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Land for food or fuel: the struggle over biofuel policies

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Worldwide, humanity used 2.5 billion metric tons of food and almost 25,000 terawatt-hours (TWh) of energy in 2022 (IEA 2023). Of that energy production, 700 TWh came from biofuel, which is expected to rise to 1300 TWh by 2030 (IEA 2023). The United States, representing a quarter of the world's economy, plays an important role in biofuel policy. Policy in the United States concerning the food versus fuel debate sets the narrative for the rest of the world. In the U.S., interest groups compete to draw the line between responsible biofuel policies and policies that would jeopardize global food supplies.

Pro-fuel groups fuel producers and some agricultural interest groups. Anti-fuel groups include environmentalists and food supply watchdogs. Groups such as consumer advocacies and policy think tanks also play a role in the debate.

Promoters of biofuel usage defend their policy agendas opportunistically, adapting their reasons as it serves their purposes. Varying their arguments with the era and the audience, they have cited US energy independence, farmers' economic wellbeing, and decarbonization. Their opponents have been more consistent. Some oppose such subsidies on grounds of fiscal responsibility, while others argue that biofuels are no more sustainable than petroleum and that they tend to drive up food prices.

Review of Research

Research on the relevance of biofuels use defines the scope of this paper. Busic et al. (2018) describes fermentation's relation to foodstuffs and the current need for cereals to make biofuels. The economics of biofuel manufacturing and demand are described by the EPA's 2023 report. Curtis (2010) notes the massive private sector and federal investments that have been

made in the biofuel industry. Hahn-Hägerdal et al. (2008) notes the rising scientific and technological interest in biofuel production and deployment.

Advocacy groups must appeal to the public and policymakers, to influence legislation that favors their agendas. The effect of psychological reactance, and the perceived effects of the curtailing of freedom on eliciting a negative response to a particular issue, is documented in the context of public policy by Song et al. (2018), explaining why advocacy groups cast their goals in terms of such ends as stopping climate change or setting off a global food crisis. The perceptions of power, as explained by Partzsch (2017) influence perceptions of biofuel policy, saying that “power over,” such as coercion, has dominated the biofuel narrative, adding a negative perception to biofuels in any public debate. Bonaiuto et al. (2024) describes the psychological value of increasing persuasiveness by targeting single issues most dear to citizens and policymakers. Understanding these trends is needed to contextualize and evaluate modern persuasive tactics used by both sides.

Existing scholarship has noted trends in the tactics employed by advocacy groups in favor of and against biofuel use. Talamini et al. (2012) points to the increasing reliance on the perspectives of journalists and decreasing role of scientists in the decision-making process of policymakers with respect to biofuel legislation. Cacciatore et al. (2012) demonstrated that politicization around the issue drives public interest in biofuels, subject to perspective warping by media exposure. Major issues, such as climate change, have become crucial planks in the agendas of both sides of the biofuel debate, and keeping their agendas in the context of climate change helps rally public support, as stated by Pralle (2009). Case studies, such as those done by Dragojlovic and Einsiedel (2015) in Canada, demonstrate that even exposure to anti-biofuel

arguments can reduce support for biofuel policies, but only if those people did not see climate change as a major threat.

Food availability

What is used for fuel cannot be eaten. Detractors of biofuel policy make this case often. Many of the crops turned into biofuels are food crops, such as corn and soy. As more food crops go to fuel production, less are available for consumption (Tenebaum 2008). Supply concern advocacies seek policies to prevent swapping food production for biofuel production. The United Nations Human Rights Council (UNHRC), one such advocate, notes the dangers biofuel demand poses for developing nations. Developing countries risk selling their food crops as cash crops. The UN's Special Rapporteur on the right to food, Jean Ziegler, stated in a report to the General Assembly that "There are serious risks of creating a battle between food and fuel that will leave the poor and hungry in developing countries at the mercy of rapidly rising prices for food, land and water" (Ziegler 2007). Of special interest for this prospectus is the assertion in the same UN report by Mr. Ziegler that "...biofuels should be made from non-food plants and agricultural wastes, reducing competition for food, land and water" (Ziegler 2007). Food growers' advocates also show concerns over supply issues in a growing world. The International Union of Food Science and Technology (IUFoST), notes that current policy warrants ethical concern. On behalf of international food suppliers, the IUFoST raises the question of resource allocation. With subsidies rising for biofuels in the developed world, the IUFoST notes that continued food insecurity around the world should "...raise ethical and moral concerns regarding the failure of the international community to make decisive progress towards achieving world food security"

(Spiess 2013). Localized to the United States, the Institute for Progress, a consumer-advocate policy think tank, stated the following.

The connection between biofuel policies and food prices is fairly straightforward. Roughly 36% of U.S. corn is now used for bioethanol production. The RFS therefore provided a massive increase in demand for America's most important crop, a crop that accounts for nearly a fifth of all calories consumed worldwide. (Richards 2022)

The same source noted that the supply-side influence of biofuel demand. Richards' 2022 statement continues this point.

There was also some increase in supply, with U.S. corn acreage growing by an estimated 16.5% in response to this demand, but much of this came at the expense of soybean acreage. Similar displacement effects have been seen in other parts of the world, with increases in oilseed cultivation coming at the expense of wheat production in major wheat growing countries.” (Richards 2022)

These complaints tie in with environmentalist concerns over land use. The Institute for Progress also cites downstream effects of crop diversion to biofuels, arguing almost in-line with some environmental advocacies.

Major grains — corn, wheat, rice — are substitutes, and so rising corn prices also impact other staple foods. The growth of additional crops to meet biofuel demand also competes with food and livestock feed for key inputs like pesticides and fertilizers, further raising food prices. (Richards 2022)

Biofuel companies are aware of competition with food stocks. To address food supply concerns, some industrial groups look to shift blame. The Minnesota Biofuels Association points

to market hiccups, not supply competition, as the cause of food price volatility (Smith 2023).

ETIP Bioenergy, a European biofuel producer group, remarked that too many factors coalesce to cause rising food prices to point the finger at crop diversion to biofuel production.

When considering the potential impact of first generation biofuels on food prices, a diversity of factors also need to be taken into account, such as oil prices, fertiliser costs, rising demand for meat in emerging economies, demands on land for bioenergy (heat and power) and other bioproducts (e.g. plant oils for non-food use), rising global populations, the effects of climate change on agricultural productivity, local market conditions, and other factors that impact on price and availability of food in the short and long term. (ETIP Bioenergy 2015)

Some advocates of biofuel usage go on to deny the relevance of the food versus fuel debate. The Institute for Agriculture and Trade Policy, a non-profit think tank specializing in agricultural policy, attacked the food supply argument in three points.

U.S. biofuel production will not likely result in more global hunger. First, a negligible volume of U.S. corn is exported to undernourished populations. Second, while a rise in the price of corn and other agricultural commodities can adversely impact food prices, it also provides more opportunity for subsistence farmers around the world that have been devastated by depressed global commodity prices. Third, many of the issues of hunger and poverty that are attributed to biofuels are more appropriately linked to structural problems of corporate concentration and inequalities in agricultural trading systems.” (Muller et al. 2007)

When put in the context of the work of Dragojlovic and Einsiedel (2015), the perceived necessity of denying a platform to detractors of biofuel use can be seen as a real tactic employed by those who favor the expansion of biofuel use.

Biofuel production

The detailing of clear policy objectives is a way to garner support, as with the publishing of the policy “wish-list” of Growth Energy, the largest biofuel trade association. Offering clear targets for what constitutes biofuel-friendly policies gives clear metrics for success in the eyes of biofuel proponents. As Growth Energy CEO Emily Skor expressed “We hope these priorities serve as roadmap for elected officials seeking to support biomanufacturing facilities at the heart of America’s bioeconomy” (Ethanol Producer Magazine 2024). Presenting the biofuel industry as economically vital is a major tactic used by biofuel proponents. The Progressive Farmer, one of America’s most read farmer’s magazines, argues that the biofuel market is needed to keep farmers afloat, stating “With U.S. agriculture facing a significant loss of export share in the world to expanded production in Brazil and Russia, new biofuels markets offer a much-needed antidote to slow the decades-old trend of declining numbers of U.S. farmers and ranchers” (Hultman 2023). Biofuel advocates also tout technical progress driven by the demand for biofuels. ProtecFuel, a consulting company fronted by trade associations such as Growth Energy, lauds the advent of enzymatic and nanotechnological processes that are being investigated by biofuel companies as having sweeping applications in other fields (ProtecFuel 2023).

Some opponents of biofuel use see the side effects of industrial expansion as not being worth the benefits. Citizens of Barrio Logan, a community where biofuel company New Leaf sought to expand the size of their existing facility, have voiced opposition, and their sentiments on a new pipeline in their neighborhood are captured in the local paper.

Since the pipeline plan was first presented to the community in March, the planning group and residents alike expressed worries that the project would only cement the facility's place in the neighborhood and help New Leaf scale up its overall production, despite city efforts to curb industrial activity in the community. (Alvarenga 2023)

Opponents of biofuel expansion cite the underlying practices that anchor biofuel usage as morally reprehensible and oppose biofuel production for its downstream effects. For example, new demands for bio-methane could facilitate practices that may constitute cruelty to animals, resulting in "Propping up industrial agriculture through incentivizing factory farm gas...harming surrounding communities and animals" (Animal Legal Defense Fund 2022).

Environmentalism

Environmental advocates largely oppose biofuel expansion. They seek policies to limit or prevent biofuel use. Advocacies such as Friends of the Earth (FOE) seek to reduce biofuel demand by opposing biofuel consumption quotas, such as the Renewable Fuel Standard in the United States (Fox 2012). Other advocacies, such as the World Wildlife Foundation, oppose biofuel expansion because of land availability. As demand for food rises, more land must be brought under cultivation; biofuels add another source of land demand. As the WWF noted in a report, the only solution to meet both demands is "...the expansion of the existing areas under cultivation" (Pastowski 2007), jeopardizing local ecologies. biofuelwatch, a grassroots advocacy organization, opposes biofuel expansion policy due to the failure of biofuels to meaningfully reduce climate change and the industry's reliance on subsidies. In an open letter to the U.K. government, biofuelwatch endorsed the sentiments of scientists who stated that current biofuel policy will result in "...adding millions of tonnes of carbon dioxide emissions every year" (biofuelwatch 2011). Tomei and Helliwell (2016) presented the land use argument in a global

north versus south context, saying biofuel usage occurs in mostly post-industrial economies, while food insecurity affects less developed areas. As summarized by the International Food Policy Research Institute, a policy advocacy for international food producers, some argue that the carbon offset potential of biofuel is questionable.

Recent research concludes that the carbon intensity of maize-based ethanol in the U.S. is no less than gasoline and likely ‘at least 24 percent higher.’ Moreover, when indirect land use change (ILUC) is considered (for example, through deforestation) GHG emissions for palm- and soy-based biodiesel may also be quite large.” (Glauber and Hebebrand 2023)

This synergy of direct and indirect climate effects of biofuel production serves to amplify the argument of biofuel opponents by linking their position to the climate change effects most people are aware of.

Advocates in favor of biofuel expansion press the issue of climate change mitigation via decarbonization. Growth Energy points to biofuels’ ability to reduce greenhouse emissions. As governments push for cleaner transportation, Growth Energy CEO Emily Skor, in remarks to the group’s annual summit, gave an industry-specific example.

Today, with the right policies, biofuels can take up a larger part of our nation’s fuel supply to lower emissions; tomorrow, with the right modeling, farm-based biofuels will serve as the cornerstone feedstock for SAF that dramatically decarbonizes the aviation sector. (Growth Energy 2023)

With White House climate advisors and secretaries from the Departments of Transportation and Agriculture present at these events, industry influence on policymakers is clear. Biofuel advocates also seek to regain control of the narrative over biofuel use by

highlighting a lack of interest on behalf of environmental advocates. IRENA, an intergovernmental pro-biofuel think tank, stated the following.

Environmental NGOs have differing positions on advanced biofuels. While almost all categorically oppose 1G biofuels, positions on advanced fuels vary. Greenpeace, for example, allots a role for biofuels from woody feedstock, waste or algae that is not produced on existing agricultural land. (IRENA 2019)

Presenting a unified front on behalf of the pro-biofuel side, and pointing out divisions in the anti-biofuel camp, creates an appearance of biofuel advocates as cohesive. Of note from the paper is the source of the redirection of interests on behalf of those groups, with the statement “However, the role of biofuels is generally decreasing in NGO strategies due to emerging EVs” (IRENA 2019) showing that apathy is not at play in this debate. Combatting existing changes in biofuel use policy that may favor electrification has been a strategy employed by biofuel-use advocates. The American Fuel and Petrochemical Manufacturers, a trade association of fuel and biofuel producers, have responded to the EPA’s changing of the renewable fuel standard to increase subsidies to electric vehicles.

American fuel refiners are the entities tasked with paying for the RFS. Understandably, we have long engaged on and objected to many problematic parts of the RFS, but our sector agrees that transportation fuels need to become less carbon intensive. To that end, we’ve made significant investments in cleaner fuel production and are now among the world’s top producers of renewable diesel and sustainable aviation fuel. Our concerns with the next chapter of RFS, however, are serious and should be shared by U.S. biofuel producers, champions for American energy security and anyone else who believes EPA should be bound by the will of Congress. (Kelly 2023)

By touting progress that has already been made, and presenting policies that can reduce biofuel consumption as “power-over,” these advocates forward their agendas by exploiting the work of Partzsch (2017) to cast said policies in a light of coercion.

Consumer and Fiscal Concerns

Opponents of biofuel expansion cite harm to consumers in a variety of facets to advance their agendas. Direct impact to individuals is expressed by biofuel detractors who point to the damage done to personal vehicles by biofuels. The Automotive Skills Development Council, a trade association of automobile manufacturers, noted that “Compared to conventional fossil fuels, biofuels have increased oxygen and water content, which increases the risk of corrosion and damage to fuel system parts such as fuel tanks, fuel injectors, and fuel lines” (ASDC 2023). The role of government in propping up the biofuel industry is one complaint of anti-biofuel expansion advocates. Downsizing the Federal Government, an online grassroots advocacy dedicated to cutting the size of government in the U.S., puts forward a free-market argument to detract from biofuel expansion by state action.

By ending federal subsidies and mandates, biofuels use would decline to efficient levels that maximized consumer benefits. Agriculture and food markets would benefit from the elimination of distortions that biofuel mandates are creating. The most competitive elements of the biofuels industry would survive and thrive in a free market.” (Loris 2017)

Opponents of subsidies to the biofuel industry advance claims of fiscal irresponsibility with respect to biofuel subsidization. Taxpayers for Common Sense, a group dedicated to

monitoring how the government spends its money, decried the financial irresponsibility of the state on behalf of biofuel industries.

While proponents have attempted to sell the biofuels and biomass industries as those that would increase U.S. energy independence and reduce GHG emissions, they have failed to meet these goals despite decades of generous subsidies. The wide array of supports, spanning at least seven government agencies, have done more harm than good and have spurred numerous unintended consequences and costs for both taxpayers and consumers. Biofuels and biomass subsidies have also distorted energy markets, raised fuel and food prices, picked winners and losers, and worked at cross-purposes with one another. After nearly 40 years of subsidies for corn ethanol in particular, it is time the biofuels and biomass industries survived on their own two feet without taxpayer support.” (Taxpayers for Common Sense 2017)

Proponents of biofuel expansion appeal to slow progress in the realm of electrification. The Renewable Fuels Association (RFA), another biofuel manufacturer trade association, notes that combustion engines won't go away. RFA CEO Geoff Cooper remarked “Americans will continue to rely upon hundreds of millions of combustion engines and hundreds of billions of gallons of liquid fuels for many decades to come, even as more EVs enter the fleet” (RFA 2023). Some groups take a more combative approach to reduce the competition of unfueled vehicles and policies that favor a drop in fuel consumption. In a letter to the EPA, the National Farmers Union, a trade association for American farmers, seeks emissions evaluations policies that “account for all emissions relating to different fuel and engine technologies and equitably incentivize emissions reductions from all of those technologies” (NFU 2023). This serves the group's goal of reducing competition with biofuels by reducing the viability of electric vehicles.

In response to changes on fuel consumption regulations, the National Corn Growers Association (NCGA 2023) President Tom Haag noted that many proposed laws push too hard against fuel use. Mr. Haag stated that with current policy directions, "...auto manufacturers will be forced to overlook viable solutions, such as high-octane biofuels like corn ethanol, as they rush to meet these standards." Appeals to more personal interests, such as health and safety, also feature in the arguments of those who favor biofuel use. In an article published in Car and Driver, a large reference site frequented by new car buyers, the observation is made by one of the editorial boards that "Biodiesel also reduces tailpipe emissions, including the amount of soot and "air toxics" released into the atmosphere. Environmental Protection Agency (EPA) research indicates that biodiesel emits 11% less carbon monoxide and 10% less particulate matter than diesel" (Hearst Autos Research 2020).

Conclusion

Advocates of pro-biofuel policies have adopted a variety of approaches to promote the use of biofuel and to secure public support and legislation to that end. Detractors of biofuel use and expansion hold more closely to a few key arguments, and often find themselves responding to claims but forward by biofuel proponents. Both sides tie policies and agendas they support to large crises and pressing concerns to promote their side as a "solution" or to present the other side as an active contributor to such a crisis. Issues like the climate crisis, food price and availability, economic security, technological innovation, fuel pricing, and the role of the state in biofuel policy are touted as paramount by both sides. These headline-grabbing issues tend to crowd out other concerns that may be more immediate to the public, such as health concerns and

fuel prices. This renders it exceptionally difficult for a member of the public to weigh these advocates' agendas without being emotionally impacted by the links to these major issues.

While all these areas are of concern in our modern global community, the connection of these issues in the context of biofuels to their "worst-case scenarios" muddies the waters and turns a policy debate into an existential crisis. The divorcing of the substantive impacts of biofuel policy from the histrionics of these advocates should be the goal of responsible policymakers and citizens. Advocates on both sides are not incentivized to moderate their presentations to the public. Policymakers and citizens alike must take steps to discourage the inflation of impacts of biofuel policy to the extremes to encourage substantive debate on the issues.

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