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Biofuels are Good Politics but Translate into Bad Policy

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by

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Abstract

In the past decade, the usage of biofuels as an alternative transportation fuel has grown in manifolds. This rise in the production and use of biofuels is owed to energy insecurity, high prices of gasoline, and constantly increasing greenhouse gas emissions. Therefore, biofuels have become the all-encompassing solution to all these issues. Likewise, the benefits of biofuels include their renewable nature, energy security, and a means to rural prosperity. However, the increase usage of biofuels was not just because of their benefits but also a combination of political instruments like government targets, mandates, blending quotas, as well as subsidies and incentives for farmers to grow feedstock. Biofuels just like another fuel also has its own cons. They are becoming increasingly controversial, as the process of growing biofuel feedstock and creating ethanol, biodiesel, etc. is responsible for significant amounts of greenhouse gas emissions, virtually nullifying most of its benefits. Also, biofuels are putting pressure on the available agricultural land, and endangering forest areas and wetlands. Furthermore, an increased reliance on biofuels is causing food security issues among developing nations. However, despite these overwhelming disadvantageous qualities of biofuels it continues to be a policy area strongly promoted by the government of United States, and other countries throughout the world. Therefore, this paper seeks to argue, and prove, that biofuels, because of their influence over a range of policy areas, tend to provide a good political rhetoric in terms of planting vote banks and gathering masses to rally behind a plethora of ambiguous issues. However, they are not good policy in terms of environmental sustainability. To demonstrate the same, this paper uses the case study of the United States government and evaluates the changing rationales over time used to justify the production and usage of biofuels. As well as critiques various biofuel policies (not all) for their use of methods like mandates instead of taxes to impose binding decisions on the public.

Henceforth in this paper the term biofuels is a reference to ethanol, biodiesel, and other types of biofuels.

Keywords: Biofuels, ethanol, environmental policy, mandates, taxes, Renewable Fuel Standard.

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Introduction

The overwhelming attempts to combat climate change, combined with concerns surrounding energy security and the constantly rising price of oil, has led to a steady increase in the use of biofuels. The significant upsurge in the presence of biofuels, as a gasoline extender and substitute transportation fuel, can be owed to the benefits accompanying this alternative source of energy. The benefits of biofuels include their renewable nature that provides an alternative to fossil fuels, their contribution towards rural prosperity through the use of agricultural products, reduction in greenhouse gas emissions, and increased energy security while reducing reliance on foreign oil. As a result, biofuels have been promoted as the all-encompassing solution to hot-button issues like energy security and environmental sustainability, essentially since the 1970's in light of the oil embargoes and the formation of OPEC.[1] However, this significant increase in the production and the use of biofuels is not only because of its ideal combination of benefits; rather it is the anticipated result of strategic political tools like government targets, mandates, blending quotas, along with subsidies and incentives for farmers to grow biofuel feedstocks. Such political tools are being implemented by various countries around the world, including United States, Canada, Brazil and numerous European countries, for their range of socio-economic and political benefits. Because of the collective global efforts to shift towards renewable fuels and alternative sources of energy, the production of biofuels has become a vital policy issue globally. The implementation of these tools can be observed through witnessing the upsurge in the global production of ethanol for fuel just in the past two decades. The global production of ethanol for transportation fuel went from 17.1 million cubic meters in 2000 to 84.4 million cubic meters

[1] Bill Kovarik, "Environmental History of Biofuels,"*Environmentalhistory.org,* 2013, http://www.environmentalhistory.org/billkovarik/about-bk/research/cabi/

in 2015.[2] Likewise, ethanol contributed to about 10% (i.e. about 14.4 billion gallons) of the total gasoline consumed in United States in 2016.[3]

However, despite a growing demand, biofuels have recently become controversial as their benefits are virtually nullified because they are responsible for significant amounts of greenhouse gas emissions during the process of obtaining biofuels like ethanol from especially grown feedstock. Likewise, it has been uncovered that corn based ethanol doubles the greenhouse gas emissions over 30 years, instead of yielding 20% savings as originally proposed and anticipated.[4] The production of biofuels is also putting pressure on the available agricultural land because of biofuel mandates, in turn endangering forest areas and wetlands. The incorporation of biofuel crops has had implications on the quantity and quality of water used for agricultural purposes, leading to problems like soil erosion and water pollution because of phosphorus runoff resulting from fertilizers use. Also, large quantities of water are required to convert feed crops into biofuels.[5] Consequently, from an environmental standpoint even though biofuels are ostensibly a cleaner fuel as measured by carbon emissions they nonetheless account for a greater carbon footprint, as the mechanism utilized to cultivate the crops to produce biofuels requires large amounts of electricity, water, fertilizers and additional agricultural land obtained from clearing out forests. Furthermore, an increased reliance on biofuels has led to an increase in food prices, as first generation biofuels are obtained from staple food crops like corn, soybean and wheat. Therefore, as a result of government quotas and incentives such food crops are diverted from feedstock

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[2] "Global ethanol production for fuel use from 2000 to 2016," *Statista.com*, last modified February, 2017, https://www.statista.com/statistics/274142/global-ethanol-production-since-2000/

[3] "How much ethanol is in gasoline, and how does it affect fuel economy?" *U.S. Energy Information Administration,* last modified March 29, 2017, https://www.eia.gov/tools/faqs/faq.php?id=27&t=4

[4] Timothy Searchinger et al. "Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change," *American Association for the Advancement of Science's Science Magazine*, Vol. 319 (2008): 1238-1240, DOI: 10.1126/science.1151861

[5] "Water implications of biofuels production in the United States," *The National Academy of Sciences*, last modified October 2007, https://www.nap.edu/resource/12039/biofuels_brief_final.pdf

towards the production of biofuels instead of fulfilling its intended purpose of feeding people. This results into a higher demand and a lower supply for such crops leading to increases in food prices, not just domestically, but also internationally. For example, in the United States today about 40% of the total corn produced goes into the production of ethanol.[6] Consequently, such excessive measures of diverting food supply towards biofuels in the developing world result into food insecurity because of hikes in international food prices, as seen in case of many developing countries in the Asia Pacific region. Additionally, it is important to note that the diversion of agricultural products towards the production of biofuels also affects food security in countries that do not produce biofuels because of the involvement of all countries in the international agricultural trade.[7]

Despite these environmental concerns, politicians continue to promote biofuels as a lucrative win-win opportunity. Ironically, biofuels constitute one of the very few policy areas which is equally supported by both Democrats and Republicans in the United States. They are not alone. Various governments around the world promote biofuels for their alleged benefits; however, it is an especially political issue in the United States. Biofuels are extremely political in nature in the United States as the primaries for both Democrats and Republicans takes place in Iowa, a state that is dependent on the biofuels' industry for about 42,000 jobs and accounts for $4.7 billion of Iowa's GDP.[8] The United States is the largest corn producer in the world, the state of Iowa is the largest corn producer in the United States, and 53% of Iowa's corn is used in ethanol production.[9] Therefore, beginning with the presidential primaries, biofuels is an issue all the nominees have to explicitly agree with and

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[6] Colin A. Carter et al. "Corn for Food, Not Fuel," *The New York Times,* last modified July 30, 2012, http://www.nytimes.com/2012/07/31/opinion/corn-for-food-not-fuel.html

[7] "The state of food and agriculture in Asia and the Pacific region 2008," *Food And Agriculture Organization (United Nations Regional Office For Asia And The Pacific)*, February 2, 2008, http://www.fao.org/docrep/010/ai411e/AI411E04.htm

[8] "Iowa Corn," *iowacorn.org*, last modified March 5, 2017, https://www.iowacorn.org/resources/faqs/

[9] "Iowa Corn," *iowacorn.org*, last modified March 5, 2017, https://www.iowacorn.org/corn-uses/ethanol/

support it to win Iowa. Dr. Schmidt, a political science professor from Iowa State University, explains it this way: "you can't trash ethanol and expect to win in Iowa".[10] Biofuels are also an inherently political issue as they umbrella three major policy areas: environmental, agricultural, and energy security. Hence, biofuels as a policy area has the capacity to garner a large public support due its ambiguous nature as a result of overlapping issues.

Therefore, this paper seeks to argue and demonstrate that biofuels, because of their influence over a range of policy areas, tend to provide a good political rhetoric in terms of planting vote banks and gathering masses to rally behind a plethora of issues being covered under biofuels. However, biofuels often do not translate into good policy in terms of targeting a comprehensive list of issues. Rather the scope of biofuels policy is often vague and constantly changing due to its impact on multiple policy areas. To demonstrate the same, this paper uses the case study of the United States government and evaluates the changing rationales over time to justify the production and usage of biofuels. As well as critiques various biofuel policies (not all) for their use of instruments like mandates instead of taxes to impose binding decisions on the public.

Section 1- Legislative Background

Biofuels became a noticeably important policy agenda during President George W. Bush's administration, when he called for an increase in the production of ethanol and other alternative fuels in his State of the Union Address in 2007. In this address President Bush urged Congress to join his agenda to reduce the usage of gasoline in the United States to about 20% by 2017, through the implementation of Renewable Fuel Standard (RFS) established through the Energy Policy Act of 2005 and extended through the Energy

[10] Shailagh Murray "Ethanol Undergoes Evolution as Political Issue," *Washington Post*, last modified March 13, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/03/12/AR2007031201722.html

Independence and Security Act of 2007. President Bush essentially warranted this legislative decision by reiterating that it would reduce United States dependence on foreign oil and assists the American rural economy in an environmentally conscious manner.[11] However, biofuels have been a staple part of United States policy mandate essentially since the advent of internal combustion engine in automobiles. In fact, the automotive pioneer Henry Ford designed his Model T's in 1896 to run on both ethanol and petroleum. Ford strongly endorsed biofuels as the 'fuel of the future', and was an outspoken proponent of ethanol (alcohol) based transportation fuels. Ford believed that if his Fordson tractors and Model T motors could run on biofuels, framers would benefit from it instead of Standard Oil.[12] Biofuels, despite being a part of American political arena for decades, have been promoted by the United States government with constantly changing rationales. These changing rationales ranged from the legislation passed for the support of domestically produced fuel to compete against Standard Oil Company in 1907, to biofuels being a strategy to deal with agricultural surpluses in 1930's, to the promotion of ethanol as a gasoline extender in late 1970's, and as a solution to combat smog in 1990's. Finally, in 2001 the corn-ethanol economy of the country and its proponents tipped the odds in favour of biofuels and it was promoted by President Bush to curb dependence on foreign oil, as the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007.[13] This section seeks to analyse how biofuels throughout American political history have been a palliative solution to a temporary problem instead of a long-term environmentally and economically sustainable policy.

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[11] "President Bush's 2007 State of the Union Address," *Washington Post*, last modified January 23, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/01/23/AR2007012301075.html

[12] Shubhomita Bose, "Ethanol Is The Fuel Of The Future, Prophesied Henry Ford," *Think Bioenergy*, last modified August 4, 2015, http://thinkbioenergy.com/ethanol-is-the-fuel-of-the-future-prophesied-henry-ford/

[13] "Renewable Fuel Standard," *United States Environmental Protection Agency*, last modified June 7, 2017, https://www.epa.gov/renewable-fuel-standard-program/overview-renewable-fuel-standard

1907's Tax Free Alcohol Bill[14]

In 1907, before the prohibition era, a Tax Free Alcohol Bill was passed with much public support, and it was expected to be beneficiary for the farmers in light of declining prices of agricultural products. President Theodore Roosevelt believed that establishing an alcohol fuel industry would benefit the domestic economy and simultaneously create competition for Standard Oil. It is was widely observed at the time that the Standard Oil Company had systematically through unlawful methods, eradicated domestic completion for gasoline and established a monopoly over the sale of gasoline in the United States. Therefore, to to compete against Standard Oil gasoline monopoly, the United States government started promoted biofuels specifically plant based ethanol (i.e. ethyl alcohol). This shift towards biofuels was made to essentially replace gasoline controlled by Standard Oil with a domestically produced fuel, which was anticipated to be economically beneficial for American farmers, and to get rid of Standard Oil's control over the fuel industry. However, with the dawn of the prohibition era, the alcohol fuel industry started to decline with the availability of cheaper gasoline and eventually withered completely.

1930's Farm Chemurgy Movement[15]

The Farm Chemurgy movement came about during the Great Depression era. The Farm Chemurgy movement was focused on industrializing agricultural products through innovations and scientific research as a means of dealin with the problem of agricultural surpluses. The Chemurgy movement chose to look at crops as more than food, and tried to

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[14] Bill Kovarik, "History of Biofuels," *Ethanol History*, last modified May 7, 2013, http://www.ethyl.environmentalhistory.org/?page_id=58

[15] Palani Permeswaran, "Chemurgy: Using Science Innovatively to Save American Agriculture from Overproduction," *The History Teacher* 44, no. 1 (2010): 95-125, www.societyforhistoryeducation.org/pdfs/THT-NHDPermeswaran.pdf

find more uses for food crops. In light of the Great Depression, then President Franklin Roosevelt introduced the New Deal to combat the economic stagnation and pull the country out of depression. One of the major programs' of the New Deal was the Agriculture Adjustment Act (AAA), which was vital to the establishment of the Farm Chemurgy movement. The AAA, passed in 1933, proposed that the farmers should destroy more than a quarter of their crops. This proposal let to some economic relief, however, that was accompanied with a lot of resentment. This led to the Farm Chemurgy movement with Henry Ford being a strong supporter of it. The Farm Chemurgy movement eventually came to be also known as the 'alcohol power movement', as one of the significant projects of this movement was the use of ethanol as an octane booster in gasoline.[16] Consequently, the United States government recognized the significant of Chemurgy movement, and the United States Congress deliberated to pass a legislation to require the mandatory use of alcohol with gasoline. During the late 1930's there were more than 2,000 service stations that sold a blend of alcohol and gasoline.[17] However, the sales of this alcohol blended fuel eventually plummeted when the price of agricultural products rose. Although, it is important to note that during this period the United States government, including the President, supported biofuels as a gasoline extender.

1970's Global Energy Crisis[18]

The United States by the 1970's was heavily dependent on foreign oil especially petroleum, for most of their energy needs, and this oil came largely from the countries in the

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[16] Bill Kovarik, "History of Biofuels," *Ethanol History*, last modified May 7, 2013, http://www.ethyl.environmentalhistory.org/?page_id=58

[17] Joseph DiPardo, "Outlook for biomass ethanol production and demand," *agmrc.org*, last modified July, 2007, http://www.ethanol-gec.org/information/briefing/6.Pdf.

[18] "Oil Embargo, 1973–1974," *United States: Office of the Historian*, last modified May 9, 2017, https://history.state.gov/milestones/1969-1976/oil-embargo

Persian Gulf. In fact, by the early 1970's about 36% of the petroleum in the United States was imported.[19] In October of 1973 the Organization of Petroleum Exporting Countries (OPEC) was formed and this organization essentially tried to monopolise the oil market through controlling international oil prices. Additionally, the formation of OPEC coincided with the Arab-Israeli war of 1973. This strategically timed overlap between the Arab-Israeli war and formation of OPEC gave rise to an oil embargo by the Arab members of OPEC targeted at the United States, in retaliation for supporting Israel in the war.

In addition to the embargo, the OPEC member states chose to express their dominance by raising the oil prices initially by doubling it per barrel, then quadrupling it and then increasing it beyond even that. The embargo, and the hike in oil prices, directly impacted the American public, making the United States government and the Nixon administration painfully aware of United States' dependence on foreign oil. Subsequently, President Richard Nixon declared his plans of ending American dependence on foreign oil by the year 1980, and called this effort to increase energy security 'Project Independence' in 1973.

Followed by President Nixon was President Carter who also chose to reallocate national resources towards the energy crisis. On April 18th 1977, in his address to the Nation on Energy he spoke truthfully about the implications of the energy crisis daunting the nation, and called it "the moral equivalent of war". In this speech President Carter explained to Americans "Ours is the most wasteful nation on Earth. We waste more energy than we export…we use twice as much energy per person than other countries like Germany, Japan, and Sweden."[20] Amidst the long lines at gas stations and a nation under distress because of stagflation, President Carter appealed to the American public to reduce their fuel

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[19] Joseph DiPardo, "Outlook for biomass ethanol production and demand," *agmrc.org*, last modified July, 2007, http://www.ethanol-gec.org/information/briefing/6.Pdf

[20] Jimmy Carter, "Address to the Nation on Energy," *The American Presidency Project*, last modified April 18, 1977, http://www.presidency.ucsb.edu/ws/?pid=7369

consumption and mend their ways in terms of excessive usage of energy as all the petroleum sources are running out. Environmental and business advocates also joined him in his message to appeal to the American people for the same.[21] Essentially this concern about energy insecurity in the nation guided President Carter's energy priorities and energy policy. As a part of the Carter administration's energy independence efforts President Carter laid out ten principles to guide the development of the energy policy of United States. Consequently, he called for the development of unconventional new sources of energy as per his outlined principles, to rely on in the coming time. In his energy plans, he also declared the removal of federal taxes from domestic oil to discourage the use of imported oil. In an effort to reduce dependence on foreign oil President Carter set tangible goals to be achieved by 1985. These goals basically outlined a number of policy measures to be implemented by the federal government to encourage the use and development of alternative sources of energy, and to reduce the quantity and in turn use of imported oil from about 16 million barrels to 6 million barrels per day.[22]

Because of the policies and incentives implemented by President Nixon and Carter farm states around the country became interested in production of fuel ethanol. Fuel ethanol essentially was a reference to gasoline blended with 10% alcohol, which came to be known as gasohol.[23] Furthermore, members of Congress and senators from farm states like Nebraska were also trying to promoted gasohol as a new renewable fuel, which was produced domestically.[24] Moreover, the American Automobile Association and the federal government

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[21] "Energy Crisis," *The National History Museum of American History*, last modified April 10, 1996, http://americanhistory.si.edu/american-enterprise-exhibition/consumer-era/energy-crisis

[22] Jimmy Carter, "Address to the Nation on Energy," *The American Presidency Project*, last modified April 18, 1977, http://www.presidency.ucsb.edu/ws/?pid=7369

[23] David L. Milton, Geneva S. Hammaker, R. J. Buzenberg, and John P, Wagner. *Gasohol: economic feasibility study. Final report*, No. SAN-1681-T1, Development Planning and Research Associates, Manhattan, KS (USA), 1978.

[24] Hal Bernton, William Kovarik, Scott Sklar, B. Griffin, and R. J. Woolsey. "The forbidden fuel." *A History of Power Alcohol.* 1982.

strongly supported gasohol; despite the warning signs given by General Motors and Ford that it may corrode the engines and other internal parts.[25] The United States government continued to support the program even after a report by the Worldwatch institute explained how the gasoline-alcohol blend programs across the United States would potentially impact the prices of grain globally.[26] Therefore, in the case of the energy crisis the United States government essentially employed the use of biofuels to reduce dependence on foreign and to increase their energy security, despite it affecting the food prices globally.

The Energy Tax Act of 1978 and Alcohol fuel subsidies of 1980's[27]

In 1978, the United States Congress passed a major legislation in favour of biofuels, called the Energy Tax Act, this legislation exempted gasohol from any federal tax. This act also exempted vehicles from federal highway tax, provided those vehicles used alcohol-blended fuels and the blend had at least 10% alcohol that was obtained from domestically grown crops. This act eventually led to a subsidy of about 40-cents per gallon for every gallon of ethanol-blended fuel.[28] This legislation essentially set a precedent for tax exemptions and subsidies for ethanol blends in gasoline, as long as the ethanol was obtained from domestically grown agricultural products.

Furthermore, by the late 1980's about 27 states were providing additional subsidies for ethanol-blended fuel. These additional subsidies along with the Energy Tax Act of 1978, led to a booming economy and market for alcohol-blended fuel. As predicted, the usage of ethanol-blended fuel had increased manifolds, and the use of ethanol went up to about 120

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[25] Walter S. Mossberg, "Can U.S. Reduce Imports with Gasohol?" *The Wall Street Journal*, last modified July 12, 1978.
[26] Lester Brown, "Food or Fuels: New Competition for the World's Cropland," *Worldwatch Institute*, March 7, 1980.
[27] Salvatore Lazzari, "Energy Tax Policy: History and Current Issues," *Congressional Research Service*, last modified June 10, 2008, https://fas.org/sgp/crs/misc/RL33578.pdf
[28] "A History of Federal Support for the Ethanol Industry," *alternativeenergysourcesinfo.com*, last modified June 20, 2011, http://www.alternativeenergysourcesinfo.com/ethanol-subsidies-history.html.

million gallons, although, out of total consumption a significant portion of this ethanol was being imported from Brazil. Because of the Brazilian National Alcohol Program implemented to reduce their oil imports and to utilize Brazilian sugar.[29] However, the large import of ethanol for American consumption was very concerning for many in the United States government. As the entire purpose of subsidizing alcohol based fuel was to encourage domestically grown biofuels to impede imports of foreign oil and become energy sufficient. Consequently, a request was made to the Treasury Department to find a way to impose federal taxes on imported ethanol. However, imposing a tax on imported ethanol would have been in violation of GATT, also it was believed that would lead to a monopoly of certain domestic players to produce ethanol.[30] However, regardless of the legal opposition to imposing federal taxes on imported ethanol the Congress put in place a tariff on foreign imported ethanol. Eventually in 1980, President Carter at the end of his term, signed a bill called the Omnibus Reconciliation Act and Congress passed it, this bill called for tariffs to be imposed on imported ethanol.[31]

Soon after the enactment of the Omnibus Reconciliation Act the price of oil dropped as the oil embargo had ended and the global oil prices had stabilised. On the other hand, the price of ethanol fuel increased as a result of the import duty and tariffs, and consequently the demand for ethanol reduced once again leaving United States depended on foreign imported gasoline. The rise in prices of ethanol led to a shift back to gasoline, and the United States government at this point did not create any provisions to encourage its further use. This drop in the demand for ethanol-blended fuel led to the shutdown of many commercial ethanol

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[29] David Sandalow, "Ethanol: Lessons From Brazil," *The Brookings Institution*, last modified May 8, 2006, https://www.brookings.edu/wp-content/uploads/2016/06/sandalow_20060522.pdf

[30] Salvatore Lazzari, "Energy Tax Policy: History and Current Issues," *Congressional Research Service*, last modified June 10, 2008, https://fas.org/sgp/crs/misc/RL33578.pdf

[31] Jimmy Carter, "Omnibus Reconciliation Act of 1980 Remarks on Signing H.R. 7765 Into Law," *The American Presidency Project*, last modified December 5, 1980, http://www.presidency.ucsb.edu/ws/index.php?pid=45560

plants. By the mid-1980s the average price of a gallon of ethanol as fuel was about $1.40 as compared to gasoline at 55 cents per gallon.[32] Therefore, the decision of the United States government to let American citizens revert back to gasoline when it was convenient to do so proves their selective usage of biofuels as a political tool to rally the nation in times of crisis like in case of the high prices of gasoline during the oil embargo.

Ethanol as an Environmental Gasoline Extender in the 1990's

As the American public resumed using gasoline as their primary transportation fuel by the mid-1980s, a large number of commercial ethanol plants were left without business. Therefore, in 1985 when the EPA announced that the lead that was used as a gasoline extender was harmful to human health and the environment, it was replaced by ethanol. Back in 1920's ethanol had been used to boost octane ratings; hence it was an adequate replacement for lead. Furthermore, along with being safer in terms of health risks ethanol was a more viable option environmentally. The application of ethanol instead of lead was considered a more appropriate option environmentally to help reduce the rate of air pollution in cities resulting from high carbon emissions from cars. Therefore, in the 1990's ethanol was used as a gasoline extender much like in 1930's.

The Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007[33]

The most recent major legislation for biofuels is the Energy Policy Act of 2005 (EPAct) responsible for establishing the Renewable Fuel Standard (RFS1), and the Energy Independence and Security Act of 2007 (EISA) responsible for amending the Renewable

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[32] "Ethanol and Unleaded Gasoline Average Rack Prices," *Official Nebraska Government Website*, last modified November 10, 2017, http://www.neo.ne.gov/statshtml/66.html

[33] "Summary of the Energy Independence and Security Act," *United States Environmental Protection Agency*, last modified August 2, 2016, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act.

Fuel Standard (RFS2). The Energy Policy Act of 2005 and the Energy Independence Act of 2007 were among the signature legislations of President Bush's time in office, as energy policy was a high priority for the Bush administration. The main purpose of the Energy Policy Act of 2005 was to diversify the sources of energy available as fuel to the American public to reduce United States dependence on foreign oil, while fighting the energy problem being faced by the country as a result of this dependence. The version of this bill that was passed by the house and the senate comprised of a mandate calling for the mandatory blending of ethanol in gasoline. The blending of ethanol was an important provision required to be included in this bill for it to be passed. This is because this bill had already been introduced to the Congress in 2001 and again in 2002, and it had been tabled twice. However, it was revived in 2003 with the addition of the ethanol-blending mandate. The ethanol mandate was vital in this bill as it was instrumental in garnering the support of the members of Congress that were strong proponents of ethanol. Furthermore, it was warranted by Renewable Fuels Association's President and a prominent lobbyist- Bob Dinneen, that the ethanol mandate would help create as much as 214,000 jobs.[34] Regardless, the bill did not pass even in 2003 as it did not offer a long-term sustainable policy for energy security, and instead it offered tax breaks and incentives to special interest groups for short-term profits.[35]

The Energy Independence and Security Act of 2007 (EISA) was a very popular bill, as it was one of the rare legislations that passed through both chambers of Congress with bipartisan support. EISA passed through the Senate as a combination of the two legislations; hence, this bill included all the provisions of the Energy Policy Act of 2005, as well as, the provisions of Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007.

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[34] Rob Nikolewski, "Ethanol gets a lifeline from Trump," *The San Diego Union-Tribune*, last modified February 22, 2017, http://www.sandiegouniontribune.com/business/sd-fi-ethanol-trump-20170222-story.html

[35] "The Energy Policy Act of 2003 - A Missed Opportunity," *The Heritage Foundation*, last modified November 18, 2003, http://www.heritage.org/environment/report/the-energy-policy-act-2003-missed-opportunity

EISA covers and fulfils wide range requirements like diversity in the energy sources, the increasing presence of alternative fuel in gasoline, increased efficiency of alternative fuels, and energy independence and security through locally harnessed renewable resources. EISA was essentially a revamped version of the Energy Security Act, and it was instrumental in issuing a favourable policy for biofuels. These two energy policy legislations passed during the Bush administration were essentially more targeted at promoting biofuels than its Energy Security agenda.

Renewable Fuel Standard (RFS1 and RFS2)

The Renewable Fuel Standard is a program established by the federal government as a part of the Energy Policy Act of 2005, and the Energy Independence and Security Act of 2007 further expanded its scope. The original intent of the Renewable Fuel Standard was to ensure the presence of a certain amount of renewable fuel within transportation fuels at an increasing rate. However, with its expansion through EISA it was expected to reach about 36 billion gallons by 2022. The challenging part of this requirement was that out of 36 billion gallons of alternative fuel; only about 15 billion gallons could be from corn-based ethanol, while 16 billion gallons is supposed to be derived from third generation biofuels like cellulosic.[36] American automobile producers like General Motors, Chrysler, and Ford, also drove the policy requirements under RFS2 through their extensive support for ethanol. Additionally, these automobile companies began to equip their cars so that they could work on E85 fuel, in order to obtain alternative fuel incentives from the government. The Renewable Fuel Standard through its wide range of implications is a program that fully utilized the dubious nature of biofuels policy and their influence on major policy areas like environmental policy, agricultural policy and energy security.

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[36] "Renewable Fuel Standard," *Alternative Fuels Data Center*, last modified March 15, 2009, https://www.afdc.energy.gov/laws/RFS.html

Second 2– Critical Analysis of major Biofuel Policies

Through the previous section it is clear that in the United States biofuels are usually a political success in terms of receiving overwhelming support from the public and bipartisan support in Congress. However, regardless of the political success the policies pertaining to biofuels are often not effective towards achieving a coherent list of goals. This is often the situation with especially environmental policies as there is a disparity between the intended goal of a particular policy and the instruments implemented to achieve that goal. As elaborated in the previous section that in various policies biofuels are implemented as the instrument to achieve the goal to reduce emission of greenhouse gases, to reduce U.S. dependence on foreign oil and to help improve the American agricultural and rural economy. Therefore, this section seeks to critically analyze the major policies and legislations concerning biofuels on the bases of their success achieving the three outlined objectives, as the policy instrument used is not aligned with the anticipated goals. However, it is important to note that this section does not indicate that all biofuels concerning policies are worth criticism.

Energy Security

Energy independence is an important policy issue for the United States, and it has been a topic of concern for the political leaders essentially since the 1970's oil crisis. Despite energy security being a persistent policy issue, the U.S. is far away from achieving absolute energy independence, due to its high dependence on petroleum. It has been estimated according to the EIA that in the year 2016, U.S. used about an average of 19.7 million barrels of petroleum per day, which adds up to 7.21 billion barrels of petroleum used in the entire

year.[37] In terms of legislative actions towards energy security in the U.S., there have been three major policies passed in 1992, 2005 and 2007. Prior to the Energy Policy Act of 1992, Presidents Nixon and Carter took some administrative measures during the 1970's and 1980's to address this issue as a result of the oil crisis. In 1973, President Nixon, in an effort to reduce American dependence on foreign oil, proposed 'Project Independence'.[38] The purpose of this project was to reduce dependence of the United States on foreign oil through a commitment to develop alternative sources of energy and through practicing energy conservation. Through the implementation of this project President Nixon wanted to achieve increased energy self-sufficiency for the nation by the year 1980. President Nixon, as a part of his efforts, called for the development of nuclear plants and biofuel based gasoline to achieve this goal.[39] Likewise, in 1977 President Carter addressed the nation about the realities of the oil crisis and its dire impact on the American economy, and proposed efficient use of energy though conservation. Eventually he championed a policy for the removal federal taxes from domestic oil and encouraged the nation towards using domestically produced fuel ethanol and gasohol.[40]

The Energy Policy Act of 1992 (EPAct 1992) is an important piece of legislation and its provisions helped pave the path for the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007. EPAct 1992 was established to reduce United States' dependence on gasoline, and to improve the quality of air through the expansion of

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[37] "How much oil is consumed in the United States?" *U.S. Energy Information Administration*, last modified September 27, 2017, https://www.eia.gov/tools/faqs/faq.php?id=33&t=6

[38] Richard Nixon, "Address to the Nation About Policies To Deal With the Energy Shortages," *The American Presidency Project*, last modified November 7, 1973, http://www.presidency.ucsb.edu/ws/?pid=4034

[39] "Energy Timeline from 1971 to 1980," *U.S. Department of Energy Archive,* last modified February 18, 2011, https://web.archive.org/web/20110721035950/http://www.energy.gov/about/timeline1971-1980.htm

[40] Jimmy Carter, "Address to the Nation on Energy," *The American Presidency Project*, last modified April 18, 1977, http://www.presidency.ucsb.edu/ws/?pid=7369

alternative renewable sources of energy.[41] President George W.H. Bush, after signing EPAct 1992 into law proclaimed, "My action today will place America upon a clear path toward a more prosperous, energy efficient, environmentally sensitive, and economically secure future."[42] Likewise, the subsequent Energy Policy Acts of 2005 and 2007 also warranted tentative solutions like increased production of clean energy, the practice of energy efficiency, increased production of renewable alternative energy sources, etc. to combat the problem of energy insecurity. The Energy Policy Act of 2005 incentivised the production of alternative fuels through tax incentives and easy access to loans. The main provision of this legislation was to increase the amount of ethanol being blended with gasoline. The Energy Independence and Security Act of 2007 further modified and added provisions to the bill passed in 2005. This bill was passed to innovate ways to lower the cost of energy to consumers. Accordingly, this bill proposed to increase product efficiency of building and vehicles, in addition to increasing the production of clean renewable fuel and increasing the blending amount of ethanol to gasoline.

The two Presidents and the three Energy Policy Acts of 1992, 2005 and 2007, respectively, used biofuels as a political tool and an instrument to achieve the vital policy objective of energy security. The use of biofuels in this case is not an efficient policy solution, as biofuels are not an economically sustainable option for an alternative source of energy for an entire nation to rely on. Biofuels are not profitable or self-sustaining without government subsidies and tax incentives. Furthermore, it is important to note that all three energy policy legislations had the same core proposition proposed in their solution even though they are years apart. The fact is that the problem of energy insecurity persisted even

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[41] "Energy Policy Act of 1922," *Public Law archives 102-486*, last modified October 24, 1992, https://www.afdc.energy.gov/pdfs/2527.pdf

[42] George H. W. Bush, "Statement on Signing the Energy Policy Act of 1992," *The American Presidency Project*, last modified October 24, 1992, http://www.presidency.ucsb.edu/ws/index.php?pid=21653

after the implementation of biofuels as the instrument to tackle it. This strongly suggests that biofuels are not sufficient alone to resolve the grave issue of energy security.

Reduced Carbon Emissions

Concerns about the air quality in urban areas and high levels of greenhouse gas emissions date back to the post-World War 2 era, precisely the 1950's that witnessed an increase in air pollution because of a shift towards industrial manufacturing. This rise in air pollution led to legislative actions to combat the issue. The first federal initiative to combat air pollution was passed as the Air Pollution Control Act of 1955; the purpose of this act was to provide funding to support federal research to identify the sources of air pollution. It was followed by the Clean Air Act of 1963, which was the first federal legislation passed to address the issue of air pollution. This clean air act was also responsible for sanctioning research to detect air pollution levels and through these efforts to propose the means to minimise air pollution. After that, the *Air Quality Act of 1967* was passed. This air quality act was responsible for extending the responsibility of the federal government to undertake studies regarding air pollution resulting from interstate transportation, and to enforce measures to tackle this problem. Subsequently, because of the presence of dense smog in various big cities the *Clean Air Act of 1970* was passed, and it is one of the most notable air quality legislations. This act sanctioned the development of the National Ambient Air Quality Standards, the National Emission Standards for hazardous air pollutants, along with proposing and implementing requirements for all these new federal programs. This act also implemented requirements for the control of emissions from vehicles. Consequently, all the establishment of all these federal programs gave rise to the collective standard for GHG emissions resulting into air pollution known as 'CAA emissions standards'. Furthermore, the *Clean Air Act* has been amended twice since 1970, once in 1977 and then in 1990. The 1977 amendment to the Clean Air Act modified some provisions of the existing federal programs

about air quality. The 1990 amendment to the Clean Air Act was also vital legislation from an environmental perspective because of the scope of issues it addressed. The 1990 amendment to the Clean Air Act increased and modified the legal authority of various the federal programs and established a new program, to regulate air pollution. The new program introduced as a part of this amendment was to phase out the use of the chemicals that are responsible for depleting the ozone layer. Furthermore, all the revisions of the initial Clean Air Act ensured the effectiveness and added provisions to deal with new environmental issues falling under the jurisdiction of air pollution. All these amendments in the 1990 also became a part of the CAA emission standards.[43]

The realization of all these legislations concerning air quality depends upon maintaining the air quality standards through collective participation and cooperation of all the levels of governments including the local, state, federal and even tribal governments.[44] The instrument implemented by the federal government to ensure the success of their air quality policies included establishing certain air pollution limits for stationary and mobile sources through the usage of clean alternative fuels. A stationary source refers to stationary facilities like factories, refineries, chemical plants, etc., and mobile source refers to vehicles on and off the roads.[45] In this case the implementation of clean alternative fuels like ethanol, biodiesel and blends of biofuels are all regulated under CAA.[46] Therefore, biofuel is the instrument used to adhere to the goal of a pollution limit, especially for mobile sources. This implementation of biofuels further extends their role in another key environmental policy. In case the CAA standards biofuels are certainly not the only instrument used, however, their

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[43] "Evolution of the Clean Air Act," *United States Environmental Protection Agency*, last modified January 3, 2018, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act
[44] "Clean Air Act Requirements and History," *United States Environmental Protection Agency*, last modified January 3, 2018, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act
[45] "Air Enforcement," *United States Environmental Protection Agency*, last modified January 3, 2018, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act
[46] "1990 Clean Air Act Amendment Summary," *United States Environmental Protection Agency*, last modified January 3, 2018, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act

role is significant. The rising concerns about global warming as a result of greenhouse gas emissions prove that the implementation of biofuels as an instrument is clearly not effective.

Agricultural Economy

President George W. Bush, in one of his speeches, emphatically said, "Ethanol in automobiles is good for the agricultural sector… Ethanol is good for our rural communities. It's good economic development for rural America."[47] This statement is aptly deciphers United States' economic dependence on biofuels. Biofuels since their advent in the 1890s are considered to be a boon for the agricultural sector as they help farmers make a higher profit on the sale of the crops used in biofuel production. First generation biofuels are the most commonly used and they are extracted entirely from edible crops like corn, sugarcane, soybean, etc., this has given rise to a contentious fuel versus food debate. Furthermore, the controversial nature of biofuels often surrounds the fact that they are derived from agricultural products, leading to competition between natural resources like land, water, and food, increasing global food prices, in addition to causing deforestation and water pollution. Biofuels, in absolute terms, are beneficial to farmers as most of biofuels used as transportation fuel are first generation. This leads to the displacement of biofuel feedstock crops as food sources, leading to a higher demand of these crops and subsequent rise in their prices.[48] Additionally, government subsidies are also offered to incentivize farmers to grow crops required for biofuel production. Therefore, a combination of high demands of certain biofuel crops and availability of government subsidies for such crops, results in higher prices for these crops and these rise in prices prove to be profitable to farmers cultivating these crops. The case of exuberantly high price of corn in Mexico is an apt example for this

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[47] "Bush Delivers Speech on Renewable Fuel Sources," *Washington Post*, last modified April 25, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/04/25/AR2006042500762.html

[48] "Seminar: Impact of Biofuel Policy on Food Prices and Poverty," *United States Environmental Protection Agency*, last modified January 3, 2018, https://www.epa.gov/clean-air-act-overview/evolution-clean-air-act

phenomenon. After the implementation of NAFTA in 1994, Mexico increased their import of corn from the United States from 8% to about 1/3rd of their total corn consumption. However, the price of corn in the U.S. became subject to much fluctuation due to the heavy reliance of the ethanol industry on corn. Consequently, any increase in the price of corn in the U.S. adversely affects Mexico. Corn is an important food crop in Mexico, as it is a part of their staple diet in the form of tortillas. In 2007, the high price of corn was reflected in the price tortillas, which became too expensive for the average public to be able to afford it. In reaction to the unaffordable prices of tortillas the Mexican public broke out into riots; finally, the Mexican government had to intervene to diffuse the situation, which they did through controlling the prices.[49]

The economies of the breadbasket states like Iowa, Kansas, Missouri, and Nebraska directly or indirectly depend on biofuels. In fact, all these states are a part of the corn belt of United States, and these states produce corn mainly for biofuels, specifically ethanol.[50] For example: Iowa is the largest producer of corn and corn based-ethanol in the US; United States is the largest producer of ethanol globally, making Iowa one of the largest producers of ethanol in the world. Furthermore, about 53% of Iowa's corn is used towards the production of ethanol, and the renewable fuels industry (which includes largely biofuels in addition to solar energy) contributes to about $4.7 billion of Iowa's GDP.[51]

Furthermore, the U.S. government often promotes the major biofuel legislations with the intention of economic development in rural-agrarian areas of the country. Biofuels, in terms of economic development, are beneficial for the agricultural sector but biofuel policies

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[49] Pump the Movie, "How Lobbyists Invented the 'Food vs Fuel' Problem," YouTube, May 12, 2016, www.youtube.com/watch?v=-fzj-n8OdGo

[50] Jonathan Foley, "It's Time to Rethink America's Corn System," *Scientific American,* last modified March 5, 2013, https://www.scientificamerican.com/article/time-to-rethink-corn/

[51] "Iowa Corn," *iowacorn.org*, last modified March 5, 2017, https://www.iowacorn.org/corn-uses/ethanol/

often use it as the only instrument to achieve the goal of prosperity of the rural-agrarian areas of the country.

Section 3- Deliberate Vagueness

This section seeks to point out the overwhelming use of strategic ambigues tool to promote and garner support for biofuels, supporting the fact that biofuel policies do not have a coherent set of goals to achieve, instead they only provide a strong political rhetoric. Since 1907 the United States government has used different rationales to support biofuels as explained in section 1 of this paper. These rationales ranged from addressing environmental reasons, to reducing United States dependence on foreign oil, to using up the agricultural surpluses to help the farmers. It can be argued that the United States government has always pitched biofuels as an opportunistic solution to various problems, instead of using it to address and achieve a coherent list of issues. Biofuels, because of their range of policy issues, have become a dubious solution, as they represent different things to different people. This lack of precision of policy goals can be construed as strategic uncertainty and is a useful political tool. Furthermore, the U.S. government has overwhelmingly opted to use mandates instead of taxes for biofuel policies. The issue with taxes is that they make the cost of reaching a goal transparent and explicit. When the cost is transparent, it becomes clear who is paying for the policy and how much. On the other hand, as mandates are not transparent, it makes it difficult to know what one is exactly paying for. Since, mandates do not clarify the sources benefiting from the money, it is easier to increase their cost. Therefore, it is deliberate on the government's part to use an instrument like a mandate instead of taxes, much like the use of other dubious political tools like changing rationale in case of biofuel policy.

Conclusion

To sum it all up, biofuels have their benefits in comparison to fossil fuels; however, the current process of extraction of biofuels is more harmful than beneficial. In order to be a competent alternative to fossil fuels, biofuels would have to offer a gain in the net energy produced, be capable of mass production without interrupting food supply, and be sustainable through having a significantly smaller carbon footprint than fossil fuels, as per the 'green metric' devised by NASA for their Extreme Green research project (focusing on the discovery/invention of the next generation aviation project). However, it is also vital to understand that despite their cons biofuels are the most used alternative fuels, as currently they are the only available alternative to fossil fuels that is compatible with the existing combustion engines of transportation vehicles. In terms of policy, the use of biofuels as an instrument to achieve multiple policy goals is essentially misguided as biofuels only provide a temporary palliative solution, and not a permanent economically sustainable one. For biofuel policies to be successful, future policies should prevent using biofuels as the only instrument for achieving multiple objects, and be more efficient by not keeping its objectives ambiguous. Furthermore, it would be possible to achieve the objectives if policy makers properly define a narrow and specific set of goals for each policy and the cost attached to it. Finally, more research is required to innovate biofuels towards becoming more environmentally and economically sustainable, and an increase in the use of second and third generation biofuels would be beneficial, as that would not interrupt food supply.

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