



The politics of imaginaries and bioenergy sub-niches in the emerging Northeast U.S. bioenergy economy



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ARTICLE INFO

Keywords:

Bioenergy
Marginal land
Multi-level perspective
Object conflict
Scale
Sociotechnical imaginary

ABSTRACT

As part of a transition to lower carbon energy systems, bioenergy development is often assumed to follow a uniform pathway. Yet the design, organization, and politics of bioenergy production in specific regional contexts may be contested. This study examines contestation within an emerging perennial crop bioenergy sector in the U.S. Northeast. Synthesizing conceptual contributions from the multi-level perspective on the significance of niches and sub-niches in sustainability transitions and from science and technology studies on the material and moral implications of sociotechnical imaginaries and object conflicts, this paper analyzes the politics of bioenergy sub-niche imaginaries. It identifies two main bioenergy sub-niches centered on (1) regional production and (2) community energy. Examining proposed and current production of perennial energy crops on marginal land, the study draws on 42 semi-structured interviews with bioenergy actors (e.g., scientists, industry representatives, policymakers, farmers/landowners) and secondary documents. The two bioenergy sub-niche imaginaries revealed political contestations around scale of operations, control and beneficiaries, and about definitions and uses of marginal land relative to livelihoods and community. This study highlights the potency of rival imaginaries *within* a developing sociotechnical niche and implications for sustainability transitions. Tracing the contours and emphases of, as well as conflicts between, bioenergy sub-niche imaginaries can clarify which pathways for transition to a lower carbon energy future could garner political and public support. The paper concludes by considering how disagreements between sub-niche actors could lead to productive mutual learning and the possibility of forging solutions contributing to more robust and equitable sustainability transitions.

1. Introduction

Transition to a less carbon intensive, renewable energy system is paramount for achieving social and environmental sustainability goals. Geography and science and technology studies (STS) scholars have called attention to the role that sociotechnical imaginaries, or collective visions and accompanying policy frameworks for achieving a “good society” via technology development (Calvert, 2015; Jasanoff and Kim, 2015; Smith and Tidwell, 2016), play in shaping sustainability transitions. In the United States, powerful actors, including national-level industry groups and policy-makers, envision bioenergy development as one important renewable resource pathway towards achieving a low carbon energy system. The national bioenergy sociotechnical imaginary

rests on using biomass resources to reduce fossil fuel dependence, revitalize rural economies, ensure energy security, mitigate climate change, and provide environmental services such as water quality improvement (Eaton et al., 2014; Lehrer, 2010; Selfa et al., 2015; Tilman et al., 2006).

In the Northeast United States, developing a bioenergy economy based on perennial energy crops (e.g., switchgrass or short-rotation woody crops) grown on marginal land is seen by many actors as central for enacting this imaginary (e.g., NEWBio.psu.edu; Stoof et al., 2015; VSJF, 2014). At the same time, other actors in the region have advocated for and are pursuing alternative visions for bioenergy development, visions that prioritize more “localist” approaches focused on reclaiming local control of economies and opposing their corporate

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colonization (Hess, 2009, 7; Hess, 2010). Rather than responding to national energy needs, these visions stress maintaining smaller-scale, distributed and flexible production on the land as the basis for a more equitable economic system.

Divergent options in bioenergy production systems and their accompanying sociotechnical imaginaries raise important questions not only about how bioenergy crops should be grown, harvested, processed, and used (van der Horst and Evans, 2010), but also about which bioenergy development model will provide the greatest social, environmental, and economic benefits and for whom. Even as a national sociotechnical imaginary for bioenergy has solidified, different actors and interests in the Northeast U.S. disagree about what are desirable and appropriate forms of bioenergy development, and what a future “good society” made possible via bioenergy technologies should look like. However, the contours of these contested visions and their material and discursive implications have received little scholarly attention.

In this paper, we examine ongoing political struggles—what we call a *politics of imaginaries*—unfolding between actors promoting different forms of bioenergy development in the Northeast as means to achieve rival imagined futures. We contend that analysis of these visions is important as whose imaginary ‘wins’—that is, becomes manifest in technology infrastructure, policy, and standards—has implications for both politics of discourse and values and the distribution of material goods and bads (e.g. financial resources and environmental burdens) (Busch, 2011; Latour, 1991; Sclove, 1995).

To develop our analytical approach, we draw from and synthesize three bodies of social science literature on technology development. First, we position bioenergy development in the Northeast in terms of what the multilevel perspective (MLP) on sociotechnical transitions literature (Geels, 2002, 2005, 2010) terms “niche” technology development, referring to emerging, novel technologies that have yet to be incorporated into the broader sociotechnical system. Linking the MLP framework to Jasanoff and Kim’s (2009, 2015) notion of sociotechnical imaginaries, we then highlight how niche actors envision their respective technological projects not only in technical, but also moral terms by calling attention to how particular technological choices would produce either better or worse future societies and for whom. Our research uncovers the contested dimensions of actors’ visions for a future good society within the same bioenergy niche. To analyze how the material and moral dimensions of these actors’ projects are interwoven, we draw on Hess’ (2005, 2007) notion of “object conflicts,” or definitional struggles between actors pursuing different ends within the same technological niche. Synthesizing facets of these three literatures provides the foundation for our research questions: how is bioenergy development in the Northeast U.S. envisioned and for what sociotechnical imaginary, and by whom? What do these sociotechnical imaginaries entail? And how are they contested?

Our findings show that actors constructed their bioenergy priorities and activities according to their vision of how bioenergy can be used to secure a better future society, while simultaneously challenging the visions of their rivals. Advocates of the dominant imaginary for large-scale bioenergy development, what we call the regional production model, envisioned a future where land and landowner practices are shifted toward dedicated energy crop production supplying centralized energy systems to provide environmental and economic benefits resonating with national and regional-scale policy aims for a bioenergy economy. Alternatively, what we call the community energy model imagined local-scale bioenergy systems that fit closely with existing land use practices and prioritize economic benefits to the local community through direct marketing and use of bioenergy products to increase local producers’ autonomy and control.

We argue these competing visions shape bioenergy niche development in two ways. First, some advocates of the dominant regional production imaginary discredited the economic and environmental sustainability of smaller-scale systems, thereby diminishing the poten-

tial of alternatives to large-scale, centralized systems in the eyes of policy-makers and the public. Concurrently, some farmers, landowners, entrepreneurs, and others contested this dominant imaginary by appealing to an alternative vision of small-scale, decentralized bioenergy production as a means of prioritizing community benefits and reorganizing economies to enact localist imaginaries.

In the next section, we review and synthesize literatures on (1) the MLP, (2) sociotechnical imaginaries, and (3) object conflicts in the field of energy technologies to develop our *politics of imaginaries* conceptual framework. We also discuss the significance of scaling and marginal land in energy transitions to contextualize key thematic tensions in this research. We then introduce the study region, describe the different forms of bioenergy production present, and highlight the activities of the New York Grass Cooperative (NYGC) to demonstrate the significance of bioenergy sub-niches in the Northeast. Methods, results, and discussion follow. Our intent is not to suggest that either the regional production or community energy model is better than the other. Rather, we conclude by arguing that the tensions between different bioenergy imaginaries point toward possibilities for imagining multiple bioenergy paths for obtaining better futures.

2. Literature review

2.1. Multilevel perspective on sociotechnical transitions

The MLP theorizes how sociotechnical systems evolve and transition toward more sustainable forms (Geels, 2002, 2005, 2010). In this framework, transitions emerge through interactions across three levels: landscapes, regimes, and niches. The landscape includes cultural norms and values; political coalitions and legal or regulatory changes; and economic, social, and environmental changes that provide a macro-level structuring context within which sociotechnical transitions occur. Regimes are meso-level forms of governance and sociotechnical practice that structure and stabilize existing sociotechnical systems and determine how technologies are developed and used. Finally, niches are experimental spaces where innovations can be developed and trialed outside of the normal selection pressures exerted by the mainstream sociotechnical system (Kemp et al., 1998). Niche development is pursued by small networks of actors who support novel sociotechnical practices based on their imaginaries of what these can achieve to better their communities and society (Marsden, 2013; Pesch, 2015).

2.2. Critiques of the multilevel perspective

Much scholarship within the MLP tradition has analyzed already completed transitions, while neglecting emerging transitions. Further, this work has generally focused on the temporal and technical dimensions of transitions, while ignoring their place-based dimensions and the social actors shaping transition outcomes (Bridge et al., 2013; Karanikolas et al., 2015). Recent scholarship has critiqued the MLP for paying inadequate attention to place, space, and scale (Bridge et al., 2013; Hansen and Coenen, 2015; Hodson and Marvin, 2013), and for emphasizing elite actors and technologies at the expense of local knowledge and context-specific social process and political dynamics (Lawhon and Murphy, 2012; Lawhon, 2012). Of particular importance for this study are questions of niche actors’ competing visions of appropriate scale and land use for achieving their bioenergy imaginary, which we highlight by developing the bioenergy sub-niche concept.

2.3. Bioenergy sub-niches

MLP-focused research has largely treated niches as homogenous spaces where actors share attitudes, values, and sociotechnical practices in working towards a common goal (Gibbs and O’Neill, 2014, 2015). However, heterogeneous sociotechnical configurations with contrasting visions and practices of sustainability often exist within a single niche

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