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Envisioning and implementing wood-based bioenergy systems in the southern United States: Imaginaries in everyday talk

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ABSTRACT

Bioenergy development in the Southern United States was said to promise a future with renewable energy, energy independence, expanded wood markets, and rural development. We view this vision of wood-based bioenergy as a sociotechnical imaginary involving a future where energy and rural development needs are met using sustainably-harvested local resources. While this vision has led to bioenergy development, it has not been universally shared and counter-narratives have circulated. Local people receive multiple messages and have diverse experiences with bioenergy, which affect how they interpret the imaginary. We use cultural models to examine the extent and ways that elements of the national bioenergy imaginary occurred in everyday talk in three communities where bioenergy plants had recently been developed. We show how local people articulated, responded to, and altered the national bioenergy imaginary while simultaneously drawing on diverse experiences, values, and other important social discourses. While local people had limited opportunities to alter the national imaginary, they contested and diluted it in ways that indicated that they were not fully in support of the imaginary and the development it spurred. Ultimately, this may hinder bioenergy development.

1. Introduction

A new interest in bioenergy, along with other renewable energy options, began to develop in the United States (U.S.) and Europe in the early 2000s. This new interest, which followed earlier attention during the 1970s energy crisis, was related to rising gasoline and natural gas prices, concerns about overdependence on foreign oil, and growing awareness and concern about the role of fossil fuels in climate change [1–3]. Wood-based bioenergy was seen as an important and accessible part of a renewable energy portfolio, particularly in the Southern U.S., for several reasons. One, wood is an ancient source of energy and has continued to be the leading source of renewable energy in numerous developed countries [4]. Two, biomass-based liquid fuels represent one of the only options for transportation fuels that can meet future metrics of environmental, social, and political sustainability [5]. Three, the Southern U.S. has extensive timberlands, a large and established forest product industry and infrastructure, and excess capacity due to downturns in pulpwood markets, and is seen as ideally suited for wood-based bioenergy for power generation and liquid transportation fuels [6,7].

Policies in both the European Union (E.U.) and the U.S. have promoted bioenergy in ways that spurred its development in the Southern U.S. [8,9]. In the E.U., a series of energy directives mandated that 20% of each country's energy portfolio come from renewable sources, with woody biomass playing a role in meeting this target [9]. A wood pellet industry developed in the U.S. in response to E.U. renewable energy targets and subsidies for renewable electricity production [4]. In the U.S., the 2007 Energy Independence and Security Act (EISA) set ethanol targets that included phasing in increasing quantities of biofuels made from cellulosic feedstocks [10]. To meet this target, cellulosic bioenergy development was aggressively promoted by the U.S. Department of Energy and other federal agencies [11]. Additional incentives in agriculture, rural development, and forestry sectors also supported these goals [9], reflecting the fact that promotion of bioenergy was crafted as an effort to simultaneously address climate change, promote rural development, and achieve energy independence and security [6,12].

Developing a viable wood-based bioenergy industry in the Southern U.S., as with efforts to advance sustainable bio-economies elsewhere, clearly involves social as well as technological change [6,13,14]. Social issues have become increasingly important as bioenergy has been linked to rural development and is seen as a way to diversify the economic base of wood-dependent rural communities in the Southern U.S. [6]. Local economic development interests, supported by local media,

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have promoted bioenergy development as an alternative compatible with the existing forest product industry with important benefits for forest health [6,15,16]. While a variety of types and scales of wood-based bioenergy development exist, including home/community heating and cogeneration of electricity, national and international energy policies led to the emergence of wood pellets for electrical power and advanced biofuels as leading near-term options in the Southern U.S. in the early 2000s.

Policy-led efforts to develop a renewable energy system and promote rural development through wood-based bioenergy development can be usefully analyzed through the concept of sociotechnical imaginaries, which are powerful cultural resources that support and shape societal efforts to transition to new energy futures [14,17,18,19–21]. In the United States, energy imaginaries entailing energy security and energy independence have long been part of the rhetoric of politicians [22]. This language, which crosses party lines, dates back to the 1960s and 1970s [3,15,22] but intensified in the U.S. after the terrorist attacks of September 11, 2001. In 2006, George W. Bush lamented the United States' "addiction to oil," while in 2007, Barack Obama promoted freedom from the "tyranny of oil" [23]. This type of rhetoric evokes emotional reactions in citizens in support of alternate sources of energy and merges with environmental discourses about renewable energy reducing emissions and mitigating climate change, thus strengthening the power of a sociotechnical imaginary promoting bioenergy development [25]. Bioenergy imaginaries drove policy, for example in the U.S. Department of Energy's "Billion Ton" reports [26–28], which examined the feasibility of an annual supply of one billion tons of biomass as a feedstock for bioenergy and linked the need for energy independence and security with rural development. Non-governmental organizations also joined the effort, for example 25x'25, which defines itself as "a diverse alliance of agricultural, forestry, environmental, conservation and other organizations that are working collaboratively to advance the goal of securing 25% of the nation's energy needs from renewable resources by the year 2025" [29]. The forest resources in the Southern U.S. were seen by various national and regional entities as integral to achieving energy independence and security, developing a national renewable energy portfolio to address climate change, and stimulating rural development.

Social science literature on wood-based bioenergy development in the Southern U.S. has been limited. Several studies found low levels of information and misconceptions about bioenergy and suggested the need for collaboration and local outreach [30,31]. Other studies examined perspectives of forestry professionals and forest owners, highlighting the importance of fitting bioenergy into existing wood production systems [1,32]. Bailey et al. [15] focused on the rural development potential of wood-based bioenergy development and the policies needed to ensure local benefits. If we view bioenergy promotion as a policy- and media- driven cultural phenomenon to meet a variety of energy, environmental, and rural development objectives, an important research question is the impact of national and regional energy and bioenergy imaginaries on local communities and landowners. Research on media framing of bioenergy is an important step in this direction, as media advance new discourses about bioenergy while also attempting to align their frames with the general public and thereby link bioenergy to larger cultural themes [33]. Dyer et al. [16] examined national, regional, and Alabama newspaper coverage and found that local coverage, in particular, is generally favorable when talking about bioenergy developments with potentially positive local economic effects. Although media frames may often be chosen to influence public and local opinion about bioenergy, we know very little about how they, along with the larger bioenergy imaginary, influence local people.

Eaton et al. [17] analyzed how actors in local communities in northern Michigan differentially framed national bioenergy imaginaries in support for or opposition to bioenergy development. They focused on local interpretations of the national bioenergy imaginary, specifically how a "wood for energy" frame was differentially keyed, as flat or sharp, by actors in northern Michigan communities to either make it seem like an unproblematic, obvious choice or to emphasize risks, uncertainties, and complexities. Their analysis took an important step in asking how national sociotechnical imaginaries are interpreted and acted on where specific technological projects are unfolding [17]. Our goal in this paper is to build upon and expand this approach by drawing on our ethnographic research around bioenergy development in the Southern U.S. Strauss [34,35] advocated person-centered analyses of the cultural models that underlie imaginaries and showed how people bring their own experiences and diverse cultural models drawn from multiple opinion communities to their interpretation of the imaginaries and powerful discourses they receive through the media and opinion leaders. Here we draw on both Eaton et al. [17] and Strauss [34,35] to use cultural model and conventional discourse analysis to present and discuss the ways that local people talk about nearby bioenergy development in the context of the national bioenergy imaginary. Understanding local interpretations of bioenergy development, the interests and values that underlie these, and the ways that these lead to supportive or oppositional actions is necessary if bioenergy development is to be broad-based and collaborative, and to provide local benefits.

2. Methods: multi-sited ethnography on bioenergy development

2.1. Research sites

In 2010, when enthusiasm for wood-based bioenergy development was very high [6], we began an ethnographic study of communities and landowners around major bioenergy plants in the Southern U.S. Our research was initially funded by the Southern Research Station of the USDA Forest Service to learn more about social aspects of bioenergy development as a complement to investments in technical research. We began with general research on bioenergy in the Southern U.S. and intensive research around the Range Fuels plant in Soperton, Georgia, which at that time was a promising cellulosic ethanol plant. Based on our initial research, in 2011/2012 we successfully competed for a U.S. Department of Agriculture grant in sustainable bioenergy in a program focused on socio-economic analysis of biofuel development on rural communities. By the time we submitted our proposal, the Range Fuels plant had ceased to operate and was preparing for foreclosure sale.

For our larger research project, we selected our three primary research sites based on stages of bioenergy development, two liquid fuel plants in different stages of development—one mature but less successful and one developing and promising success and one operating pellet plant. For the first, we continued to work around the Range Fuels plant as it suspended operations and was sold to LanzaTech to produce aviation or other drop-in fuels. This research site represented a community that had gone through initial excitement and disappointment, but had continued hope, around bioenergy development. For our second liquid fuel plant, we initially chose a promising proposed cellulosic ethanol plant, the Coskata plant in Boligee, Alabama, where the community was very engaged and enthusiastic about development. Shortly after our research began, Coskata terminated their Boligee development, and we substituted the nearby KiOR plant in Columbus, Mississippi. This plant was at the time the most advanced liquid fuels plant in the Southern U.S., and soon became the first plant to produce cellulosic fuel at a commercial scale. We completed our research around the KiOR plant just prior to its shutdown and bankruptcy in 2014. Its failure was likely due to technological difficulties and low gas prices, which resulted in the plant being unable to produce cellulosic crude oil at competitive prices.[1] For our third research site, we chose the newly opened Georgia Biomass wood pellet plant in Waycross, Georgia, which

[1] http://www.biofuelsdigest.com/bdigest/2016/11/24/kior-the-story-of-a-company-gone-wrong-part-5-the-collapse/http://www.biofuelsdigest.com/bdigest/2016/11/24/kior-the-story-of-a-company-gone-wrong-part-5-the-collapse/ (accessed 6/19/2017).