market barriers.

[91] The idea for this solution stemmed from several conversations with experts who expressed concern about winning over public opinion before biofuels could reach their potential in Florida and the rest of America. Many thanks to Michael Dobson, Pres. & CEO, Fla. Renewable Energy Producers Assoc., Comm'r Charles H. Bronson, Fla. Dept. of Agriculture & Consumer Serv., and Cynthia L. Craig, Vice Pres. & Dir., Fla. Renewable Energy Producers Assoc.

Second, it would offer states a buffer to help in mitigating and possibly preventing fuel shortages.[92] People of all states have been subject to many fuel shortages and price spikes over the last quarter century, beginning with the 1973-74 Arab Oil Embargo, and continuing as recently as the September 2008 Hurricane Gustav shortage.[93] The 1973-74 Arab Oil Embargo shortage lasted several months, causing a gasoline price shock, with price levels quadrupling rapidly.[94] The embargo contributed to a severe worldwide recession.[95] More recently, the September 2008 Hurricane Gustav shortage lasted two weeks and spread across the Southeastern United States.[96] Because of the Gustav Shortage, car lines sixty-deep around gas stations formed, colleges cancelled classes, and police stations barred the general public from certain gas supplies to ensure that law

---

[92] Common with fuel shortages is the secondary effect of a self-fulfilling "gas scare," which causes a self-created run on gasoline if everyone depletes the current supply by filling up their fuel tanks before they naturally would. Leonora LaPeter Anton & Stephanie Garry, *Crist: 'There's Plenty of Fuel'*, ST. PETE. TIMES, Sept. 14, 2008, at 4A, *available at* http://www.tampabay.com/news/article809899.ece.

[93] *The Price of Oil*, CBC NEWS, July 18, 2007, http://www.cbc.ca/news/background/oil/ (last visited Apr. 30, 2009); *see* Copeland *infra* note 96.

[94] Educate Yourself—The Arab Oil Embargo of 1973-74, http://www.buyandhold.com/bh/en/education/history/2002/arab.html (last visited Apr. 30, 2009).

[95] *Id.*

[96] Larry Copeland, *No Quick End to Gas Shortage: Southeast's Scarcity of Fuel Enters Third Week*, USA TODAY, Sept. 28, 2008, at 3A.

enforcement and other city vehicles would have sufficient fuel to continue daily duties.[97]

This proposed fuel reserve would be similar to the United States government's creation of a strategic fuel reserve. In 1912, President Taft created the U.S. Strategic Petroleum Reserve because he worried what the country would do without a sufficient fuel source—only four years after the Model T became ubiquitous.[98] Now, the U.S. Reserve holds an inventory of 727 million barrels in various locations.[99] The reserve is growing too, in 2007, President Bush announced the doubling of the reserve.[100]

For states, a strategic ethanol reserve would require fuel blenders to continuously keep a reasonable amount of ethanol in a specially designated inventory. "Reasonable amount" would be defined as ten percent of the previous year's gross ethanol consumption.[101] For example, if an oil blending station purchased

---

[97] Steven Mufson, *Gas Shortage in the South Creates Panic, Long Lines*, WASH. POST, Sept. 26, 2008 at D01, *available at* http://www.washingtonpost.com/wp-dyn/content/story/2008/09/26/ST2008092600422.html; Interview with Jeffrey Joyner, Fla. State Trooper, stationed in Tallahassee, Fla. (Oct. 10, 2008).

[98] U.S. Dept. of Energy—Fossil Energy: U.S. Petroleum Reserves, http://www.fossil.energy.gov/programs/reserves/#Naval percent20Petroleum percent20and percent20Oil percent20Shale percent20Reserves (last visited Apr. 30, 2009).

[99] U.S. Dept. of Energy—Fossil Energy: Environmental Impact Statement, http://www.fossil.energy.gov/programs/reserves/spr/expansion-eis.html (last visited Apr. 30, 2009).

[100] *Id.*

one-hundred million gallons of pure ethanol in 2008, in 2009 the same blender would keep at least ten million gallons of pure ethanol in designated storage facilities at all times.

A distributor would store the fuel at the distribution facility to allow it to be allocated rapidly during an emergency.[102] When a shortage, like the September 2008 Hurricane Gustav shortage, occurs, demand for gas and ethanol subsequently increases, thereby depleting gas and ethanol supplies.[103] The reserve would counteract this problem by using the ethanol reserves to increase the blending allocation from E10 to E20.[104] By substituting ten percent of the scarce gasoline consumption with the strategically reserved ethanol, the ethanol reserve

---

[101] The mandate could be adapted through an act of the legislature or administrative rule led by the Governor's Office of Energy and Climate Change. In addition, an Executive Order from the Governor would be the only trigger allowing for blenders to use the ethanol reserve. The order must be initiated by a recommendation from the legislature or the Governor's Office of Energy & Climate Change.

[102] This would provide a vital gap filler if the U.S. reserves were tapped. Unlike the national government, which must wait on the refining process, the Florida Strategic Reserve System would store a finished product that only needs to be distributed to serve its purpose. Other countries have already made this distinction. *See* South Korea Energy Data, Statistics and Analysis—Oil, Gas, Electricity, Coal, http://www.eia.doe.gov/emeu/cabs/South_Korea/Oil.html (last visited Apr. 30, 2009) (noting that South Korea holds twelve million barrels, about seventeen percent of total reserve stockpile, in the form of finished and refined fuel products).

[103] U.S. Dept. of Energy: Energy Consumption for Transportation in Florida, http://apps1.eere.energy.gov/states/transportation.cfm/state=FL#ethanol (last visited Apr. 30, 2009) (noting ethanol is below ten percent of the overall fuel supply in Florida, whereas gasoline makes up well over ninety percent of the fuel supply). .

[104] Fuel mixed with ten or twenty percent ethanol, combined with ninety or eighty percent gasoline, respectively.

would give Florida at least an extra three and a half days of fuel at normal consumption rates.[105] This amount could have prevented the September 2008 Hurricane Gustav gas shortage from effecting Florida. This reserve would expand gross biofuel consumption, and provide a substantial shield from the next shortage.

By using an ethanol reserve to prepare for the future, states will be buffered from gas shortages and the attendant economic difficulties. By saving consumers money, producing more home-grown fuel, and, most importantly, keeping people from running out of fuel, this reserve will grow the economy.[106] In all, the ethanol reserve will allow states with ethanol reserves to stand out as leaders among other states whenever the next fuel shortage occurs.

IV. Conclusion

The time has come for states to harness the power of biofuels to improve the wellbeing of consumers. By the end of World War II, "the ethanol industry in the United States lost

[105] At least three and a half days would come from the original E10 RFS. Then the Florida Strategic Reserve System would require ten percent of the ethanol from the RFS to be held in reserve at all times; therefore holding one percent of Florida's fuel consumption in a safety reserve. One percent of annual consumption should average to 3.65 days, or at least three and a half days. Once the RFS peaks at E20, this would provide the Florida Strategic Reserve System with at least full week's buffer. Furthermore, if the market continues to naturally increase past the RFS as expected, then the reserve would only grow as well.

support due to advances in the technology and supply of petroleum."[107] Since being pushed out of the transportation fuels market, there has been no better chance for biofuels to recover than now. Because of a number of barriers to entry, however, biofuels have not yet re-emerged as a competitor to petroleum-based fuels, even though consumers are again realizing biofuels' benefits.

Fresh thinking will be necessary for states to increase the ability of biofuels to compete with petroleum fuels. An optimal policy would remove all government intervention from the fuels market and allow true competition. Barring such a solution, the second-best alternative for states would be to help foster a more competitive market. A number of states seem to recognize the necessity of this path. As one commentator noted:

> It's famously said that you can't make an omelet without breaking a few eggs. Likewise, in an energy market dominated by petroleum, it seems nearly impossible to jumpstart a viable biofuel[s] market without government support. The trick . . . is that nations should operate from a realistic assessment of their resource assets, and proceed accordingly.[108]

Unfortunately, many believe that biofuels should be left to the market's discipline, not realizing that government intervention facilitated petroleum's dominance. In fact, government

---

[107] Benson, *supra* note 3, at 636.

[108] Tom Philpott & Gordon Feller, *Samba Lessons: What Brazil Can Teach the U.S. About Energy and Ethanol*, GRIST, Dec. 14, 2006, http://www.grist.org/news/maindish/2006/12/14/brazil/index.html.

intervention is the only short-term solution for a viable biofuels market.[109]

[109] The material on which this Article is based won the Jeb Ellis Bush Outstanding Achievement Award in January 2009 from the Executive Office of Governor Charlie Crist of Florida. This award is given to winners of a competition open to a select group of students involved in a fellowship program sponsored by the Governor's Office. It is awarded to the best legislative policy proposal, based on depth of analysis, pragmatism of implementation, and appropriateness based on current events.

We thank the Board of the Gubernatorial Fellows Program for their insightful questions, as well as the dozens of experts in business, science, and policy who gave their time to us in preparation for the competition—especially Jeremy Susac, Dir., Governor's Energy Office; Charles H. Bronson, Comm., Fla. Dept. of Agric. & Consumer Servs.; Mel Martinez, U.S. Sen., Energy & Natural Res. Comm., U.S. Senate; and Larry Ringers, Chief of Staff, Lt. Gov Jeff Kottkamp.

We also thank the editors and members of the *Florida State University Business Review* for their hard work on this article, especially Executive Editor Terin Barbas and Articles Editor Christa Pletcher.