You Can't Always Get What You Want: A Comparison of Biofuel Policy in the United States and Japan

Jay KLAPHAKE※ and Hironori SASADA※※

Abstract

Dramatic increases in global oil prices, along with a growing awareness of the need for greater environmental protection measures, led the Japanese and U.S. governments to introduce a series of policies aimed at promoting increased production and distribution of bioethanol. Much was expected of the two countries' biofuel policies; however, their policy outcomes made a clear contrast. What causes are behind the gap in policy outcomes between the U.S. and Japan? This study seeks to answer this question by examining the biofuel-related policies of the two countries and analyzing the variations in catalysts and contexts that led to the differences in results.

Key Words: Japan, United States, Biofuel Policy, Ethanol, Environment

※ Associate Professor, Interfaculty Institute for International Studies, Ritsumeikan University. J.D. William Mitchell College of Law (1995).

※※ Associate Professor, Interfaculty Institute for International Studies, Ritsumeikan University. Ph. D. University of Washington (2008).

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You can't always get what you want
You can't always get what you want
You can't always get what you want
But if you try sometimes you might find
You get what you need[1]

-The Rolling Stones

I. Introduction

The increasing awareness of the need for broader environmental protection measures coupled with the steep rise in energy prices in recent years has led the governments of both Japan and the U.S. to introduce a series of policies aimed at promoting increased production and distribution of biofuel, or a type of fuel produced from biomass. Biofuel is an alternative to fossil fuels and is considered to be more environmentally friendly because it is a renewable form of energy. Much was expected of the two countries' biofuel policies; however, their policy outcomes made a clear contrast. While the biofuel policy of the U.S. government was arguably a success by at least several measures, the policy in Japan was a huge failure.

The United States became the world's largest producer of biofuel within a short period of time, and biofuel is widely distributed and sold in gasoline stations throughout the U.S. Yet, the Japanese government failed despite the efforts of powerful ministries, including the Ministry of Economy, Trade, and Industry and the Ministry of Agriculture, which did their utmost to promote production and distribution of biofuel. Biofuel production in Japan today is still limited, and the commercial sale of biofuel is almost nonexistent.

What causes lie behind the vast chasm in policy outcomes between the U.S. and Japan? This study seeks to answer to this question by examining the biofuel-related policies of the two countries and analyzing the variations in catalysts and contexts which lie beneath the differences in outcome. It also tries to address some challenges and difficulties both countries are currently facing in their biofuel campaigns, and suggests solutions to overcome those challenges.

The outline of the remainder of our paper is as follows: The next section discusses the environmental and economic significance of biofuel, and we make the case that the study of biofuel policies are of particular importance. Section

1. Jagger and Richards, "You Can't Always Get What You Want," song by the Rolling Stones from the album "Let it Bleed," Decca Records, released December 5, 1969.

three examines the current condition of biofuel production and distribution in the U.S. and Japan, and then we compare and contrast biofuel-related policies of the two countries. In the fourth section, we present our analysis of the context behind the remarkable differences in policy outcomes. Finally, the concluding section discusses some of our policy recommendations for more widespread use of biofuel in Japan.

II. The increasing significance of biofuel

Biofuel is a type of fuel that is produced mostly from organic material such as corn, wheat, sugar cane, and other kinds of biomass. There are a number of different fuels that could fall under this category including bioethanol, biodiesel, biomethanol, biomethane gas, and bioether. However, this study will focus specifically on bioethanol (i.e. ethanol produced from organic materials) and does not involve biofuels of other kinds. This is because bioethanol is the type of fuel that would be most commonly used for fuel for most automobiles and household heating in the near future, and also the governments of Japan and the U.S. are currently concentrating primarily on promotion of bioethanol.

Biofuel recently has come under the spotlight as an eco-friendly alternative energy, because its raw materials are renewable. Much is expected from biofuel, as an increase in production and use of biofuel would lessen the reliance on fossil fuels and contribute to a reduction in emissions of carbon dioxide. Besides the environmental merits, biofuel is expected to stimulate the rural economy by providing the agricultural industry with new business opportunities. The recent economic downturn and market liberalization are posing serious challenges to the agricultural industry, and a substantial demand expansion for agricultural products is unlikely. However, if production of biofuel increases, so would the demand for agricultural products as raw material for biofuel. That, in turn, creates jobs in rural regions, increasing the income of agricultural producers, and revitalizing the rural economy. There are some concerns regarding the high-cost structure of biofuel production, adverse impacts on food price, and dependency on government subsidies. However, many expect biofuel to provide more benefit than harm, and therefore, it is of profound significance to analyze policies that are aimed at promotion of production and distribution of biofuel.

The next section will examine the policy targets of the governments of the U.S. and Japan. It then compares and contrasts the policy outcomes in the two countries focusing on the production and distribution of biofuel.

III. Production and distribution of biofuel in the U.S. and Japan

(1) U.S.

As compared with other nations, and especially as measured against the case of Japan, the U.S. government's policies to promote production and distribution of bioethanol have been an overwhelming success.

a) Policy target

In the late 1970s, partly in response to the oil embargoes of 1973 and 1979, gasoline containing as much as 10% ethanol began to increase in the U.S.[2] The Clean Air Act amendments of 1990 mandated the use of oxygenates, also known as reformulated gasoline (RFG), as part of en effort to reduce carbon monoxide emissions in cities with the worst smog pollution.[3] Methyl tertiary butyl ether (MTBE) and ethanol are the two most common substances used to add oxygen to gasoline. In 2006, demand for corn based ethanol spiked for use as an oxygenate when a number of oil companies eliminated use of MBTE as an additive to gasoline, after several states implemented MBTE bans based on groundwater contamination concerns.[4] Made possible (and profitable) by the increase in oil and gasoline prices since 2002, the current boom in ethanol production is a result of federal and state legislation for the purpose of reducing oil consumption, enhancing energy security, and lowering greenhouse gas emissions.

The Energy Policy Act of 2005 established a renewable fuel standard (RFS) that mandated a target of 4.6 billion gallons of renewable fuels by 2006, and 7.5 billion by 2012.[5] The Energy Independence and Security Act of 2007 (EISA) establishes specific targets for biofuels produced in the United States. The Act mandates that the U.S. produce 36 billions gallons of renewable fuels per year by 2022, with at least 15 billion gallons being conventional corn starch based

2. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," December 17, 2004. Available: http://ncseonline.org/nle/crsreports/04dec/RL30369.pdf. (Accessed September 9, 2010).

3. U.S. Environmental Protection Agency. Reformulated Gasoline Home. Available: http://www.epa.gov/otaq/rfg.htm. (Accessed September 9, 2010).

4. Energy Information Administration. (2006) *Eliminating MTBE in Gasoline in 2006.* http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2006/mtbe2006/mtbe2006.pdf. (Accessed October 1, 2010).

5. Pub. L. No. 109-58, §1501 (2005).

ethanol.[6] The following table (figure 1) summarizes the 2007 RFS mandate[7]:

Figure 1

Year	Conventional Biofuel	Total RFS
2008	9.0	9.0
2009	10.5	11.10
2010	**12.0**	**12.95**
2011	12.6	13.95
2012	13.2	15.2
2013	13.8	16.55
2014	14.4	18.15
2015	15	20.50
2016	15	22.25
2017	15	24.00
2018	15	26.00
2019	15	28.00
2020	15	30.00
2021	15	33.00
2022	**15.0**	**36.0**

(in Billions of Gallons)

A variety of policy measures have been used to achieve the U.S. targets in biofuel production and distribution. Measures included sweeping federal regulations, federal tax credits and incentives, as well as state government sponsored programs. In the 111th Congress alone, 31 ethanol related bills are under consideration.[8]

Federal regulations of biofuels include Renewable Fuels Standards (RFS), the Federal Reformulated Gasoline (RFG) program, and the Federal Winter Oxygenated Fuels program. The Energy Independence and Security Act of 2007 (H.R. 6) was signed into law on December 19, 2007 and amends the RFS law of 2005. The RFS provides for mandatory biofuel blend levels as well as setting levels of reduction of greenhouse gas (GHG) emissions. The 1990 amendments to

6. Malcolm, Scott A., M. Aillery, and M. Weinberg. *Ethanol and a Changing Agricultural Landscape*, Economic Research Report 86, U.S. Dept. of Agriculture, Economic Research Service, November 2009.

7. Stoel Rives LLP, *Biofuels Law Alert: EISA of 2007 Calls for Additional Production of Biofuels Through 2022 and Provides Research Grants for Cellulosic and Advanced Biofuels.* Available http://www.stoel.com/showalert.aspx?Show=2821. (Accessed September 30, 2010).

8. The Library of Congress, THOMAS search. (Retrieved 2010/09/27).

the federal Clean Air Act require RFG be used in cities with the worst smog to reduce harmful emission that cause ground level ozone as of 1995.[9] The 1990 amendments also created a winter oxygenated fuels program to reduce carbon monoxide (CO) emissions from vehicles. As of 1992, in designated areas, gasoline sold during winter months must contain 2.7 percent oxygen by weight. The addition to gasoline of oxygenates such as ethanol dramatically reduces CO pollution levels.

The U.S. government also offers a variety of federal tax credits and incentives for the production and distribution of ethanol and ethanol blends, including a Volumetric Ethanol Excise Tax Credit (VEETC), Small Ethanol Producer Credit, Alternative Fuel Mixture Credit, Cellulosic Biofuel Producer Tax Credit, Special Depreciation Allowance for Cellulosic Biofuel Plant Property, and the Alternative Fuel Infrastructure Tax Credit. Under U.S. law, ethanol blenders that register with the Internal Revenue Service (IRS) are able to receive a tax incentive of $0.45 per gallon of pure ethanol when blended with gasoline. Likewise, small ethanol producers may receive $0.10 per gallon if sold and used to produce an ethanol mixture, as a fuel in a trade or business, or sold at retail for motor vehicle use. The Alternative Fuel Mixture Credit is available to taxpayers by multiplying 50 cents times the number of gallons of alternative fuel used in the production of an alternative fuel mixture. Cellulosic biofuel producers may be eligible for $1.01 tax incentive per gallon of cellulosic biofuel, and plants are eligible for a depreciation deduction of the adjusted basis for the year it is put into services. A tax credit may also be obtained for the cost of installing alternative fueling equipment for some alternative fuels including E-85.

State programs to support biofuels include producer incentives and grants, retailer/infrastructure incentives for ethanol blends and E-85, state RFS, retail pump label requirements, and state fleet fuel purchase/use requirements.

(b) Policy outcome

Henry Ford designed his first car, in 1896, to run on pure ethanol.[10] Today, the United States is the world's largest producer of bioethanol, with approximately 200 biorefineries turning out an estimated 10.6 billions gallons in 2009.[11] At least

9. U.S. Environmental Protection Agency.

10. Goettemoeller, Jeffrey; Adrian Goettemoeller (2007). *Sustainable Ethanol: Biofuels, Biorefineries, Cellulosic Biomass, Flex-Fuel Vehicles, and Sustainable Farming for Energy Independence*. Prairie Oak Publishing, Maryville, Missouri. p. 42.

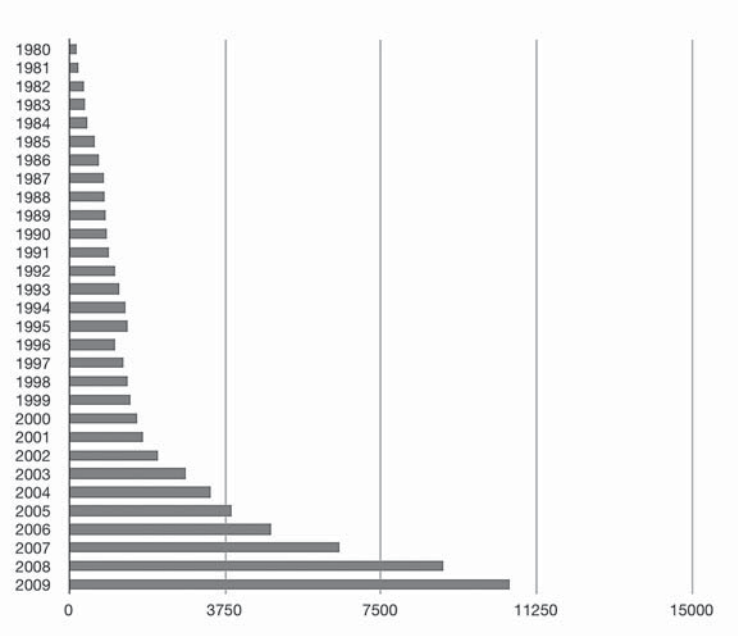
11. Renewable Fuels Association. (2010). *2010 Ethanol Industry Outlook: Climate of Opportunity.* p.2.

as measured by volume, the United States government efforts to promote production and distribution have been highly successful.

Under early laws and incentives, ethanol consumption grew from 1.8 billion gallons per year in 2001, to 2.8 billion in 2003.[12] Encouraged by a federal tax credit of 51 cents per gallon, ethanol production continued to grow, and consumption reached 3.4 billion gallons in 2004.[13] Later state laws and incentives, including subsidies and tax credits contained in the the Energy Policy Act of 2005 led to consumption reaching 6.8 billion gallons in 2007.[14]

With additional mandates and incentives, U.S. fuel Ethanol Production has gone from 175 million gallons in 1980 to 10.75 billion gallons in 2009 (see figure 2).

Figure 2 Historic U.S. Fuel Ethanol Production



(Millions of Gallons)

source: RFA[15]

12. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," December 17, 2004. p.5.

13. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," March 3, 2006. p.5.

14. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," April 24, 2008. p.5.

15. Renewable Fuels Association. "Statistics." Available at: http://www.ethanolrfa.org/pages/statistics#A. (Accessed October 11, 2010).

U.S. biofuel policy has been so successful at reaching its targets (corn based ethanol in particular), that the U.S. Government Accountability Office (GAO) believes some government incentives may no longer be necessary. The 45-cent per gallon VEETC federal tax credit was established to support the domestic ethanol industry. Analyzing the effects of the increased production and use called for by the 2007 RFS, the GAO believes that "VEETC also may no longer be needed to stimulate conventional corn ethanol production because the domestic industry has matured, its processing is well understood, and its capacity is already near the effective RFS limit of 15 billion gallons per year for conventional ethanol."[16] Of course, several challenges remain in the effort to achieve the RFS's 36-billion-gallon requirement by 2022.

(2) Japan

Contrary to the U.S. government's relative success in promoting production and distribution of biofuel, Japan's case presents a major failure of biofuel policies. The Japanese government laid out an ambitious plan to promote biofuel in the mid 2000s and introduced various policies and projects to achieve its goals. For instance, in September 2006, in his policy speech at the Diet, Prime Minister Abe Shinzo announced his government's determination to "promote the use of bioethanol as automobile fuel."[17] To achieve this goal, the government introduced various policies and projects in subsequent years. However, despite the government's best efforts, its policies have not yet achieved any meaningful results.

a) Policy target

Even though Japan leads the world in other fields of environmental technology such as energy conservation, electric/hybrid vehicles, pollution prevention, and solar energy, Japan was far behind Brazil and the U.S. in this area. Japan's production of bioethanol was only 30 kilo liters in 2005, compared to Brazil and the U.S. whose bioethanol production reached as much as 16.1 million kilo liters

16. United States Government Accountability Office. "BIOFUELS: Potential Effects and Challenges of Required Increases in Production and Use, 2009". Available: http://www.gao.gov/products/GAO-09-446. (Accessed October 2, 2010).

17. Prime Minister Abe's policy speech at the Diet on September 29, 2006. Prime Minister of Japan and His Cabinet website. Available: http://www.kantei.go.jp/jp/abespeech/2006/09/29syosin.html. (Accessed September 11, 2010).

and 16.2 million kilo liters respectively.[18]

In order to catch up with the leading producers of biofuel, the government announced its new energy policy called "The New National Energy Strategy" in May 2006. The plan set its goal at expanding distribution of biofuel up to 500,000 kilo liters by 2010 and increasing biofuel production up to 6 million kilo liters by 2030. If Japan were to produce 6 million kilo liters of biofuel, that would cover 10% of annual consumption of gasoline in Japan. Also, the government's plan included reduction of the reliance on foreign energy to 80% by 2030.[19]

The government's new energy policy was put into practice mainly by three ministries, namely the Ministry of Economy, Trade, and Industry (METI), the Ministry of Agriculture, Forestry, and Fishery (MAFF), and the Ministry of Environment (MOE).[20] These three ministries worked closely with each other and introduced a number of policies and projects aimed at promoting production and distribution of biofuel.

Among the several projects initiated by the government, the largest of all was the "Bioethanol Island Initiative (BII)" on Miyakojima Island, Okinawa. Miyakojima Island, with a population of 52,000, is located about 350 km southeast of Okinawa Island. The island's major industry is production of sugar, and the island's annual production of sugar cane was 208,661 tons in 2006. Production of sugar yields a by-product called molasses, which was formerly fed to domestic animals on the island. The government had its eye on molasses as a material for biofuel because, as molasses is a by-product of sugar, it does not affect the price of sugar or any other food product. The government started the BII in 2007 as an experiment to demonstrate the viability of biofuel policies. The BII aimed at establishing a cycle of production, distribution, and consumption of biofuel within the island. The government and some private firms jointly built production facilities for bioethanol and E3 (gasoline that contains 3% bio ethanol). It also encouraged gasoline stations on the island to install equipment for the sale of E3. The government's goal was to replace all gasoline (about 24,000 kl per year)

18. *Nikkei Shimbun*, April 8, 2007, p.26.

19. The Ministry of Economy, Trade, and Industry, "The New National Energy Strategy," May 2006.

20. Other than these three ministries, the Ministry of Land, Infrastructure, Transport, and Tourism and the Fire and Disaster Management Agency had some involvement in biofuel policies.

consumed within the island with E3.[21]

Also, the government introduced various subsidies and tax breaks to assist distributers and retailers of biofuel. First, the government made biofuel exempt from taxation, and property tax on biofuel production facilities was cut by half for three years. Second, the government provided interest-free loans to biofuel production facilities, and its repayment period was extended from 10 years to 12. Third, the government removed tariffs on some type of biofuel to encourage its import and distribution in 2008.[22]

(b) Policy outcome

Despite the extensive efforts made by the Japanese government, its biofuel policies have not achieved any meaningful results. Production of biofuel in Japan is still limited to a small scale in a few locations. According to some sources, it is estimated that the amount of biofuel production in Japan is only about several hundred kl in 2007.[23] That amount is far from the government's goal to be 10% of gasoline consumption in Japan, which would require 6 million kl of bioethanol. Also, Japan was left far behind the world's biggest producers of bioethanol such as the U.S. and Brazil.

Similarly, the distribution of biofuel is still limited in Japan. Particularly, E3 is distributed only in some small islands in Okinawa where the government is conducting "demonstration experiments." As we will discuss below, even in those islands, E3 is sold only in a handful of gasoline stations. Some gas stations in the Tokyo area started to sell a type of biofuel called, Ethyl Tert-Butyl Ether, or ETBE. ETBE is a composite of ethanol and isobutylene (a byproduct of gasoline). But, the number of locations is still limited. Moreover, most ETBE is imported from countries like France and Brazil; thus, distribution of ETBE does not solve the problem of the dependency on foreign energy sources. Also, as we discuss later, some consider ETBE to have harmful effects on the environment and human health.

What symbolizes the failure of the Japanese government's biofuel policy is its "Bioethanol Island Initiative" on Miyakojima Island. The government's original

21. Also, the government (MOE) assisted a private company in the city of Sakai, Osaka which produces biofuel from scrap woods and other waste materials. The government supported total of nine biofuel production projects nationwide.

22. The tax break applies to Ethyl Tert-Butyl Ether (ETBE). We will discuss more about ETBE below.

23. *Nihon Keizai Shimbun*, March 25, 2008, Evening edition, p.3. There is no reliable data on the amount of bioethanol production in Japan. So, we can only present a rough estimate.

plan was to produce about 700 kl of bioethanol using sugar cane, and replace all gasoline sold within the island (about 24,000 kl annually) with E3. Then, the government was to make all gasoline stations in the island (19 in total) sell E3.[24] However, the majority of gas stations refused to carry E3, and E3 is sold in only a few places. So, the production and distribution of biofuel is struggling even on Miyakojima Island, which the government planned to demonstrate as a pilot case. To make a breakthrough in the Miyakojima Project, a former prime minister, Koizumi Junichiro, paid a visit to Miyakojima Island and appealed for further promotion of biofuel in February, 2008. Yet, such a popular and influential figure as Koizumi could not rescue the situation.[25]

Part IV. The context of the different policy outcomes

In this section, we will discuss the context of the different policy outcomes in the two countries. More specifically, we will try to provide answers to the following questions: Why was the U.S. government successful in promoting production and distribution of biofuel? Why did the Japanese government's biofuel policies fail to achieve their goals? What explains the differences in policy outcomes? We attempt to analyze these questions by focusing on two factors, namely domestic political factors and policy design.

(1) Opposing actors

One critical factor to understand the differences in policy outcomes in Japan and the United States is an explanation of the roles played by domestic political actors including interest groups and bureaucratic politics.

First, the implementation of biofuel policies in Japan was sabotaged by some powerful interest groups; whereas in the U.S. such a strong opposition against biofuel policies did not exist. Due to the rise in the awareness for environmental conservation, biofuel was considered to be a growing industry of the future. So, a number of private corporations took interest in the great potential of biofuel and invested in biofuel businesses. For example, Asahi Beer has been producing bioethanol using sugar cane on Ie Island, Okinawa, together with a research institute affiliated with MAFF[26] since 2002. Also, Nippon Steel Corporation

24. The Agriculture Environment Bureau, MAFF, "For the Promotion of Domestically Produced Bioethanol," November 17, 2006.

25. *Nihon Keizai Shimbun*, February 19, 2008, p.14.

26. Asahi Beer's partner is Kyushu Okinawa Nogyo Kenkyu Sentaa [the Kyushu Okinawa Agricultural Research Center], which is an independent administrative agency.

(Shinnittetsu) has been producing fuel from food wastes in Kitakyushu, Fukuoka, since 2005[27].

However, the Japanese oil industry does not share the government's and other corporations' enthusiasm for biofuel, and the industry has become a major obstacle for the government's policies. Oil companies have been reluctant to invest in biofuel production. None of the major oil companies are currently producing biofuel. More importantly, oil retail companies are refusing to sell some types of biofuel products that the government is planning to promote. The government is promoting a biofuel product called E3, which is a gasoline that contains 3% bioethanol. The oil retail companies claim that E3 could cause harmful effects to metal and rubber parts in existing oil equipment (i.e. gasoline tanks, gas pipes, pumps, etc.), as ethanol could absorb moisture from the air. A spokesperson for the Petroleum Association of Japan describes the oil industry's concern about E3 as follows: "Bioethanol is soluble in water. So, in a humid place like Japan, there is a possibility that (bioethanol) may be separated from gasoline in the process of distribution."[28] PAJ thinks oil companies would have to replace the existing equipment at great expense. So, the oil retailers refused to carry E3 products in their gasoline stations. Such a reluctant attitude of oil companies was a major cause of the failure of the Miyakojima project. Most gasoline stations in Miyakojima were told not to sell E3 products by their parent companies.[29]

Although the Japanese oil industry refused distribution of E3 products, it did support another type of biofuel, called Ethyl Tert-Butyl Ether, or ETBE. ETBE is produced by synthesizing ethanol and isobutylene, a by-product yielded in the synthesizing process of gasoline. Oil companies consider ETBE to cause less technical problems for engines and other equipment, as it does not absorb moisture from the atmosphere, unlike ethanol.[30] Some Japanese oil companies started selling gasoline that contains 3% of ETBE in April 2007. According to the PAJ, about 1,540 stations nationwide are selling ETBE as of August 2010.[31]

However, some government agencies are reluctant to promote ETBE. Most

27. NSC's bioethanol project is receiving financial support from the New Energy and Industrial Technology Development Organization (NEDO), an affiliated agency of METI.

28. "Baio Nenryo no Yukue (The Future of Biofuel)," *Kankyo Bijinesu*, November 2007. Available: http://www.kankyo-business.jp/bio/200711_02.html (Accessed September 1, 2010).

29. *Yomiuri Shimbun*, January 5, 2008.

30. "Baio Nenryo no Yukue (The Future of Biofuel)," *Kankyo Bijinesu*, November 2007. Available: http://www.kankyo-business.jp/bio/200711_02.html. (Accessed September 1, 2010).

31. The Petroleum Association of Japan website. Available: http://www.paj.gr.jp/eco/biogasoline. (Accessed August 28, 2010).

notably, MOE claims that ETBE may cause some harm to human health and the environment.[32] A policy report issued by MOE pointed out the environmental and health concern associated with ETBE as follows: ETBE is a type of chemical substance that may damage human health when consumed for an extended period of time. Though it does not have bioaccumulation potential, it is a persistent substance that may have prolonged toxicity to humans.[33] Also, skeptics of ETBE argue that ETBE is less likely to solve the problems of dependency on foreign energy, and produce any reduction of CO_2. Currently, most ETBE distributed in Japan is imported from abroad. Japanese oil companies imported about 14,000 kl of ETBE from Europe in 2007 and 2008[34] and about 6,500 kl from Brazil in 2008.[35] There is no plan for establishment of ETBE in Japan, so ETBE may not do anything to help solve foreign energy dependency, at least for the near future. Lastly, as mentioned above, ETBE is produced from isobutylene and ethanol, isobutylene is a petroleum-derived chemical and not renewable. So, a large portion of ETBE is fossil fuel. In the current Japanese law, ETBE can be mixed with gasoline only up to 8%; therefore, it is believed that its does not significantly contribute to reduction of CO_2 emissions and fossil fuel usage.

Second, Japanese ministries did not act in an integrated manner in this policy area, and the division within the bureaucracy made it difficult for the government to implement biofuel policy. Even though three ministries (METI, MAFF, and MOE) made major efforts to promote biofuel in Japan, one ministry that could be potentially important in this policy area displayed a noticeable lack of enthusiasm. That ministry was the Ministry of Land, Infrastructure, Transportation, and Tourism (MLIT). As MLIT is the agency that administers transportation affairs, fuel for automobiles is an important agenda for MLIT. Therefore, MLIT should have gotten more actively involved in the legislation of biofuel. However, MLIT's involvement was limited. For instance, MLIT was involved in the biofuel project in the Miyakojima project; however, its role was

32. The Resources and Energy Agency, METI, "The Summary of the Working Group on ETBE," METI website: Available: http://www.meti.go.jp/committee/materials/downloadfiles/g60417a03j.pdf. (Accessed August 15, 2010).

33. The Report from the Renewable Energy Promotion Meeting, October 10, 2003, MOE website: Available: http://www.env.go.jp/earth/ondanka/renewable/03/mat_03.pdf. (Accessed August 20, 2010).

34. Currently, ETBE is imported mostly by a joint trading firm called the Japan Biofuels Supply LLP (JBSL). The firm is established by major Japanese oil companies.

35. Marubeni Corporation, "News Release," Marubeni website: Available: http://www.marubeni.co.jp/news/2008/080124.html. (Accessed August 20, 2010).

limited only to test driving of ethanol cars jointly conducted with METI and MOE. Although MLIT did not openly oppose promotion of bioethanol products or other biofuels, its reluctant attitude is a serious drag on the government's efforts to promote biofuel.

MLIT's active involvement could drastically change the condition of biofuel in Japan. MLIT has jurisdiction over regulation of automobiles and other transportation machines. Had MLIT introduced such strict requirements as its American and Brazilian counterparts, the Japanese automobile industry would have developed new products that would contribute to promotion of biofuel, for example, flexible fuel vehicles that can run on both gasoline and ethanol. In the past, strict emission control and efficiency regulation encouraged Japanese automakers to develop cleaner and more efficient cars. However, despite the powerful regulatory power of MLIT, it has not used that power to promote biofuels.

In the U.S., as in Japan, both bureaucratic actors and interest groups were major political factors in shaping biofuel policy. However, in the U.S. the story is somewhat more complex, with powerful agricultural interest groups strongly advocating on behalf of expanding biofuel policies. Moreover, outside political factors have also played a larger political role in the U.S. biofuel debate. In the early days of ethanol development, there were more advocates than opponents, however, that dynamic has recently begun to change with proposals to adopt E-85.

In contrast with Japan, a wide range of powerful interest groups in the U.S. have supported the development and production of biofuel. Ethanol supporters argue that the use of bioethanol can result in decreased emissions of toxic and ozone-forming pollutants, and greenhouse gases, in particular when higher-level blends are used.[36] Moreover, to the extent that it reduces demand for petroleum imports, it aids in promoting energy security. It also creates jobs in rural areas, and increases farm income, which is why the U.S. agriculture industry was so quick to embrace corn ethanol. The National Corn Growers Association, Agribusiness giants like Cargill and Archer Daniels Midland (ADM), the Renewable Fuels Association, and the Congressional Biofuels Caucus have been powerful advocates for expanded U.S. biofuel policies.

Other factors have also came into play in the formation of U.S. ethanol policies. The Iowa Political Caucuses are a key test for any candidate seeking to run for President. As a result, the corn farmers of Iowa are often able to generate

36. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," April 24, 2008. Summary.

substantial bipartisan support for corn ethanol among not only presidential candidates, but also members of congress who want to keep alive the possibility of a future White House run. In addition to the increase in gas prices resulting from the Iraq war, politicians have come under increased pressure to lessen American dependence on middle-east oil. More recently, with the recession in the U.S., there is little public or political support for cutting programs that will result in sudden large job losses, and ethanol plants create jobs.

Like Japan, the U.S. has its share of ethanol opponents. Interest groups like the American Petroleum Institute (API), while generally opposed to biofuels, have had a love/hate relationship with biofuel policy. While it is no surprise that the oil industry would want to resist alternative fuels, in the early days, the API did not offer as much resistance as might have been anticipated, in part, because it viewed ethanol as a better alternative than a policy to expand use of electric vehicles. With ethanol, the petroleum industry would still control the distribution, and currently receives a 51 cent per gallon subsidy. However, today they strongly oppose moving to E-85 over stated concerns that it will damage equipment and reduce fuel economy.

Unlike Japan, U.S. government agencies yield relatively less power independent from the President. For example, there was remarkably little opposition by the U.S. Department of Transportation over the possible loss of road construction funds from ethanol related reductions in gasoline taxes. Congress controls the purse strings for the gasoline tax, increases in which have proven so unpopular that, since 1993, the federal gas tax has remained unchanged at 18.4 cents per gallon.

As corn prices have increased, so have the number of groups joining those in opposing to corn based ethanol. In early 2007, the National Cattlemen's Beef Association, the National Chicken Council, the National Turkey Federation, and the National Pork Producers' Council testified before Congress demanding an end to corn ethanol subsidies.[37]

As questions are arising about increasing agricultural runoff leading to clean water and air problems, rising food prices, and the lack of resources for alternative energy (like solar and wind) environmental groups have also begun to question bioethanol policy. In October 2010, an odd coalition of groups, ranging from oil and automobile industry associations to outdoor sporting groups and environmental groups, announced their opposition to increasing the amount of

37. Ethanol's growing list of enemies, By Moira Herbst. Available: http://www.msnbc.msn.com/id/17706399/ updated 3/20/2007. (Accessed October 1, 2010).

ethanol blended into gasoline beyond 10 percent.[38]

(2) Policy design

Another important factor to explain the differences in the policy outcomes is the way their policies were designed. Policy design also explains why some actors opposed promotion of biofuels. In the United States, biofuel policies were designed to minimize opposition from industry and were well coordinated. However, there was a critical coordination problem among Japanese government agencies in their policymaking, and their policies lacked subsidies or other compensation for those actors who were affected negatively by promotion of biofuels.

First, Japan's policymaking process in the biofuel area was seriously impaired by a coordination problem among government agencies. Some ministries were eager to promote production and distribution of biofuel. However, there was no consensus among them as to what type of biofuel to promote and how much change needed to be made to the existing system. For instance, the ministries disagreed on the type of biofuel to be promoted. On the one hand, METI wanted to promote ETBE, which was the type of biofuel accepted by the oil industry. Although METI was aware of the fact that ETBE may not significantly solve the problems of foreign oil dependency and emissions of CO_2, METI pushed ETBE because it requires much smaller initial investment and is easier to introduce. However, MOE and MAFF advocated E3. As mentioned above, MOE opposed distribution of ETBE because of environmental and health concerns. MAFF also supported E3, because it will not increase demand for domestically produced bioethanol, because ETBE is mostly imported from abroad.

Also, there was a lack of coordination in the issue of content rate regulation for bioethanol in gasoline. MOE advocated relaxing the content rate regulation. The Japanese government relaxed the regulation on ethanol in gasoline to 3% in 2003, as earlier research conducted by the government found gasoline with 3% of ethanol (i.e. E3) has no harmful effects on existing cars. MOE insisted this regulation should be further relaxed. MOE laid out its policy goals of promotion of E10 in its policy report published in 2005. In the document, MOE recommends the Japanese government replace all gasoline products with E10 by 2030 and require all new automobiles to be E10-ready cars.[39] However, METI is reluctant to

38. Followthescience.org. "Campaign Announcement." Available: http://www.followthescience.org/2010/10/read-our-campaign-announcement/. (Accessed October 29, 2010).

39. The Global Environment Bureau, MOE, "A Report on the Promotion of Ecological Transportation Fuels," May 2006.

relax the content rate regulation or require automakers to build E10-ready cars, as they would be a heavy burden on Japanese automakers.

Second, Japanese biofuel policy lacks compensation for those actors who would be negatively affected by introduction of biofuel. The oil industry expects that the introduction of E3 or E10 would require the industry to invest in new equipment. The Petroleum Association of Japan estimates that if the industry is to introduce a new system for E3, it may require hundreds of billions of yen of additional investment.[40] Nonetheless, the government's policies did not include subsidies for oil companies to compensate for the possible financial losses as a result of the introduction of biofuel. Part of the reason for that was because MOE believed that E3 causes no harm to the existing equipments and engines, and it requires no new investment. Yet, PAJ did not share MOE's view, and thus, the oil industry strongly opposed and sabotaged the government's plan to promote E3.

Another important actor who would be negatively affected by biofuel is MLIT. A major reason for MLIT's reluctance to introduce biofuel was, it would reduce tax revenue from the gasoline tax and thus reduce the agency's budget. In Japan, the revenue from the gasoline tax is used solely on construction and maintenance of road and road-related facilities such as public works for roads and highways. MLIT has the jurisdiction to administrate such public works. In other words, MLIT has exclusive access to the gasoline tax revenue. However, if the government introduces E10 for instance, the gasoline tax revenue will decline by 10%, as biofuel is tax-exempt. E10 is gasoline that contains 10% biofuel, so only 90% of that is subject to taxation. The total revenue from gasoline tax was 2.09 trillion yen in 2008.[41] If E10 is introduced, MLIT's budget would shrink by about 200 billion yen. Therefore, although MLIT does not openly oppose introduction of biofuel, the agency does not actively support the plan.

In contrast with Japan's lack of substantial subsidies, the U.S. invests billions of dollars every year in the form of tax breaks and subsidies to domestic ethanol producers with the goal of making biofuels central to a policy of an energy security and fuel diversification. By providing benefits to not only the agriculture industry but to the oil industry as well, opposition was minimized. The RFS and a tariff on ethanol imports also contributed to that success. Also, in response to concerns about losses of Highway Trust Fund revenue, the 108th Congress

40. "Baio Nenryo no Yukue (The Future of Biofuel)," *Kankyo Bijinesu*, November 2007. Available: http://www.kankyo-business.jp/bio/200711_02.html. (Accessed September 1, 2010).

41. Ministry of Internal Affairs, *Japan Statistical Yearbook 2010*. Available: http://www.stat.go.jp/data/nenkan/05.htm. (Accessed September 3, 2010).

substituted an income tax credit for the excise tax exemption, which shifted the impact from the Trust Fund to the general treasury.[42]

It seems likely that not all of the targets called for under the Energy Independence and Security Act of 2007 will actually be reached in the time frames of the Act.[43] One problem is the expected increase in use of E-85. The introduction of E-85 fuel to increase the average use of ethanol past the current 10 percent faces major technical barriers. Thus, RFS mandates based on E-85 projections must be reexamined. With the exception of vehicles specifically designed to run on E-85, currently no automobile manufacturer offers an engine or parts warranty for vehicles that use more than 10 percent ethanol content. This means most cars in America today are not under warranty if fueled by E-85.[44] Expanding the use of E-85 will also require new distribution equipment, as it is too corrosive for the existing infrastructure.[45] A policy of increased use of E-85 is likely to result in stronger resistance from a wide range of interest groups, resulting in an unusual coalition of environmental and automobile/oil industry interest groups.

Part V. Conclusion

Dramatic increases in global oil prices, along with growing awareness of the need for greater environmental protection measures led the Japanese and the U.S. governments to introduce a series of policies aimed at promoting increased production and distribution of bioethanol. The United States quickly became the world's largest producer of biofuel, with corn based ethanol widely distributed and sold in gasoline stations throughout the country. Japan, in contrast, failed in almost everyway, despite the efforts of powerful government ministries.

For the most part, the Japanese oil industry (along with some ministry infighting) has prevented the government from getting what it wants in regard to biofuel policy. If Japan really means to reduce reliance on foreign oil and decrease CO_2 emissions as part of a "New National Energy Strategy", then it needs to have a more comprehensive approach. We recommend Japanese policy makers emulate

42. CRS Report for Congress. "Fuel Ethanol: Background and Public Policy Issues," April 24, 2008. P.22, citing P.L. 108-357.

43. Fundamentals of a Sustainable U.S. Biofuels Policy, January 2010. Available: http://www.rice.edu/energy/publications/docs/BioFuelsWhitePaper-010510.pdf. (Accessed October 6, 2010).

44. Fundamentals of a Sustainable U.S. Biofuels Policy.

45. United States Government Accountability Office. "BIOFUELS: Potential Effects and Challenges of Required Increases in Production and Use, 2009". Available: http://www.gao.gov/products/GAO-09-446. (Accessed October 2, 2010).

some of the successful U.S. biofuel policy strategies and tactics. To achieve widespread adoption of biofuel, the Japanese government should require all gas stations to carry E3 fuel, providing funds for upgrading pumping equipment if necessary, and invest in tax credits and incentives to increase domestic production and distribution of bioethanol. The new financial incentives (perhaps along with a realization that the increasing popularity in Japan of hybrid cars such as the Toyota Prius are a growing threat to the oil industry as it exists today) should help reduce oil industry objections.

The government should also marshal support from agricultural, environmental, and other political interest groups. The popularity of the ruling Democratic Party of Japan (DPJ) led government has recently declined dramatically, in part, as a result of poor handling of China related foreign policy issues. The widespread adoption of bioethanol can be framed as not only an environmental issue, but also an important national security issue. The DPJ is so unpopular in Okinawa over the mishandling of the U.S. military base relocation issue, that it was unable to field any candidates in the most recent Okinawa Governor elections. If biofuel related resources are allocated in a way that leads to job creation and more investment in the economy of Okinawa, this might be turned into a positive local political issue as well as a national economic one. Then the government of Japan, in more ways than one, might be able to get what it needs.