



How biofuel policies backfire: Misguided goals, inefficient mechanisms, and political-ecological blind spots

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ABSTRACT

The development of an economically viable biofuel industry rests on strong state subsidies for production and processing, creation of markets through government procurement, fuel-blending mandates, price controls, as well as foreign trade tariffs and quotas, and multiple interventions in agricultural, ecological, and other regulations. We use an approach grounded in agrarian political economy to critically analyze the literature on how biofuel policies interact with broader production, trade, and agro-ecological processes. We focus on policies involving the most prominent crops in the places where biofuel production has advanced the most (i.e. USA, Brazil, and the EU), but also extend analysis to their relations with broader transformations in production, commercial, and even governance practices around the world. We investigate the political and economic interests driving biofuel policies, and how these set the terms in which state interventions and policies are conceived and implemented. We find that these are not developed and implemented according to environmental or inclusive pro-poor development purposes, but according to state interests in energy security and its intersection with a tense alliance between corporate sectors, rendering many policy mechanisms ineffective or even outright counterproductive to effectively facilitate more socially and environmentally sustainable energy production and agricultural practices.

1. Introduction

Biofuel¹ policies have been controversially discussed worldwide during the last decade. How biofuels transform the agricultural market, if they can become profitable, and how much land would be necessary to achieve the different blending targets set by various countries have been major points of concern (OECD, 2006). Their environmental and social costs and benefits have also been under scrutiny (FAO, 2013). Previous research has surveyed the policies that have fostered the expansion of the biofuel economy around the world (Sorda et al., 2010), and overviewed how (in)effective biofuel policies have been at climate mitigation (Fargione et al., 2008; Searchinger et al., 2008), and attending the further expectations of fostering energy security, driving rural development, enhancing food security, and even rehabilitating degraded lands (Hunsberger and German, this volume; Ekener-Petersen et al., 2014). Also, non-state forms of regulation through certifications and other market mechanisms have been reexamined (Reinier et al., this volume). Here we argue that biofuel policies must be understood in their historical and socio-economic context, as the

state-economy relations in which they are embedded determine how they are conceived and implemented. This central role of the state evokes the need and possibility for multiple interests and discourses to structure biofuel production. Understanding the state as a contested terrain where different actors compete to uphold their interests (Sousa Santos, 1992), our purpose is to analyze how biofuel policies arise from and interact with broader production, trade, and agro-ecological processes in the major producer and consumer blocs of biofuels (USA, Brazil, and the EU) and how they condition the broader commercial, technological, and political landscape into which smaller states possibly integrate.

We find that biofuel policies in major producer and consumer blocs are not in fact developed and implemented according to environmental or inclusive pro-poor development purposes that currently serve as the main discourses promoting them, but rather according to a tense alliance between major corporate sectors – particularly agroindustrial traders and processors, petroleum extraction and refinery, and automotive industry – structured by state interests in energy security and its intersection with private interests in profit. Biofuel policies seek,

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¹ In the article, we refer to liquid first generation biofuels unless otherwise specified.

then, to create markets and subsidize production/processing for increasing profits in domestic agro-energy sectors, even if they lock-in dependence on fossil fuels by sustaining automobile infrastructure with first generation biofuels (Smil, 2010a, 2010b; Oberling et al., 2012; Berti and Levidow, 2014) and agricultural practices marred by negative social and environmental effects (see discussion below). Ultimately, we argue that despite attempted improvements to both state and market-based governance mechanisms, it is not the optimization of policies and technologies that requires examination and political efforts (cf. Taheripour and Tyner, 2008; Tyner, 2013; Witcover et al., 2013; Vivanco et al., 2016). It is the underlying political economy of biofuel policy production itself, the corporate structure of the sector and its power through the state, that must be critically reexamined and radically transformed so that more sustainable and just practices can be conceived and implemented. Biofuel policies will only effectively facilitate more socially and environmentally sustainable energy production and agricultural practices when tied to land redistribution, customary rights protections, and stronger anti-trust, environmental, and labour protections that decentralize production and power.²

In order to identify the driving social forces behind biofuel policies and provide a basis for further and more detailed investigations on their implications, we use an approach grounded in agrarian political economy to critically analyze the literature. This approach requires an analysis into the social relations of production, reproduction, property, and power including the structures and relations of accumulation (Bernstein, 1992; White and Dasgupta, 2010). In other words, our analysis is guided by the questions: (i) who owns what (i.e. the social relations of property), (ii) who does what (i.e. the social division of labour), (iii) who gets what (i.e. surplus or wealth distribution), and (iv) what do they do with the surplus wealth that has been created (i.e. the social relations of consumption, reproduction, and accumulation) (Bernstein 2010: 22–23). Following Borrás et al. (2011: 211), we further ask: “(v) what do they (note: social groups and classes) do to each other, and (vi) how are political changes shaped by dynamic ecologies, and vice versa*” (ibid). Using this framework, we analyze biofuel policies with regard to their implications for relations around land use and control, labour relations and conditions, and the structures of accumulation that they generate. The criteria we highlight in each section are derived from a combination of the principles on which biofuel policies were promoted in that particular context, and the specific aspects of those policies that backfire in their social, ecological, and political outcomes.

We first surveyed previous reviews and critiques of biofuel policies around the world, especially in the US, Brazil, the EU, in *Energy Policy* and other major journals on renewable energy and technology, agricultural economics, rural sociology, and geography. This yielded 45 articles published in the last decade, the majority since 2012. We then extended our research to the literature in agrarian political economy that we found most useful for analysis. This review methodology enables us to investigate the political and economic interests driving biofuel policies, and how these set the terms in which state interventions and policies are conceived and implemented. We argue that by continuing the expansion of capitalist industrial agriculture, biofuel policies have used justifications based in the crop's end use to increase agroindustry's control over land and labour, exacerbating forms of production that exclude the poor and exploit the environment. We trace these in the USA, Brazil, and the EU (Section 2), then evaluate their implications for an emerging global biofuel regime (Section 3), and conclude with a discussion of policy implications (Section 4).

2. Biofuel policies and politics

2.1. USA

When the earliest automobiles were being developed, biodiesel, ethanol, and biofuel-gasoline blends were pervasive. Ford's Model T, for example, could be adjusted to run on ethanol, gasoline, or a “gasohol” blend that made it a truly flex-fuel vehicle. However, multiple factors during the early 20th century led to the predominance of gasoline use, including state policies that supported the expansion of the fossil fuel and automotive industry (Smil, 2010a), and with the discovery of the anti-knock properties of tetraethyl lead in 1921, ethanol-blends were largely abandoned as a fuel oxygenate (Solomon et al., 2007). The implications of this energy policy decision persist to this day, congealed into material infrastructures and the exorbitant power of the petroleum and automotive industries that dominated the policies and politics around biofuels in the USA until recently, when they have been joined by an increasingly assertive agroindustrial sector (Smil, 2010a; Mitchell, 2011). The shifting synergies and tensions between these sectors largely determine the goals, mechanisms, and priorities of US government policy on biofuels. After elucidating how the petroleum and automotive industries curtailed biofuel development, we retrace the historical emergence of agroindustrial interests that have largely (but not coherently) promoted biofuels.

Biodiesel and ethanol use was almost entirely repressed by the allied petroleum and automotive industries until the 1970s, when environmental restrictions on leaded gasoline and a perceived energy crisis reignited interest in ethanol use as a fuel oxygenate and volume extender (Solomon et al., 2007). Yet this intended use for biofuels meant it was not expected to replace but rather sustain the petroleum-based industry and existing automotive infrastructure (Smil, 2010a; Mitchell, 2011). Consequently, the policy mechanisms utilized – tax credits with loan and price guarantees for ethanol *blenders*, starting with the Energy Tax Act of 1978 – actually strengthened the power of the petroleum and automotive industries over the emerging biofuel economy (Smil, 2010a). This was reflected in the limited expansion of ethanol production *and infrastructure* during the 1980s, when petroleum prices stabilized at low levels. It is important to underscore ethanol infrastructure (not only agricultural feedstock production and biofuel processing facilities, but also flex-fuel engines that can operate on ethanol-gasoline blends, and the specialized distribution network to supply them), because it largely contained the early policy attempts to transform ethanol from a gasoline-additive to a true *alternative* to fossil fuels (ibid.; Mitchell, 2011). The Alternative Motor Fuels Act of 1988 and the Energy Policy Act of 1992, for example, provided auto companies with tax credits and exemptions from compliance with the Corporate Average Fuel Economy (CAFE) standards for vehicles that can run on E85 fuel (a blend of 85% ethanol and 15% gasoline), and created demand by requiring that certain government agencies renew their fleets with such vehicles (Solomon et al., 2007). But since only very few E85 fueling stations exist (mostly in the Midwest, and largely nonexistent elsewhere in the USA), to this day the estimated five million such vehicles in the country operate primarily on gasoline alone, and the program is “frequently criticized as a mechanism for automakers to avoid CAFE requirements while being ineffective at supporting purchases of E85” (ibid.: 418).

It was only with increasing restrictions on unleaded fuel oxygenates (such as methyl tertiary butyl ether – MTBE), the emergence of a powerful agroindustrial lobby for corn-based ethanol production during the 1980s (when new markets were required to avert price collapse due to overproduction), and the rising petroleum prices at the turn of the 21st century that biofuel policies in the US began to shift away from the goals and mechanisms that explicitly and directly favour the petroleum and automotive industries (Solomon et al., 2007; Smil, 2010a). Concurrently, environmentalist concerns over greenhouse gas (GHG) emissions that developed during the 1990s have since become

² The key elements of our criteria for considering and evaluating biofuel policy are outlined in the introductory essay of this special issue (and also in German et al., 2016).

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