BIOENERGY FUTURES: A STUDY OF IMAGINARIES, FRAMING, CULTURES, AND JUSTIFICATION IN COMMUNITY CONTROVERSY OVER BIOENERGY DEVELOPMENT

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ABSTRACT

BIOENERGY FUTURES: A STUDY OF IMAGINARIES, FRAMING, CULTURES, AND JUSTIFICATION IN COMMUNITY CONTROVERSY OVER BIOENERGY DEVELOPMENT

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While Renewable Energy Technologies (RETs) such as bioenergy are increasingly contested, community-level discourse and collective action in support or opposition to RETs remains understudied. This dissertation begins to fill this research gap through three distinct studies using data collected on four communities where bioenergy facility development was under consideration in northern Michigan. First, I analyze the discourse of different actors in northern Michigan around the socio-technical imaginary of bioenergy development, finding that discourse critical of proposed local development invokes powerful remembered histories of clear-cut forests. Second, I draw from the sociology of culture to investigate the relationship between divergent community-level responses to proposed development and the cultural resources built up around industrial development and pollution in particular places. Third, I extend insights from French Convention Theory to examine how actors in community-level disputes appeal to a select number of higher principles in an attempt to truncate debate. These three papers will contribute to theories of community-level responses to RETs that help explain how community factors shape social responses to RET development.

This dissertation is dedicated to my wife Christina Louise McDonald and daughter Greta Rae Eaton. Without your patience, love, and encouragement I could not have taken on and completed this project.

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INTRODUCTION

The terms “bioeconomy” and “biobased economy” describe a future in which people rely more on renewable resources to meet society's needs for energy, chemicals and raw materials. Instead of an economy dependent on the planet's limited supply of nonrenewable resources such as petroleum and coal, we would convert plant material and municipal and livestock waste — biomass — into electricity, fuels, plastics and the basic components of chemical processes. In a bioeconomy, we can replace energy and materials as fast as we use them. Today we can’t.

—Doug Gage, Executive Director of the MSU BioEconomy Network[1]

If you believe in climate change, worry about air pollution, and care about the destruction of natural ecosystems, you probably support a transition from dirty to clean energy, coupled with cuts in energy consumption. Close your eyes for a second and picture what “green” energy means to you. Whirring wind turbines cresting a hilltop? Fields of solar panels glinting in the sun? Smokestacks pumping out particulate matter, volatile organic compounds, and carbon dioxide? Probably not the last one, right? Well, it’d be a more accurate image, since combustion-based bioenergy — electricity, heating, and transportation fuels — is the #1 source of “renewable” energy in the U.S.

—Josh Schlossberg, Editor of the Biomass Monitor[2]

[1] (MSU BioEconomy Network, n.d.)
[2] (Biomass Monitor, 2015)

Scientists, politicians, business leaders and environmentalists alike envision a future where solar, wind, bioenergy or other renewable energy technologies (RETs) provide 'clean' alternatives to existing 'dirty' energy production practices. Of these RETs, bioenergy technologies offer the additional benefit of providing a constant supply of power, as compared with the intermittent power supplied by solar or wind technologies. Across the U.S., local, state, and federal polices are enacted in order to bring a "bioeconomy" into being. However, no matter the scale of policy measures, new bioenergy facilities must be sited in specific places — often small or rural communities with close access to the required land, water, forest and other material resources. And while these places may be ideal from the perspective of policy-makers and developers, resistance at the community-level is on the rise[3].

As the above quotes begin to reveal, bioenergy, like other more familiar RETs, is increasingly contested. While scholars have examined campaigns to resist various technological projects or facility sitings, community-level collective action opposing or advocating for RETs specifically remains an understudied area of research. What is missing is a theory of resistance and advocacy around RETs that explicitly addresses both the emergent character of RETs and the perspectives and experiences of people living in communities where new developments are proposed. This three paper dissertation begins to fill this gap by presenting a partial theory of community level responses to RETs.

Rather than framing local resistance to RET development as a "problem" in need of a "solution", I develop new ways of understanding how both resistance and advocacy emerges and shapes RET development. That is, how RET development is constructed as a solution for some, a problem for others, and how these constructions shape action. Moreover, I try to make sense of

[3] For example, the "Partial List of Victories Against Biomass & Waste Incinerators Since 2010" posted on Energy Justice's website lists 45 recent "victories" against bioenergy development in over twenty states (Energy Justice, ND).

how and why these processes vary across different places, and how contestation relates to the perceived legitimacy of emergent RETs as means for obtaining a better energy future.

Three interrelated processes provide the underlying premise for this research: 1) that the future of bioenergy development hinges on interpretations of how resources were used in the past; 2) that these interpretations are shaped by the industrial histories of particular places; 3) and that disputes over the legitimacy of proposed developments are bounded by the public context of disputes. I begin with a general description of biomass bioenergy and its development across northern Michigan, USA.

Bioenergy Development in Michigan

Bioenergy technologies use organic matter, or 'biomass', to produce liquid fuels, heat, steam, and/or electricity. Biomass includes forest matter, agricultural waste or crops, and forest products industry waste — all of which is abundant in Michigan.

Michigan's history is richly entangled with resource extraction. Copper has been mined on the Keweenaw Peninsula since prehistoric times, and iron ore extracted from the Upper Peninsula's Huron Mountains since the 1840s. From the late 1800s until the turn of the century, logger barons clear cut nearly all of the state's once vast old growth White Pine forests. Newly cleared land provided for the successful agricultural industry (Michigan ranks second to California in terms of agricultural diversity). And while the state's old growth pines were nearly exhausted, millions of acres of forestland were soon thereafter consolidated into one of the largest state forest systems in the U.S., as well as four national forests[4]. This provided access to forest resources for a once strong but now declining forest products industry. For example,

[4] Nearly twenty million acres of Michigan are classified by the United States Department of Agriculture as forestland. Of this, over 4 million acres of forestland are state-owned (more acres than any other state) and over 2.5 millions acres are federal-owned (Holste and Garmon, 2013).

Between 1998 and 2010, approximately 500 timber proprietors closed or left the state, while 24,600 jobs were lost in the timber industry (Holste and Garmon, 2013). Today, advocates argue Michigan's vast stock of natural resources should be used to fuel a new bioenergy industry.

I limit this study to wood-fired biomass bioenergy technologies designed to produce electricity on a retail scale for sale to the electrical grid. As with other RETs, bioenergy is at once age-old and emergent. In simple terms, bioenergy facilities produce electricity by combusting or gasifying biomass to convert water into steam that turns a turbine creating electricity. Yet while this technical design has remained relatively stable (today's operational facilities essentially combust biomass for energy), new actor groups are drawing attention to environmental and human health risks they associate with plans for future bioenergy development. Claimsmaking by citizen, environmental, and expert groups calls attention to ways bioenergy development may threaten forest health, soil and ground water quality, exacerbate existing industrial contamination, and negatively affect air quality. That is, activists are associating bioenergy technologies with a host of emergent concerns and unknowns.

But while concern is emergent, bioenergy development is not new to Michigan. Several facilities currently operate, having come online in response to late 1970s federal energy policy[5] — and yet no new facilities have come online since the early 1990s. Developing a new facility is costly and requires clearing several regulatory hurdles, including obtaining permits to discharge water used for cooling and permits for emitting particulate matter into the air. Developers must also find site locations that offer access to water and biomass resources, as well as access to the electrical grid. Moreover, a steady, reliable, and long term supply of biomass must be obtained. And perhaps most importantly, new bioenergy facilities must obtain a power purchase agreement

[5] The Public Utilities Regulatory Policies Act of 1978 promoted energy conservation and use of domestic sources of energy. Importantly, this policy created a "coal proxy" which tied the price paid for bioenergy to that paid for coal fired energy, thereby securing a market for bioenergy.

with electrical utilities and access to the electrical grid via Regional Transmission Organizations.

In short, bioenergy development is risky business. But potential developers are receiving invigorated support. Renewed discourse on rising energy costs, energy security, environmental concern and climate change is again pointing to the potential for RETs to provide solutions. Advocates argue bioenergy technologies provide clean energy from domestic resources. However, as the second above quote suggests, polluting emissions and cutting down trees are not what is typically imagined in discussions of RETs. Consider, for example, the observation by one study participant that all opponents need to do to raise public concern is point to "smoke stacks and tree stumps". Critics are asking, how can burning something be 'green'? Industry proponents counter with expert testimony arguing bioenergy emissions are part of a natural "carbon cycle". That is, bioenergy does emit carbon dioxide, but this process is "carbon neutral" as new, growing trees absorb bioenergy emissions. Emissions from fossil fuels, on the other hand, only add to the stock of carbon in the Earth's atmosphere. These arguments were codified in federal policies that provided grants and loan guarantees, as well as in state policy in Michigan that defines biomass as a renewable energy resource, and requires state electrical utilities to achieve a supply portfolio of 10% renewable energy by 2015[6].

Along with policy and industry support, research universities also contribute to a renewed push for bioenergy development. As only one example, consider the scientific, engineering, financial, and other resources Michigan State University (MSU) has invested in bioenergy development. When I began my graduate studies in the Fall of 2009, I quickly discovered a growing network of MSU research and development was "aimed at developing and growing the bioeconomy" (Depolo, 2010 p. 25), including the BioEconomy Network, Office of Biobased

[6] Public Act 295, the Clean, Renewable and Efficiency Energy Act, was signed into law on October 26, 2008.

Technologies, the Great Lakes Bioenergy Research Center, Ag Bio Research, Forest Biomass Innovation Center, and numerous other research centers and teams of engineers, scientists, Extension specialists, and other experts. These groups, and their private industry partners, revisit technological designs implemented since the 1970s in order to increase efficiencies, reduce emissions, create a sustainable supply chain, and, more generally, to remove any "roadblocks for widespread acceptance of biofuels" (MSU Biofuels Research, 2012).

And across the state, private, state, and university foresters document how annual forest growth far exceeds harvest rates, while forestry industry representatives paint bioenergy development as an important market for less valuable forest products and a profitable means for maintaining healthy forests.

In short, for advocates, bioenergy technologies not only offer environmental and economic benefits, but nearly all the elements necessary for this project's success seem to be in place — that is, all accept widespread acceptance.

As local or regional newspapers first began reporting in the late 2000s, developers and supporters encountered resistance in a number of communities across several states including Michigan. Here, locally based citizens groups, environmental activists and residents were claiming local development threatened rather than enhanced their communities. Advocates claimed resistance would slow if not all together impede development[7]. While press reports made clear supporters and critics were responding to the future possibilities of bioenergy development in very different ways, it was less clear what caused divergent responses.

This dissertation develops and answers this question in three research papers, each of which centers around a particular puzzle. Following Abbott (2004), a puzzle emerges when we

[7] Frankena (1992) reports similar findings during the first round of bioenergy development across northern Michigan during the 1980s.

start to realize something is different than we would expect it to be. In a first paper I ask why proposed bioenergy is contested — especially in a state where industry has for generations used forest resources — and how is it advocated for and contested against? In paper two I ask how adjacent and similar places respond to the same bioenergy development proposal in entirely different ways — as a problem in some places, but a 'non-problem' in others. In the final paper I ask how projects that seemed likely to succeed end up failing. I do so by examining how the public context of controversies shapes their outcomes. Below I introduce these puzzles further. Next I introduce the data collected for this study.

Data Collection

Data used for this study was collected between 2010 and 2014. I began in 2010 by interviewing scientists, engineers, entrepreneurs, Extension specialists and other experts working for MSU and the state of Michigan in order to better understand how experts were imagining the future of bioenergy development. Through these meetings I developed a sense of where bioenergy projects were proposed, details about the range of technologies under development, and plans for improving the biomass commodity chain. I also interviewed State of Michigan regulatory agency staff from the Department of Environmental Quality and Department of Natural Resources to grasp how regulators understood the potential for a growing bioenergy industry to impact the environment and human health.

Central to my research were forty field interviews with actors involved with proposed bioenergy development in four northern Michigan communities. Rather than attempting to gather a statistically representative sample of residents of the community, I instead targeted interviewees who were actively involved in the project, and did so first by seeking out actors

actively engaged in public claimsmaking on the community's project (cf. McLachlan, 2009) via a content analysis of local news coverage. Additional interviewees were then identified via snowball approach. This included thirty mostly on-site interviews with local officials and staff, newspaper editors and reporters, community organizers, planners, concerned citizens, environmental advocates, representatives of Native American communities, Chamber of Commerce employees and others from the business community, and employees (active and retired) from key industries in each community[8]. Interviews were conducted 2010-2011, with follow-up and additional interviews in 2014. I digitally recorded, transcribed, and analyzed each according to the various conceptual frameworks that underscored each paper's premise. Interview details are listed in Table 1 the Appendix.

Beyond formal interviews, site visits also included less formal discussions with community residents — e.g., while having coffee in a local diner before a meeting, stopping in a restaurant, hardware store, library, touring an operational bioenergy facility, or waiting in an official's office. These informal meetings provided insight into the unique hopes, fears, and specific cultural resources people in different places were drawing upon in order to make sense of proposed future development.

Furthermore, I conducted a content analysis of local press coverage of bioenergy development. I examined press coverage both for discourse on bioenergy as well as for specific project details. I also obtained video recordings of public hearings as well as the planning meetings of one power company and transcribed these meetings, coding the content according to the research questions and conceptual frameworks of each paper. Finally, I gathered and analyzed personal letters, emails between officials and residents, technical documents and

[8] A small number of interviews were conducted over the phone rather than in person. See Table 1 in Appendix A.

reports, promotional pamphlets, policy papers and other materials pertinent to bioenergy development in these four communities.

Importantly, data collection and interviews took place at a time when bioenergy was an active issue in these communities. News stories quoting developers and local proponents made front page news, while community leaders met both privately and publicly to debate the project. Developers held town hall meetings flush with Styrofoam backed scaled diagrams while the claims of Extension experts and university foresters detailing ways bioenergy would (safely) impact area forests and water were reported in short editorials. In some communities, individuals pooled into concerned citizens groups, watershed groups began investigating the environmental impacts of bioenergy, and established environmental groups like the Sierra Club provided in-house expertise and hosted experts who raised questions about bioenergy's impacts on the environment and human health. In short, I collected data in places where bioenergy development was less an abstract idea — something that might happen in the future, here or elsewhere — than it was a pressing matter.

I examine this data collectively as public discourse. Following a practice theory approach (Swidler, 2000), I investigate public discourse as an impersonal space. By this I mean that the content of what anyone in particular says is not what is important for this study. Instead, my focus is on the collective understandings that allow particular statements to be meaningful in particular contexts. In sum, I examine this data for insights into the bounds of successful and acceptable ways of framing and justifying bioenergy in particular places and in public situations.

Puzzling Bioenergy

Data collected for this project suggests a disconnect between supportive and critical discourses. I found that discourse advocating bioenergy development was future orientated. Attention was directed to the goods bioenergy development will provide in time. Existing facilities, controversy surrounding their operation, and more generally, controversy over industry and the state's management of forests and water resources were framed as closed or 'settled' matters rather than issues of central concern. At the community level, however, bioenergy discourse also invoked a living history. Previously settled matters, such as the history of forest mismanagement in Michigan, were reexamined. That is, from the perspective of discourse in local places, the future of bioenergy was interpreted in terms of the local remembered histories, stories, and common understandings of previous interactions between industry, state regulators, and the natural environment. In short, state and national level discourse on bioenergy was largely positive, whereas local discourse was conflicted — the abstract social goods national discourse attributes to bioenergy development may be possible, but at the same time, bioenergy discourse in local places emphasized threats to forests, water, air, land, and quality of life.

I analyzed these disjunctures primarily in a first paper "Bioenergy Futures: Framing Sociotechnical Imaginaries in Local Places". Building on Jasonoff and Kim (2009), I examined national and state discourse articulating a "socio-technical imaginary" where political leaders envisioned a better future made possible through technological development and supportive policies. Indeed, policy-makers in Michigan and beyond envisioned obtaining a more clean, green, and prosperous future through the application of bioenergy technologies. In local places, some actors reiterated this imaginary. But at the same time, others offered an alternative vision, one full of smog, smokestacks, stumps, struggling and overstressed forests, and communities tied to an outdated energy technology. These divergent visions for the future are puzzling — it seems

as though actors were discussing two entirely different projects. To solve this puzzle, I argued that divergent visions for the future are linked with contradictory collective memories of place going back to over a century ago when Michigan's then White Pine forestlands were nearly entirely clear-cut.

However, while different imaginaries of the past and present were important for understanding the roots of controversy in Michigan, these processes seemed to play out differently in particular communities. In some places discourse on bioenergy was largely critical, while in others it was more supportive. The puzzle I unpacked in a second paper "Naturalized and Contested: Socially Constructing the Problematics and Non-Problematics of Renewable Energy Technologies" was this: how is it that two seemingly similar and adjacent communities respond to the exact same proposal in very different ways? This distinction was evident in the nearby communities of Rapid River and Mancelona townships. Discourse in Rapid River stressed how local bioenergy development would use local public resources for the private benefit of the "outside" developer. And yet across the county line in Mancelona, local actors responded to the project as important for the community's well-being. To solve this puzzle, I extended the first paper's findings, and investigated how community responses were linked with locally salient material realities including but also going beyond forests. To conceptualize this, I built on Swidler's (1986; 1995) notion of cultural resources. For Swidler, culture is less a private, mental phenomena than it is shared, material, and empirically observable. This includes the stories people tell and retell, the common knowledge and discourse salient for particular places, and, more simply, roadside and other signs, landscapes, and the material organization of a space. I developed this theoretical approach to investigate the industrial histories of both Rapid River and Mancelona townships and their surrounding counties — i.e., local industries, salient

pollution and related events, and the material organization of communities — as reflecting the cultural resources available to actors in different places. My argument was that these different material arrangements provide for the construction and selection of locally salient cultural resources that people draw upon when responding to locally proposed bioenergy development.

This second paper required a comparison of two places, and a focus on sub-surface differences between largely similar places. With this focus, more nuanced tensions within particular places were only superficially examined. A different approach was required for studying controversies around bioenergy development that divided communities. This was especially the case in Traverse City, a growing amenity community on the shores of Traverse Bay, Lake Michigan. The contrast between Traverse City and the other communities I researched can be summarized in terms of local actor's response to the term "environmentalist". In Mancelona, or Rapid River, "environmentalist" was a dirty word. Environmentalists were the people they were fighting against, the people who wanted to impede their development projects. In contrast, Traverse City might best be described as a blend of environmental attitudes and protectionism. Moreover, where a private developer had proposed the bioenergy facilities in the other communities I studied, Traverse City's own municipal power company proposed developing a small bioenergy facility. In short, it would seem that if a bioenergy project were to succeed anywhere, this would be the place. Instead, citizen and environmental activists were successful in turning the city commission against the project.

I investigated this in the third paper "How could people oppose renewable energy? Reframing controversy over biomass as a 'quest for confidence' requiring critics to 'close their eyes'". Here I borrowed from Boltanski and Thevenot (1999) in framing controversy as a public dispute over the legitimacy of a new technological development. My argument was that

controversy over renewable energy technologies is less about a collision of fundamentally opposed values, or a manipulative endeavor where interested actors attempt distract the public from potential risks — two common approaches to studying conflict — than it was an effort to engender the trust of actors who continue to express doubt. This was done by appealing to a limited number of higher social goods and justifying the validity of one's argument by producing material evidence in order to truncate debate.

The below three papers develop these arguments in depth. Later, in this dissertation's final concluding section, I both address ways these findings contribute to an emergent theory on community level responses to RETs as well as sketch possibilities for future research.

APPENDIX

Table 1: Field Interviews

#	Type of Group Represented	Interview Date	Interview Format	Duration	Community
1	Chamber of Commerce	March, 2010	Telephone	1.5 hours	Traverse City
2	Local Environmental Organization	April, 2010	In person, Traverse City	1.5 hours	Traverse City
3	Local Environmental Organization	March, 2010	In person, Traverse City	.5 hour	Traverse City
4	TCL&P Board, TC City Commission	April, 2010	In person, Traverse City	1.5 hours	Traverse City
5	Tribal Organization	April, 2010	In person, Traverse City	.5 hour	Traverse City
6	Local Environmental Organization	March, 2010	Telephone	1 hour	Traverse City
7	Concerned Citizen	March, April 2010	Telephone/In person, Upper Peninsula	3+ hours	Traverse City
8	TCL&P Board, City Commission	April, 2010	In person, Traverse City	1.25 hours	Traverse City
9	Tribal Organization	April, 2010	In person, Escanaba	1.5 hours	Escanaba
10	Developer	April, 2010	Telephone	.25 hours	Escanaba
11	City Commission	April, 2010	In person, Escanaba	1.5 hours	Escanaba
12	City Manager	April, 2010	In person, Escanaba	1.25 hours	Escanaba
13	Concerned Citizen	March, 2010	In person, Escanaba	1.5 hours	Escanaba
14	City Engineer	April, 2010	In person, Escanaba	1.25 hours	Escanaba
15	City Assessor	April, 2010	In person, Escanaba	.75 hours	Escanaba
16	City Commission	April, 2010	In person, Escanaba	1.25 hours	Escanaba
17	Township Assessor	March, 2010	In person, Mancelona	1 hour	Mancelona
18	Township Manager	March, 2010	In person, Mancelona	1 hour	Mancelona
19	Developer	February, 2010	Telephone	1 hour	Mancelona
20	Township Board	March, 2010	In person, Mancelona	.75 hours	Mancelona

Table 1 (cont'd)

21	Village President	March, 2010	In person, Mancelona	.75 hours	Mancelona
22	Regional Planner	March, 2010	In person, Mancelona	.75 hours	Mancelona
23	Regional Water Authority Employee	March, 2010	In person, Mancelona	.5 hours	Mancelona
24	Community Organizer	March, 2014	In person, Mancelona	1.75 hours	Mancelona
25	Newspaper Editor	March, 2014	In person, Mancelona	1.5 hours	Mancelona
26	Concerned Citizen	March, 2010	In person, Rapid River	1.75 hours	Rapid River
27	Concerned Citizen	March, 2010	In person, Rapid River	1.75 hours	Rapid River
28	Concerned Citizen	March, 2010	In person, Rapid River	1.75 hours	Rapid River
29	County Assessor	March, 2010	In person, Rapid River	.75 hours	Rapid River
30	Township Board	March, 2010	In person, Rapid River	1 hour	Rapid River
31	Township Board	March, 2010	In person, Rapid River	1 hour	Rapid River
32	Township Board	March, 2014	In person, Rapid River	1.5 hours	Rapid River
33	Environmental Organization	August, 2010	Telephone	.5 hour	NA
34	Environmental Organization	August, 2010	Telephone	.5 hour	NA
35	Environmental Organization	September, 2010	In person, Grand Rapids	1 hour	NA
36	Industry Interest Group	September, 2011	Telephone	1.5 hours	NA
37	Statewide Environmental Organization	November, 2010	Telephone	.5 hour	NA
38	MSU Forester	July, 2010	Telephone	.5 hour	NA
39	Michigan DEQ	March, 2010	Telephone	.5 hour	NA
40	Michigan DEQ	April, 2010	Telephone	.5 hour	NA

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CHAPTER ONE

BIOENERGY FUTURES: FRAMING SOCIOTECHNICAL IMAGINARIES IN LOCAL PLACES[9]

Introduction

Science and Technology Studies scholars have long argued for a deeper appreciation of the way technologies embody political, moral, and social choices along with their specific technical capabilities. Jasanoff and Kim (2009) coined the term "sociotechnical imaginaries" to draw attention to another important technological realm: that of the imagined future. Sociotechnical imaginaries draw attention to the way national actors legitimate science and technology investment, design, and deployment through mingling policy action with collective visions of a better future made possible through technoscience. This paper focuses on sociotechnical imaginaries for renewable energy technologies (RETs) such as biomass derived energy, or bioenergy. Imaginaries for bioenergy emanate from state actors who envision a future where energy and economic interests will be met with homegrown resources. Bioenergy technologies are imagined as providing "green" means to address salient social problems such as the nation's dependence on foreign and domestic fossil fuel supplies, climate change, pollution, environmental degradation, national energy security, and (rural) economic depression. The term imaginary connotes the way that these visions provide an attainable end goal, or collective vision of a feasible, desirable future social order, provided by technological projects.[10]

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[9] This chapter is a revised version of an earlier publication: Eaton, Weston M., Stephen P. Gasteyer and Lawrence Busch. 2014. "Bioenergy Futures: Framing Sociotechnical Imaginaries in Local Places." *Rural Sociology* 79(2):227-256. Copyright 2013 by the Rural Sociological Society

[10] The notion of imaginaries builds on a 20-year academic literature that started in political sociology (Anderson 1991) and political philosophy (e.g. Taylor 2004) but has been picked up by political geographers and environmental historians (e.g. Davis 2011) in describing the colonial and postcolonial development of landscapes.

Attainment of these futures, however, has been problematic. More than simply the product of production processes, specific RET projects run into conflict with actors who have different visions and goals. As with other socially and politically important technologies, advocates of RET projects are sensitive to the concerns and desires of the 'public', who are seen as either welcoming or resistant to technological deployment (Walker et al. 2010). When surveyed, people voice support for transitioning away from conventional and toward renewable sources of energy (Devine-Wright 2011; Upreti and van der Horst 2004; van der Horst 2007). At the same time, attempts to achieve specific imaginaries through technological projects become sites of contest and conflict. This is certainly the case for bioenergy, where a groundswell of resistance, especially in communities where sitings are to take place, challenges and in some cases impedes proposed developments. This phenomenon has been defined in different ways, including 'NIMBY' (not in my back yard) attitudes, where opponents are assumed to be acting in their own self-interest (Burningham, Barnett, and Thrush 2006), the "social gap" (Bidwell 2011), or the "value-action gap" (Barr 2004, cited in van der Horst 2007), wherein "certain services are in principle considered beneficial by the majority of the population, but that proposed facilities to provide these services are in practice often strongly opposed by local residents" (van der Horst 2007:2705). However, in other instances, local actors welcome development. Devine-Wright (2007) points out that research on the local experience of resistance and consent is limited and a genuine understanding of the dynamics of public acceptance remains elusive. To address this gap, we argue that sociotechnical imaginaries play a crucial role in conflicts over RETs. While the State and interested actors work to convert imagined futures into reality, local actors define and contest the ways bioenergy may or may not contribute to a better future. These definitions and contestations are related not only to imagined futures, but to different interpretations of

environmental histories (Davis, 2011; Gasteyer and Flora, 2000; Gasteyer et al. 2012). We build upon the concept of imaginaries to demonstrate that the material world, such as the forests that supply woody biomass for bioenergy, is always constructed ideationally. There are no purely material or ideational things. Instead, the material world is constituted symbolically, so the world is always both (Busch 1996). In short, alternative imaginaries are woven around material resources and ideational definitions in ways that challenge extant framings of both the past and the future.

Using a frame analytic approach, we demonstrate the ways actors in four northern Michigan communities frame the national imaginaries woven into local bioenergy proposals. While describing multiple collective action frames employed in service of the imaginary, we focus on bioenergy as "wood for energy" to exemplify how different actors frame the same concept differently. We employ Mooney and Hunt's (2009) analysis to show how these frames are "keyed" toward either more "flattened", institutionalized interpretations or toward "sharpened", more critical understandings. We argue that flattened keys reinforce and reproduce the extant assertions of the national imaginary of bioenergy whereas sharpened, critical keys problematize and challenge the imaginary. As such, sharpened keys are linked more with social movement oriented actors and groups while flattened keys emanate from more institutionalized actors and groups (Mooney and Hunt 2009).

Our aim is to develop a better understanding of the ways national imaginaries are re-imagined and contested as well as reproduced in different ways by different actors. We ask: In what ways are national sociotechnical imaginaries interpreted and acted upon in local places where specific technological projects are to be sited? To what extent do local actors simply adopt the bioenergy imaginary in local places? Is there resistance? Re-imagining? If so, how do these

processes happen? To develop our responses to this line of inquiry, we first demonstrate the way bioenergy technologies have become implicated in a national sociotechnical imaginary. We then present "wood for energy" as one way the imaginary for bioenergy is framed and the way this frame is keyed. We close with a discussion of implications for analyzing the way local communities experience and utilize national sociotechnical imaginaries.

Bioenergy Technologies as Sociotechnical Imaginaries

Jasanoff and Kim (2009:120) define sociotechnical imaginaries as "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects." Sociotechnical imaginaries then are the particular futures that state actors believe ought to be obtained through technological innovation. The term imaginary conveys a vision that is real in that interested actors are working to bring about these new forms of order and life. Imaginaries in this sense do not rest in individual minds but are collective interpretations of a social reality (Program on Science, Technology & Society 2012). Jasanoff and Kim (2009) use the concept to discuss the imaginative resources nations use to relate nuclear policies to the public good. They present the comparative case of nuclear power policies in two countries, the United States and South Korea, to show how different imaginaries of social life and order are co-produced along with the goals, priorities, benefits, and risks of science and technology. Scholarship on sociotechnical imaginaries, however, has little to say about the way national imaginaries are interpreted locally.

The sociotechnical imaginary for bioenergy posits using biomass to supply the nation's chemical, energy, and raw material needs. As codified in Michigan state law,

> "Biomass" means any organic matter that is not derived from fossil fuels, that can be converted to usable fuel for the production of energy, and that replenishes over a human, not a geological, time frame (State of Michigan 2010b).

Woody biomass includes materials from woody plants -- trees and shrubs that can be grown intentionally or sourced from existing supply chains (Tabak 2009). This includes materials from "precommercial" thinning designed to improve forest stands, wood wastes and residues from the processing of wood products or paper, fast growing hybrid willow and poplar, as well as trees harvested specifically for woody biomass. Unlike conventional energy resources, woody biomass bears the promise of cleaner, renewable[11], and therefore sustainable energy production that may limit the greenhouse gas emissions responsible for climate change. As explained by people at the MSU BioEconomy Network (n.d.), "by harnessing these resources, nonrenewable resources such as petroleum and coal will be replaced by plant materials and other organic matter. In this way, humans can replace resources as fast as they are used, unlike in today's nonrenewable economy." Indeed, woody biomass feedstocks can be combusted in much the same way as coal to produce baseload electricity, heat and steam, the basis of the modern electric grid system. Woody biomass then promises an energy and product future less hindered by the present day limits of fossil fuel based energy technologies. However, these promises are limited biophysically. As compared with coal, woody biomass has a lower energy content, is bulky, irregularly shaped, prone to self-ignition, and, therefore, more costly to store and transport (Simpkins 2006; Tabak 2009). Moreover, woody biomass is currently relied upon by existing industries, such as paper

[11] As long as wood resources are sourced in accordance with standards for sustainable harvesting practices (Simpkins 2006:29).

mills and operational power plants. These attributes present significant socio-technical-political hurdles for those whose aim is increasing woody biomass implementation for power generation.

Policy-makers funnel this mix of capabilities and possibilities into a future vision where bioenergy provides the means to address some of society's most critical issues. This vision is supported by government initiated and funded studies about the capacity of biomass to solve these and other problems. The 2005 U.S. Department of Energy and U. S. Department of Agriculture study called "Billion Ton Vision" (Perlack et al. 2005), is a pivotal example[12]. According to this study, meeting the target set by the U.S. Congress for replacing 30% of the nation's present petroleum with biofuels would require 1 billion tons of biomass resources annually[13]. Tasked with addressing whether the nation's forest and agricultural lands could supply this need, the report found that these targets were indeed attainable.

The report's findings formed the basis for mandates set in the 2005 Energy Policy Act (developing the first one-billion gallons of cellulosic ethanol and for a Renewable Fuels Standard) and the Energy, Independence and Security Act of 2007 (which updated the national Renewable Fuels Standard). These and other federal and state policies also support R&D on emerging technologies and processes for attaining this vision. On October 6, 2008, Michigan established a Renewable Energy Standard requiring retail electric providers to achieve a supply portfolio that includes at least ten percent renewable energy by 2015 (State of Michigan 2008). This supportive policy environment contributed to the proposed siting of multiple woody biomass energy facilities in forest-nested rural communities across the northern parts of the state.

[12] An updated resource assessment (U.S. Department of Energy 2011) also finds that there is sufficient biomass feedstock in the United States to meet bioenergy policy goals.
[13] In accordance with current policy, biomass is the only resource capable of producing liquid fuels that qualify as renewable.

The imaginary of bioenergy embodies efforts to address the complex challenges of climate change with technological innovations that change the feedstock of energy itself. Through bioenergy technologies, society can immediately take steps toward a better future with supposedly minimal costs. In other words, by obscuring the obstacles, or at least moving them away from the focal point, imagined futures can justify technology investments and policy agendas (Jasanoff and Kim 2009). Building on Jasanoff and Kim (2009), our analysis calls attention to the way the national imaginary for bioenergy is received and reproduced as well as re-imagined by actors in local places where bioenergy technologies are to be sited.

Framing, Sociotechnical Imaginaries, Social Movements and Alternative Pathways

As discussed above, sociotechnical imaginaries are collective visions of desirable and attainable futures that accompany technological projects emanating from national centers. As such, sociotechnical imaginaries are themselves conceptually distinct from problem frames: "they are less explicit, less issue-specific, less goal-directed, and less politically accountable" (Program on Science, Technology & Society 2012). However, as our intention here is to investigate the way local actors interpret, interact with, and respond to the national bioenergy imaginary, we ground our analysis of local responses in frame-analytic approaches (Mooney and Hunt 1996, 2009; Snow and Benford 1992; Wright and Reid 2010). It is important to point out that conceptualizing technological projects as imaginaries, and frames as social constructions, is not to argue that they are somehow not real. Sociotechnical imaginaries are most certainly 'real', as opposed to being 'imaginary', in the sense that State actors have made concrete policy moves to enact their collective visions. Frames have been conceptualized differently. For instance, Benford (1997) argues frames do not exist independently of the actors who construct them.

However, as the Thomas theorem states, "if men define situations as real, they are real in their consequences" (Thomas 1928:572). As social constructions[14], frames indeed have real consequences. For instance, social movement scholars use frame-analytic approaches to better understand and explain the meaning construction that accompanies collective action. Framing processes work to achieve three tasks essential for mobilization: the first, diagnostic framing, is the identification of some event or aspect of life as problematic. Second, prognostic framing develops a proposed solution to the problem and specifies courses of corrective action. A third task, motivational framing, is a call to arms or rationale for engaging in corrective action (Snow and Benford 1988). Variation in the prospects for the consequences of collective action depends on achieving each of these three framing tasks.

Movement scholars have shown that certain broad, or "elaborated master" frames, such as sustainability and renewable energy frames, act as consensus frames in that they elicit "nonreflexive consent" (Gamson 1995). Using the consensus frame "food security," Mooney and Hunt (2009) demonstrate how collective action frames housed within the consensus are themselves interpreted in variable ways. Elaborating Goffman's (1974) concept of "keying," they show how collective action frames may carry both "sharpened," critical interpretations, as well as extant, "flattened" interpretations or "keys". Treating frames as "sharpened" or "flattened" rather than "sharp" or "flat" emphasizes the dynamic quality of framing activity (Mooney and Hunt 2009), which is to say that frame keys are tendencies rather than completed and reified stances. Keying provides a conceptual link between the process of frame construction and issues of power. For instance, Mooney and Hunt find that the sharpened and flattened

[14] To say that something is socially constructed is not to argue that it is somehow unreal. Nearly everything in our contemporary world is socially constructed, from buildings to institutions. Instead, the notion of social construction sheds light on the way the thing or issue at hand is merely one of many possible ways reality could be brought into existence.

analogies correspond with "the contentious politics often associated with social movements as a struggle between institutionalized power and challenging 'outsiders'" (2009:471). We use the notion of keying to help tease apart the way different alignments of actors embrace, cope with, re-imagine, or struggle against the national sociotechnical imaginary of bioenergy.

Framing processes are constrained by the particular cultural contexts within which they mature (Swidler 1995; Snow and Benford 1986; 1988). The cultural contexts we are interested in here are community responses to the sociotechnical imaginary accompanying proposals to site bioenergy technologies in potential host communities. New energy technology proposals can generate "technology movements" that respond not to long festering grievances, but to "suddenly imposed grievances" (Walsh, Warland, and Clayton-Smith 1993:36). Analyzing outcomes in this context is clearcut: either the new plant is sited or not, and contending movements and countermovements either win or lose. Swidler (1995) discusses cultural contexts differently, drawing attention not only to outcomes but to social positions. For Swidler, "it is the conflict itself, the need to separate allies from foes and the need to turn general predispositions into specific decisions, that structures ideological debate" (1995:35). The context of siting contests therefore crystalizes ambiguous individual perceptions into solid public stances (ibid.).

The way the cultural context of siting disputes tends to corral individuals into competing coalitions complements an analysis of frame keys in that positing more "sharpened" or "flattened" keys presumes a tendency to stress particular public stances. The literature on political sociology and risk demonstrates the relationship between power and particular stances on technology development. Scholars have pointed to the importance of perceptions of degrees of control, choice, or voluntariness in the context of technological risk conflicts (Renn 2008). Groups that feel in control are more willing to take risks, while those who feel little control are

more risk adverse (Slovic 1993). Freudenburg and Pastor (1992) argue that questions of (perceptions of) social control are unique for situations of technological risk. For instance, in some risk contexts, such as personal investment, individuals feel they can control their own financial decisions. "By contrast, when a farm family learns that a toxic waste incinerator will be built nearby, they may have no real choice but to accept or protest the decisions that have already been made by others" (Freudenburg and Pastor 1992:391). This highlights the political and discursive struggles embedded in technological risks and the way technological development may impose risks on citizens and other risk bearers, thereby "sharpening" or "flattening" frames.

At the same time, individuals may privately remain ambivalent, even while coalitions harden their public stances. Frames and frame keys are therefore not about "people trying to represent as accurately as possible the stable schemata they have in their minds" and are instead relational, situational, used strategically or drawn upon in response to the cultural context (Dewulf and Dercon 2004:185). Like the cultural approach emphasized by Swidler (1995), the context of community response to the national imaginary of bioenergy we analyze in this paper takes place in a specific place and time, namely in communities where a new energy technology either will or won't be sited locally. This reflects alliances and visions for the future that depend on one outcome or the other. The framing and keying processes that participants in this study undertake are continuous and ongoing and therefore temporarily stabilized only in the sense that the context of siting a new plant requires groups to crystalize and communicate their vision for the future of bioenergy.

Hess (2005; 2007) coined the term "object conflicts" to describe the social tensions and controversies based in differing definitions and design possibilities for technological innovations and sitings. The concept focuses attention "on how the design choices between different

variations of similar objects become sites for conflict among the range of organizational and individual actors that develop [from social movements] to established industries" (Hess 2005:521). Moreover, Hess points out that object conflicts over technological innovations involve complex arrangement of multiple actor groups. Such is the case in this study, where, as discussed below, actors from environmental movement organizations, the state, industry, research institutions, and civil society, struggle discursively over not only the definitions and meanings of bioenergy facilities and their accompanying imaginaries, but politically over who decides the future of bioenergy. We argue that this is not only a contest over the future but over the past, over the vision of how resource managers and policy makers have succeeded or failed in protecting the environment and the interests of the public. By centering this research on bioenergy, we explore the range of future possibilities actors evoke from the same "object".

Background, Data and Research Methods

Our data is derived from interviews with community members as well as a content analysis of media and other documents. Interviewees and communities were identified over several phases. We began in late 2009 by contacting scientists, engineers, Extension Educators, and others at Michigan State University (MSU) working on bioenergy to identify where new sites were proposed and the arguments that accompanied technological development. Press reports from regional and local media sources were then used to identify specific communities and to gain preliminary insight into the claims made about what bioenergy might mean for these communities. We also contacted the Michigan Department of Natural Resources (MDNR) and a statewide biomass industry interest group to access information on both past and current siting proposals.

In this way we identified four communities where bioenergy was either actively or very recently proposed. To protect confidentiality, we use the following pseudonyms to label our study sites: Baytown, Forest Township, Lakefront, and Midtown. These communities are attractive to developers as they supply the costly infrastructure, services, and workforce needed for energy production, and their close proximity to forests and forest resources is necessary to keep the costs of transporting forest resources manageable (Simpkins 2006: Tabak 2009). In each community, emergent coalitions worked to site new bioenergy facilities locally, while at the same time, to varying degrees, concerned citizens and environmental activists sought to transform or impede the local siting. From early 2010 to early 2011 we interviewed a total of 37 key actors in these networks, including city officials, industry and academic forestry and energy experts, economic developers and planners, members of statewide and local environmental organizations and interest groups, loggers, foresters, and citizens -- all people grappling with the promises, hopes, and doubts that accompany identified and championed paths to prosperity. Initial interviewees were identified through local press reports and others were derived from a snowball process. In this way, we concluded interviews in each community once it became clear that we had spoken with nearly every person or group identified by previous interviewees. Interview questions, such as “Why is biomass right or wrong for your community,” or “Do you think of your community as a renewable energy community” were designed to elicit actors’ interpretations of the sociotechnical imaginary of bioenergy energy. Largely on site interviews of 30-90 minutes were conducted in the respective communities. They were recorded, transcribed, and coded following a grounded theory approach (Corbin and Strauss 2008).

In each community, bioenergy was proposed to residents by either a small group of local elected community officials or by private developers. These promoters in turn cited national level claims as to the environmental, economic, and energy benefits of bioenergy.

In Baytown, a growing amenity community, the city's own municipal power company proposed bioenergy as a means to supply local, renewable power to the community. A loose coalition of concerned citizens and activists, however, presented enough of a political threat to the local establishment to derail the proposal.

In rural Forest Township, a regional private gas and oil developer approached the community about siting a new bioenergy facility locally. Here both township officials and a group of concerned citizens argued the bioenergy plant would use local resources for the benefit of others outside the community, a position which successfully deterred further actions by developers. Instead, the same developers approached Midtown, a small community just north of the original site, about locating a plant in their inactive industrial park. Here community leaders saw an opportunity for much needed economic development in their shrinking community. While some area residents raised concerns during public air permit hearings, the plant's design met required standards and permits were granted. To date, however, despite efforts by local leaders to procure special tax benefits for the project, developers have failed to attract investors or secure power purchase agreements with utilities and, as a consequence, the project is currently inactive.

In Lakefront, local leaders saw bioenergy as a means to sell their unprofitable municipal coal plant to private developers who would use the new renewable federal and state energy policy incentives to retrofit the facility to burn woody biomass -- which was assumed to be a plentiful and feasible resource in this community with a long history of logging, paper mills, and

forest products industries. Some residents and organizations voiced opposition, yet this was largely in response to the selling of the city's property and the prospect of job loss and had little to do with concerns over utilizing wood for energy. To date the sale of the plant is still pending.

Taken together, these four communities provide an illustration of the diversity of conflicting claims and frames for the imaginaries that accompany bioenergy development. As the following sections demonstrate, discourse on bioenergy is not neatly bounded by the geography or specific context of these four communities. Instead, actors in these places are responsive to the actions of others outside their community, such as the reports of university scientists and regulatory spokespersons, especially as reported in the regional media. We therefore present our data (as it was presented to us, especially during interviews) in the form of discourse that shifted back and forth between community specific references along with discourse concerning bioenergy as a regional, statewide, national, as well as global project.

Additionally, the findings presented here are derived from several secondary sources including our content analysis of local media reports and editorials, as well as technical documents including wood procurement studies, state and federal policy documents, technical and financial materials provided to us by interviewees, and materials produced to supplement formal and informal meetings and hearings on bioenergy in the region. This analysis represents the claims of key actors engaged in discourse and actions intended to bring bioenergy into being in particular places -- or to alter these plans, including impeding local deployment -- during a time when a new local siting was a very real possibility.

From these data we identified at least four salient frames and accompanying frame keys as presented in Table 2 in the Appendix. While the remainder of this paper will give attention to only the "wood for energy" frame due to space constraints, it is important to recognize that this is

only one part of a broader range of claims and issues raised. The "economic justification" frame is central to siting disputes in these communities. For promoters, bioenergy technologies provide rural economic development, while critics raise questions about alternative uses of the same resources to supply jobs and economic development. Disputes over standards and expertise are central to technology development and movements. In a flattened key bioenergy fits existing regulatory structures, such as the air permits issued by the MDNR, and therefore the technology should be seen as sufficiently safe, efficient, and acceptable. Sharpened keys argue existing standards and definitions are inadequate due, for example, to the complexity and emergent state of carbon dioxide and emissions science. Therefore, higher standards should be set for bioenergy. Ecological justifications are keyed according to the value given to claims concerning the impacts of a new bioenergy regime on pollution and land degradation both locally and beyond. Flattened keys assert a zero sum game for burning wood versus coal -- if bioenergy is rejected, more coal is the result. Sharpened keys, on the other hand, claim burning woody biomass is the equivalent of burning the biosphere itself.

Michigan's Forests: The Wood for Energy Frame

> For many, it is more satisfying to look at a forest and imagine a wildlife sanctuary or a source of wood to build homes and furniture -- or to look at a vast expanse of grain and see a source of food or a way station for migrating birds -- than to look at forest and field and see "biomass," which is just another term for "fuel for the fire" (Tabak 2009: 121).

As suggested in the above epigraph, the varied meanings associated with trees and forests resonate deeply and in different ways. The "wood for energy" frame focuses on future

possibilities for forests as resources for energy production; distinct domains that bioenergy technological projects mesh together. Using wood for energy is certainly not a new idea. However, the process of labeling and defining certain forms of forest-derived matter as woody biomass, which in turn is defined and codified as a source of renewable feedstock capable of fueling large scale energy production technologies, challenges both currently accepted forest and land uses and imaginaries.

We explore these tensions by presenting struggles over three issues falling within an energy production frame. First, should forest matter be used for large-scale electricity production? Any discussion of the way people interpret bioenergy must take into account both present-day expert accounts as well as symbolic interpretations (McLachlan 2009). Second, what will happen to the area's forests, and more broadly, the ecosystem, if new bioenergy plants are sited? Finally, exactly what is woody biomass? Under what conditions do forests or trees qualify as biomass? Discussion of these topics get at what a bioenergy RET ought to be, and therefore represent a range of moral considerations that sharpen or flatten this frame's key. We will address these differences through comparing the flat frame key we are calling "resourcism" and the sharp key of "threats to the forests," which are both described below.

Resourcism: The Flat Key

Experts and specialists regularly point out that the sheer volume of wood in Michigan is growing annually. Current harvest rates are much lower than growth rates, partially due to an exodus of the forest products industry which has relocated to the southern U.S. and South America which offer longer growing seasons and often more conducive regulatory structures.

The notion that the decline of harvest represents resources underutilized for development that ought to be redirected toward bioenergy constitutes the "flattened key" that we call "resourcism."

The closure of a particleboard factory in mid-Michigan in early 2006, a major regional buyer of forests products, is a key example. Community leaders interested in bringing bioenergy projects to their area, such as those in Midtown, cited this case as evidence not only of the availability of wood, but of the commensurability of new bioenergy facilities with existing, and therefore presumably acceptable, forest management regimes. The village president explained how wood was locally available and in need of use:

> I've heard people say 'how are you going to get wood?' Well [the particleboard factory in mid-Michigan,] this biomass plant will use 10% of the total amount of wood chips that they used over there. Well, what are they doing with the wood chips that they used over there? Are they just staying out in the woods and rotting cause nobody's buying them. The ten percent that we're going to use of that total 100%? Very small. I'm hoping that they can get their chips right here locally and prosper from that, get a better deal on buying chips, and create a little revenue for the locals that do have some property.

Claims like these contribute to the normative argument that not only is wood available, but increasingly underutilized. In each of these communities, supporters argue many of the concerns raised by critics have already been adequately addressed, perhaps many times over. For instance, some interviewees stressed the depth of their own investigations, industry and government feasibility studies, consultations with forestry and industry experts, and the transparency of their planning processes, pointing out that they now know the one right course of action: forests can

supply the resources and indeed should be supplying the community's energy needs. Moreover, state and regulatory actors endorse these siting efforts and accompanying policy frameworks and regulatory regimes, which further legitimize bioenergy technologies by bringing them within the established order, set by institutionalized actors. As a city official in Baytown told us,

> [biomass is] a renewable resource and no one's saying it's not. I'm telling my friends, you can fight us and stop us, but you really should be fighting Lansing, fighting Washington, and changing the regulatory issues around biomass if you don't want biomass because currently it's listed as a renewable resource.

Furthermore, not only is woody biomass available, attainable, and renewable, but by using resources that are currently being wasted, implementation will not interfere with the needs of other forest based industries. In short, while many technical and social hurdles remain, the key environmental and economic fences can be scaled.

This specific diagnostic framing opens a space for imagining bioenergy RETs and industries as turning overgrown and therefore wasted forests into energy. This perspective closely resembles Gifford Pinchot's "resourcist" views on conservation (Callicott and Mumford 1997:34). According to Pinchot (1947), "The first principle of conservation is development, the use of the natural resources now existing on this continent for the benefit of the people who live here now. There may be just as much waste in neglecting the development and use of certain natural resources as there is in their destruction." There is a strong similarity between Pinchot's arguments and the claims of some forestry experts, such as specialists with MSU's Biomass

Innovation Center, who (speaking here in a regional news publication) claim overlooking wood for energy is a wasteful act:

> It seems wasteful to not use wood for an energy source, when it's inexpensive, renewable, abundant, clean, and keeps our jobs and dollars local...Michigan, … represents one of the largest 'wood baskets' in the nation, and this wood resource is among the most underutilized in the country (Superior Chronicle 2011).

The mayor of Lakefront extends this frame's key with claims about the non-disruptive nature of utilizing what currently is considered waste:

> We're in [northern] Michigan where our one raw material is plentiful, be it wood [or other] forest products that they are currently leaving out on the forest floor to rot away. None of the product will compete with either the food chain or the commerce chain such as the, you know you're not going to take the veneer logs...and burn them, you're going to use the garbage. You're not going to take the good pulp wood away from the paper mills. So it's kind of taking what's left and reusing. And this is a project that can happen today.

However, the use of terms such as "garbage," "waste," and "rot" raise the ire of loggers and foresters. For these actors, woody biomass is less an emerging RET feedstock than an extension of their long established line of work. A logger interviewed about woody biomass quickly pointed out that there is little actual waste in logging operations. The tops, limbs and

other “waste” are often touted as being available to justify new bioenergy proposals. But both the ecological and economic hurdles of removing them from the forests show a tension within assumptions about waste. These hurdles include damage to surrounding trees, the high expense of selective harvesting, and the existing uses for logging residues, or ‘slash,’ such as providing traction and paths on the wet forest floor for heavy equipment. From this perspective, whole tree harvesting operations make more sense as they often target “low quality” (Tabak 2009:109) trees with lower economic values more in tune with bioenergy markets that require low-cost feedstocks to compete with coal. So while waste is problematized within this key, The Michigan Woody Biomass Harvesting Guidance (State of Michigan 2010a:6), a voluntary standard composed by a wide range of statewide stakeholders, illustrates the overarching consensus:

> Current and developing technologies...provide opportunities to reduce reliance on fossil fuels, and reduce the amount of wood products entering waste streams and landfills. As interest continues to grow and market opportunities expand for woody biomass, it is crucial that harvesting and removal be done using sustainable forest management principles and practices.

In a flattened key then, bioenergy feedstocks should be comprised of whatever is not being utilized by forest industries, in accordance with existing standards and regulations codified in state and federal statues as well as voluntary forest certification systems (State of Michigan 2010a). And while the constantly declining forest-based industry theoretically puts more trees on the market, paradoxically the loss of the industry itself, its infrastructure especially, makes obtaining woody biomass increasingly difficult. New supply chains must be constructed to fuel

proposed facilities. Therefore, bioenergy development represents a new means to continue long established goals of sustaining both industries and livelihoods.

Imagining the Public Response

Arguments supporting bioenergy rest on the assumption that the public is largely unaware of these benefits and, therefore, much of the negative response to new proposals is due to ignorance. Loggers, foresters, Extension Educators, scientists, and others observed and interviewed for this study often assumed the public lacked knowledge of the scientific facts and principles of bioenergy and forest management and that it was precisely this deficit of knowledge that underpinned resistance. In reference specifically to forests, interviewees discussed the "knee jerk" negative reaction much of the public supposedly has for cutting trees as well as the "nostalgia" some environmental groups harbor for old-growth forests. This is to say that the public was imagined as harboring specific concerns and misunderstandings that would need to be addressed by promoters if bioenergy was to be successfully implemented (cf. Walker et al. 2010). And if the public is largely misinformed or misguided about the environmental impacts of bioenergy, the situation could and should be remedied through efforts to educate the public about the facts of today's forest industry in order to garner support. However, gaining public understanding or support was not always seen as necessary, and some interviewees argued that some degree of public resistance to development is inevitable. For instance, as explained by the head of the Baytown Chamber of Commerce which supported the development of bioenergy across the region,

> In [Forest Township], no matter how you tried to explain it in terms of what this plant was going to be, how it was going to create, you know thirty direct jobs [and] up to two hundred indirect jobs supplying the plant, people either didn't get it or didn't want to get it because of...you know, the typical fear of the unknown.

The assumption here is that no matter what the proposed course of action, some people are going to be unsatisfied, which in turn justifies turning a deaf ear to supposedly unreasonable critics.

To bioenergy advocates, there is actually little that is 'unknown' about the technology. Foresters, loggers, and Extension Specialists across the region, for instance, often reminded us bioenergy was really nothing new, but instead was a well-established technology that had been providing heat and energy for a long time. Criticism and opposition, in turn, results from the tendency of uninformed -- or misinformed -- people to fear change. This is not a new charge. Since the late 1970s, wood-fired electric plants have been discussed, developed, contested, sited, and at least seven such plants currently operate in Michigan (Frankena 1992). Beyond this, paper mills have been using excess woody residues to power their operations for at least a century. New proposals again invigorate long-held discussions and conflicts over using wood for energy.

Threat to the Forest: The Sharp Key

While loggers, foresters and other bioenergy industry actors, such as those who drafted the harvesting guidelines, develop scientific, commercial, and professional relationships with 'natural resources,' other interviewees, including some elected officials, interest and environmental group spokespersons, and mobilized citizens, challenge bioenergy plans. They do so with arguments both opposed to using wood for energy and supportive of alternative

possibilities for utilizing forests. As such, local bioenergy proposals catalyze discussion of a wider range of issues pertaining to existing forest management regimes, perceptions about the history of forest management, and how the forest ought be managed in the future. In doing so, the assumptions implicit in the national imaginary, and reproduced in the flattened key framing of the imaginary, are unpacked, unsettled, and contested.

A bioenergy plant currently operating near these communities helps illustrate the way the wood for energy frame is "keyed". On the one hand, the plant is claimed to be ideal for local industrial and economic development. As explained by a planner working with Forest Township and Midtown who investigated the existing plant, "the report back was that they appear to be fairly clean facilities, not a lot of smoke bellowing out, almost looks like a white steam in a sense, doesn't appear to be a lot of noise, and so we were interested." On the other hand, citizen activists in Baytown opposed to new sitings used photos of the same plant, taken from the air, to demonstrate to others through their website and through local media coverage what they argued to be visible threats to forests and human health. Instead of an environmentally benign renewable energy project, opponents point to nearby clearcut forests, piles of wood chips derived from whole, green (as opposed to dead or diseased) trees, a large, noxious plume, and the toxicity of the ash that must be hauled away to a landfill. As an environmental lawyer in Baytown with experience in previous siting disputes in the region told us,

> There has already been a link made between biomass and the burning of other things than just waste wood from forestry. People are concerned about what happens when that waste wood is wet and the production of dioxins that result from the incineration of wet feedstock, and they've linked it to concerns about heavy metals. They have, most

> importantly, linked it to the possibility of demolition wood, not from this region necessarily, but mostly from other parts of SW or SE Michigan, and the introduction of heavy metals, lead, paints.

Moreover, activists recount stories of local private landowners in the area who clearcut their timber stands to supply the biomass market made possible by this and other plants. Environmental organization and industry spokespersons we interviewed claimed that existing plants already consume much of the area's available supply of woody biomass. This raises questions about exactly how availability ought to be defined. For activists, the siting of additional bioenergy plants would therefore require increased harvesting in already overstressed forests.

For some people and groups in these communities then, existing facilities and new proposals become implicated with other risks that may accompany bioenergy development. Bioenergy proposals animate a range of perceived threats and sharpen the frame by clarifying previously ambiguous and uncertain events and experiences, thereby invigorating them with new meanings (Snow et al. 1986). For instance, the prospects for local bioenergy development were evaluated through the lens of past and ongoing experiences with energy and industrial development. For example, both a group of concerned citizens as well as local elected officials in Forest Township and Midtown pointed to a legacy of pollution they attributed to these developments in their region, such as: trichloroethylene (TCE) plumes (see The Midwestern Hazardous Substance Research Center n.d.); experiences working and living with the natural gas and oil boom of recent decades; the Environmental Protection Agency Superfund status of the site where the new plant was to be built (see U.S. Environmental Protection Agency n.d.); the

county's decision to accept and bury ruined cattle sickened by contaminated feed; and the disputed bottled water industry in the area. Additionally, as the new plant proposal was made public, a waste handling company near these communities announced its intention to incinerate municipal garbage for the production of power.

With the advent of new bioenergy proposals, these disparate events were given new meaning. Again, for some residents in Forest Township and Midtown, bioenergy was one more resource and energy development project elites, authorities, and other 'outsiders' were eager to sell locals on; one more means of extracting, mining, and otherwise hauling away local resources for the benefit of others and to the detriment of the local environment and community. Concerned citizen interviewees articulated these experiences, explaining how they felt victimized and taken advantage of by bioenergy developers: "They don't care about me, they don't care about [other residents], they don't care what happens downstream from the power plant, and we're paying for it!"

However, despite these experiences with pollution, extraction, and neglect, area residents spoke with pride about the area's clean air, bright, "pristine" rivers, streams, lakes, and forests. While degradation had taken place in the past, these were now crystalized as local possessions in need of protection from outside interests and industries attempting to exert and exploit control over local resources. For instance, a local official critical of the bioenergy proposal and instrumental in the outcome in Forest Township told us how,

> One of the first things I [did] when I was put in office was got with planning and we drew up a water withdraw bill...I'm making myself sound like an environmentalist when I have

> no degrees or...I've just been here my whole life. I know what I'm surrounded by [and] that's why I'm here. You go to [our] lake and look down a hundred feet and still see.

This action was in response to ongoing struggles between state and local authority over local zoning as well as controversy over a large bottled water producer in the area. As this official explained, "We're not gonna have bottled water coming out of here. They've done it to the south of us, they've dried up neighboring wells, they won't admit that that's the reason." The possible impacts of the bioenergy proposal, which was claimed to require over a million gallons of ground water a day, was seen as an additional threat imposed by community outsiders.

The idea that bioenergy threatens local environments is linked with remembered histories and popular narratives of the 'great cut over' of the late 1800's when much of Michigan's forests were clearcut and floated downstream to supply lumber for reconstruction after the Great Chicago and the Great Michigan Fires. These evoked memories were often treated as a harbinger of what may come if too many bioenergy plants were cited. Speaking about the region as a whole, one environmental activist explained,

> A lot of people feel that we are just now recovering from the massive cuts of one-hundred years ago, and when you look at our forests, you don't see a lot of these massive trees...the forests are such a value to the people that live here that they're really concerned about how this is done, how trees will be cut down and how that would impact our forests.

Concerns over management failures of the past are reinvigorated with discussion of future forest management techniques. The prioritization of fast-growing trees over native species or managing forests to supply fuel for energy production above other forest values were also discussed as problematic by interviewees, as were concerns that future energy crop regimes would negatively impact the environment. These became salient issues in each community especially after community leaders, government actors, and forestry experts increasingly pointed to woody biomass production in Scandinavia and began advocating their model for managing forests to endlessly supply biomass resources. However, this was largely a discourse of future feedstock procurement possibilities while in the present an abundance of "waste" wood could feasibly supply the currently proposed facilities. In fact, industry representatives and supporting local officials claimed that new RETs, once operational, would only use "waste" wood, which they claimed, as shown above, was currently rotting away on the forest floor. Indeed in order to qualify for government incentives, developers must source biomass in accordance with standards as codified by state law. However, as a citizen activist from Baytown explained, despite sustainable harvesting practices,

> [the term] wood chips is euphemism for whole trees. One of the things that I have discovered is that there is no plant that runs on waste wood. That plant does not exist, and so they have been using the 'waste wood,' 'wood chips' idea when really what we are talking about is whole trees because its not economically [viable] nor is there enough energy in whatever scrap is left over after logging to run a power plant.

The implication here is that the industry term ‘waste’ is merely technical jargon meant to confuse and placate an unaware public.

Framing important concepts such as ‘waste’ as deliberately obfuscating terminology opens a space for the reimagining of what were earlier less-contested meanings, which in turn sharpens the energy production frame. The insight here is not that critical claims are a precise counterargument against advocates’ claims. Rather, as articulated by an interviewee from a statewide environmental organization, opponents feel “there is a push for biofuels without fully assessing the tradeoffs and the potential impacts on other areas of the economy and ecosystem.” In other words, beyond engaging in tit for tat arguments on specifics, critics complicate what they claim to be simplistic and inadequate justifications for bioenergy. As the row over waste wood illustrates, critics accuse promoters of taming complex issues with overly simplistic definitions of essential components of this new resource management and energy production system. As a consequence, sharpened frames re-open and re-examine assumptions about what the future of forests, forest management, and energy production ought to look like.

Although within this frame this critical re-imagining is grounded in concerns for forests, some citizen activists, such as those in Baytown, link the problematized nexus of forests and energy production with broader concerns about the limits of growth and consumption. One interviewee argued that biomass is part of a “mass delusion in society that we do not have to exert constraint. There is not enough wood to supply these plants. Does society say ‘tighten our belts?’ No. We develop more resources to continue exploitation” and “build biomass to incinerate the greenery of the planet in a last ditch effort to keep our computers on.”

Discussion

The sociotechnical imaginary of bioenergy is a vision and emerging policy framework for a better, "greener" future that is achievable through technological deployment. Using empirical data gathered through interviews and secondary sources, we have explored the ways this imaginary is discussed and acted upon in the case of ongoing bioenergy development in northern Michigan. Using Goffman's notion of keyed framings, we have demonstrated the way different actors and groups frame imaginaries.

The keying concept helps illustrate the way conflict emerges not only between, but also within the framings of the sociotechnical imaginary for bioenergy. Flattened framings borrow from and help to reproduce imaginaries in local contexts in order to justify local technological projects. The flattened key described above, "resourcism", activates and justifies the imaginary. We use this term to capture the argument that forest and other resources are available and there is a moral imperative to use these resources as energy feedstocks to supply a new bioeconomy. The flat key is employed to open space for local uptake of the national imaginary, while projecting failure to use these underutilized resources as de-facto support of continued reliance on fossil fuels. In other words, resourcism constitutes a clear binary decision. A new bioeconomy, where resources can be replaced "as fast as they are used" (MSU BioEconomy Network n.d.) appeals to actors in places where alternative economic possibilities are framed as limited. Proponents argue that local resources can be used in new ways to create new tax dollars, investment, and future ancillary businesses to alleviate local economic depression. The flat key frame of resourcism therefore enrolls local actors in the national imaginary through the promises of revitalization and development.

Part of this reproduction process involves the taming, or purifying of complex challenges. Flattened frames reproduce national imaginaries locally by funneling a diversity of arguments

and justifications about use of currently wasted resources, moral responsibilities, and economic possibilities, into the vision of a better local future made attainable by bioenergy. As local community leaders tell us, a new proposal becomes a 'no-brainer' and 'win-win' opportunity that should not be passed up. In this way, ongoing consideration of a wider range of implications and possibilities is deemphasized through the justification of resourcism[15]. Furthermore, the institutionalized status of bioenergy dissuades advocates from engaging with the complex technical and scientific arguments about whether bioenergy production is truly sustainable. Rather than unpack the black box of what constitutes a renewable resource, the definitions set by institutional authorities at higher levels suffice. Not only are woody biomass and technological resources deemed available, the potential for economic benefits high, the cause noble, but the entire program falls well within an endorsing state environmental regulatory regime. In this way, the imaginary is used as a tool by local proponents to rally the support of and enroll other actors necessary for enacting the project.

Proponents who adopt flattened keys often framed resistance to bioenergy as born of ignorance and misinformation and proposed to remedy this by providing the correct, factual information. Those who resist the positively framed and institutionally legitimated imagined future can easily be reframed as supporting an imagined problematic past (when society was more dependent on fossil fuels)[16]. Resistance to bioenergy constitutes a sort of cultural/political

[15] Some of these implications and possibilities are points raised by the environmental community and concerned citizens, including, the ways biomass negatively impact the environment and the health of local people. Asthma, for instance, was increasingly raised as a concern in these places as residents increasingly sought out information and expertise on the health impacts of biomass. Resourcist claims downplayed alternative possibilities for achieving renewable energy targets, such as those set locally in Bay Town. Bioenergy was the only answer. Other energy technologies, such as wind and solar and energy efficiency, were claimed to be of only limited capacity and incapable of meeting the community's self-imposed goals. These claims were enforced. As only one illustration of this, in a letter from the municipal power company intent on developing a biomass fueled power plant, ratepayers were told they should support bioenergy unless they wanted to see their energy bills increase.

[16] Freudenburg and Alario (2007:146) refer to this tactic as "diversionary reframing."

taboo. What is taboo here, or at least politically unsavory, is resisting the "green" future on which there is supposed consensus. Through the keyed lens of resourcism, what the imaginary intends to achieve -- the master frame of sustainability -- is dependent on the technical means of using woody biomass for energy. By attacking the means, those who criticize, question, resist, oppose, and otherwise seek to alter the trajectory of local siting projects are easily framed as challenging the consensus that RETs ought to be implemented in order to achieve a better future.

In a sharpened key, the risks, uncertainties, and possibilities tamed by resourcism are unpacked. Sharpened frames emphasize uncertainties as justification for problematizing the technological project and the vision it is supposed to engender. Opponents argue that decision-makers push bioenergy technologies too hard and too fast, oversimplify the hazards that may occur, and obfuscate alternative means to achieve sustainable ends. Against the dominant official imaginary, the criticisms and concerns in the sharpened key disrupt implementation with their own alternative imaginary. Overall, bioenergy threatens forests and alternative economic possibilities by implicating them in a new, risky energy regime, whose ambiguous standards are set by actors with at best unknown, and at worst unscrupulous intentions.

These findings demonstrate how the consensus on renewable energy, and the imaginary of bioenergy, embodies dissensus in the form of keyed framings. Using the keying framework can help researchers better understand on what basis this contestation occurs, and can help the research community better explain to policy-makers why resistance to official visions for renewable energy technologies might be something other than simply knee-jerk, irrational behavior[17]. The ways in which actors in proposed facility sites key frames of imaginaries

[17] Scholars interested in the socio-political aspects of science and technology identify claims of irrationality as a potent tactic. As Bruno Latour (1987) notes, irrationality is always an accusation. Freudenburg and Pastor point out that "*even claims about public irrationality* can be ways to "frame" risk issues," (1992:399, italics in original) as this accusation encourages desirable outcomes for the accuser.

suggests a more complicated picture. Flattened keys recreate the official imaginary as a simplistic, "no brainer". The future is framed as an extension of the past, e.g., we have used woody biomass in the past and now have in place policies that will prevent large deviations from its sustainable use even with emerging future applications. By resisting the "green" future that is made possible with bioenergy, we inadvertently support a future that fails to move away from fossil fuels. Contesting this imaginary, sharpened framings animate an alternative vision of the past as well as the proposed future. Forest management, even when bioenergy was less prevalent, was still problematic, while the future holds increased possibilities for exploitation. In short, we see dramatically different environmental imaginaries (Davis 2011).

Conclusions

We conclude by emphasizing two theoretical points about the relationship between imaginaries and frame keys. First, in this case, imaginaries are enacted through the framing processes actors undertake in the political context of siting disputes. In these contexts actors draw upon lived experiences and remembered histories. Flattened keys stress confidence, authority, credibility, and a capacity to tame and control any wickedness bioenergy may pose, whereas sharpened keys emphasize the failures of resource management in the past and the risks, uncertainties, and complexities of bioenergy. It is not clear whether these claims should be taken as evidence of articulated knowledge that *cause* sharpened and flattened keys. Indeed nearly all actors interviewed in this study made clear that they were aware of the ways bioenergy technologies were, on the one hand, extremely complex and uncertain, while at the same time familiar (combusting wood is not new) and well within codified regulations and policies. Instead, we argue that the link between individual ambiguity and group action in response to imaginaries

only becomes clear when we consider the context of disputes (Swidler 1995) and a relational approach to framing (Dewulf and Deron 2004). This approach suggests that people draw upon lived experiences, remembered histories, and community and technical discourse on bioenergy as tools to advocate for the "key" of bioenergy to which individuals publicly align themselves, and that this public stance corresponds to perceptions of control over not only technological implementation, but the risks and uncertainties of the past and future.

Second, these keys can be understood as collective action -- in the one case by those whose imaginaries are rooted in a well-established interpretation of the direction in which society is and should be going, and in the other case by those who wish to challenge that interpretation. Therefore, these keyed frames and alternative imaginaries are entangled with social movement politics capable of contesting and changing the trajectory of not only specific projects, but the wider imaginary of producing energy from woody biomass.

Figure 1 in the Appendix illustrates this point. In the diagram, time, as represented by the past, present, and future, is indicated on the X axis. On the Y axis are uses of forest resources. Line O-O' is the official or state imaginary for using woody biomass resources to achieve the trajectory. As the slight deviation at the decision point (the present) indicates, when the frame is flattened, little change is needed to accomplish the slightly new task at hand, e.g., using bioenergy technologies to replace some level of fossil fuels. Woody biomass is available and deemed renewable and, therefore, viable to meet the vision of what constitutes a better collective energy future according to "resourcist" claims. Line CA-CA' represents the sharpened, collective action alternative, in which the future is viewed as far more problematic. This is due to the way the past, in a sharpened key, is interpreted differently than in the official view (or conversely, because the past is viewed differently, the future is more problematic). As a result, the deviation

required now, in the present, is far greater -- although where exactly this deviation ought to lead is disputed within sharpened framings. More succinctly, the creation of a non-official, alternative imaginary requires not only reconceptualizing the future, but redefining the past as well.

By focusing on the imaginary of bioenergy, this study demonstrates how environmental knowledge is co-produced. For bioenergy, sets of actors co-produce knowledge about the past, present, and future states of the forest and other landscapes that might be affected by a new energy system. Co-production refers to "the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways we choose to live in it" (Jasanoff 2004:2). While ideas are important in producing the landscape, those ideas are themselves rooted in material and changing landscape features (Gasteyer, et al. 2012; Robbins 2012). This is evident especially when we consider the way imaginaries build on the past to create future trajectories.

This paper contributes to theories of imaginaries by showing how keyed framings of the past also frame future possibilities. The perceived legitimacy of the official imaginary is dependent on how different actors key their frames of the past. But imaginaries are misunderstood if they are seen as ideational only. They are always based on past experience in a world that is always constituted both materially and symbolically. Too often, those with conflicting views for the future wrongly assume all actors in the conflict generally agree on one common, legitimate, interpretation of the past, leading to the assumption that all actors are traveling along the same trajectory. In turn, other realities must be shown as inaccurate. Those entrusted to manage risks[18], for example, often assume that the lessons of the past have been learned and mistakes will be better accounted for in the future. Conflicts between authorities and

[18] In our case, pertinent risk managers are industry and state government actors.

social movements are usually described from this perspective of a singular past and (sometimes) future. This paper instead emphasizes the interpretive flexibility of past and future and how that flexibility is used differently by different groups to support their claims. Specifically, by giving attention to the way imaginaries are keyed, we demonstrate the importance of taking into account multiple understandings of the material world and RETs -- how divergent imaginaries for the future are derived from divergent understandings of the past. These competing sets of imaginaries contribute to different ways of seeing not only problems, but future possibilities -- opportunities that might have been missed through neglecting different views of the past. As the decision point in diagram 1 indicates, these differences and possibilities converge in the present where some imaginaries "are co-produced at the expense of others" (Jasanoff 2004). This is explicitly so in siting disputes where new facilities are either constructed or not[19].

Returning to the question of bioenergy, our findings suggest that there is a fuzzy, yet pivotal distinction between mobilizing to solve environmental problems versus to implement technological development. Even those enrolled to solve the *environmental problem* of moving beyond fossil fuel-based energy oppose the *technology* of bioenergy because of a different interpretation of environmental history. This suggests that perhaps an overzealous emphasis on the latter precludes broader coalition building by failing to make room for the formation of new, collective imaginaries. Such collective imaginaries will be essential in transitioning to new energy systems that are less environmentally damaging.

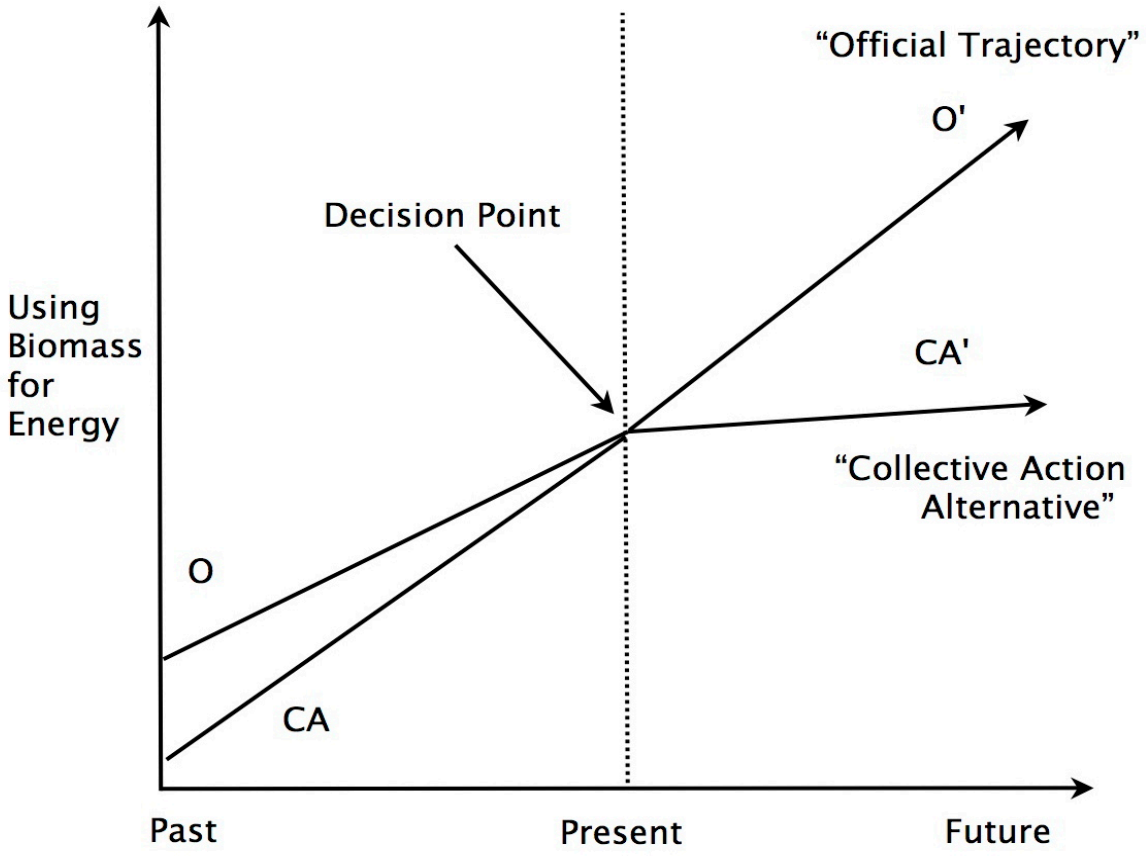
[19] Although the siting of a new bioenergy plant is as much the end of one story as it is the beginning of another. In the words of Knorr-Cetina, they are "temporary stabilizations" (1981) as both energy and feedstock markets are volatile and highly contingent on policies and economies that developers and operators may have little control over.

APPENDIX

Table 2: Four Collective Actions Frames for Woody-Biomass Bioenergy and Accompanying Frame Keys

Collective Action Frame	Description	Flattened Key	Sharpened Key
Wood for Energy	Future possibilities for using forests as feedstock for energy production	The decline of forest harvesting, and increase in forest volume contributes to a current "resourcist" perception of "waste" that justifies using wood for energy	Previous experiences and place-based collectively evoked memories with forest and resource management undermine future woody biomass energy development plans
Economic Justifications	Supplanting a fossil fuel economy with a "bio-economy"	The siting of new plants will provide economic incentives on many scales	Economic incentives will largely benefit extra-community interests
Expertise and Standards	New biomass bioenergy proposals ought to meet higher standards than fossil fuels	Biomass standards are well researched, prepared, transparent, and communicated	Existing standards and definitions are unacceptable
Ecological Justifications	Replacing fossil fuels with "clean energy"	Present day uncertainties should not inhibit action on projects that will likely have positive impacts on the future	Biomass bioenergy projects combust organic matter necessary for sustaining life

Figure 1: Divergent Past and Future Biomass Energy Imaginaries



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CHAPTER TWO

NATURALIZED AND CONTESTED: SOCIALLY CONSTRUCTING THE PROBLEMATICS AND NON-PROBLEMATICS OF RENEWABLE ENERGY TECHNOLOGIES

Introduction

The quest for large-scale renewable energy alternatives has led in part to consideration of the age old technology of burning wood for energy. In the United States, numerous wood-fired bioenergy facilities, the result 1970s energy policy, are already operational (Frankena, 1992). This paper focuses on community level responses to a new round of proposals to site woody-biomass bioenergy facilities (hereafter 'bioenergy') in response to recent federal and state policies providing tax credits and mandating renewable fuel portfolios (Simpkins, 2006).

Community responses have been mixed. Because large-scale renewable technologies entail both promises of benefits (e.g., tax revenues, jobs, economic development), as well as issues that could raise concerns (e.g., environmental and human health impacts, changes to land use, disturbances to quality of life), it is unclear how communities will respond to local development (cf. Wright and Boudet, 2012). In some places, local actors respond to bioenergy siting proposals as unnecessary impositions on the community by outsiders (McLachlan, 2009). In such circumstances, risks surrounding bioenergy development issues are emphasized and actions are taken to either change the project's design or prevent the siting altogether (Upreti, 2004). However, in other places, risks accompanying local development are downplayed, overlooked, or unarticulated. In other words, some proposals are responded to as "non-problems" (Freudenburg 2000).

This paper responds to Freudenburg's (2000) calls for sociologists to examine not only public or overt contestations, but for "systematic analysis into the ways in which certain

conditions come to be defined as nonproblematic" (p. 106). Freudenburg (2000) argues "privileged access" to environmental resources — that is, uncontested access — is made possible through powerful ideological beliefs that serve to legitimize, or "naturalize", potentially destructive environmental practices. This in turn confers access to resources for one group at the expense of others. Freudenburg's call for attention to non-problems builds on Foucault's (1977) notion of 'embedded power' as well as earlier research (Lukes, 1974; Crensen, 1971) that moves analyses of power beyond articulated and recognized challenges to and exertions of power, and toward an examination of how issues are written out of the agenda, or why potentially controversial actions fail to be recognized as public issues. A focused attention on both problems and non-problems requires the sort of methodological symmetry called for by sociologists of scientific knowledge who argue both "true" and "false" knowledge must be treated symmetrically (Barnes and Bloor 1982; Latour, 1987). That is, analysis of the social construction of both problems and non-problems in this paper receives equal analytical treatment, rather than developing different approaches.

Considering the increased policy attention large-scale renewable energy technologies such as bioenergy are receiving, now is a critical time to examine the process by which these technologies are socially constructed as environmental problems or non-problems in places where expanded development is proposed. I present a comparative case study of the responses of two communities — northern Michigan's Rapid River and Mancelona townships (of Kalkaska and Antrim counties, respectively) — to the same bioenergy development proposal. A map of these places is presented in Figure 2 in the Appendix. While actors in Rapid River respond to the proposal as exploiting local, public resources for the private benefit of community "outsiders", actors in Mancelona embrace the proposal as providing needed jobs and work closely with the

developer. I selected these communities not only for their similarities, but both are also responding to the same "exogenous force" (Paulson, 2004). By selecting analogous places for a comparative analysis, more obvious differences are diminished, and nuanced variations that can help explain differential responses to same development proposal are accentuated (ibid.). Both communities are small (4,392 residents in Mancelona township, and 1,238 in Rapid River as of 2013), have the same portion of retirees[20], rural, working class, industrialized, forest-nested and adjacent northern Michigan communities with high levels of unemployment (14.6% and 11.2% in Mancelona and Rapid River Townships, respectively). Taken together, they share a sharp contrast with the several growing coastal amenity communities located west of the area along Lake Michigan or Torch Lake, known more for their epicurean, agricultural, and recreational specialties than their industrial bases.

My central thesis is that the responses of people in these communities to proposed bioenergy development hinge on existing predominant industrial and extractive development particular to each place. While others have shown there to be a convincing link between locale specific development and responses to proposed future development (cf. Wright and Boudet, 2012), how exactly historical development patterns shape future development trajectories is less well understood (see Molotch, Freudenburg, and Paulson, 2000). The approach developed here bridges insights from two bodies of scholarship. First, my argument builds on Beamish (2002) and others (Bain and Selfa, 2013; Bell and York, 2010) who examine the institutional and organizational cultures organized around industrial development and accompanying pollution in

[20] The 2000 U.S. census reported that approximately twenty percent of households in both places have retirement incomes.

order to understand local actors' responses to environmental issues[21]. Adding to this literature, I incorporate insights from a sociology of culture (Swidler, 1986; 1995) to explain how the cultural practices people organize around existing development shape community responses. I argue that the cultures organized around industrial development provide the resources local people draw upon when constructing responses to proposals for future development, and that these cultural resources shape social construction processes by providing actors with both the opportunities to respond in the ways they do, while at the same time constraining alternative courses of action.

I begin with a brief historical sketch of Rapid River and Mancelona townships and their respective counties, focusing on resource extraction and industrial development.

Background

While both communities initially grew around forest extraction — first the 'great cut-over' of Michigan's Eastern White Pine forests up through the early 1900s, and later, once large logging operations moved north in search of remaining virgin pines, local extraction of the area's vast stands of maple and other hardwood — leaders in Mancelona parlayed these earlier industries into the concentrated manufacturing base evident today. This pattern was first initiated in 1882 by entrepreneur John Otis who built a successful smelting furnace and plotted out "Furnaceville", a company town, south of the former logging village. The smelting furnace, which was soon thereafter purchased by Antrim Iron Company, produced pig iron from iron ore mined in the Huron Mountains of state's Upper Peninsula. The ore was then transported via

[21] As discussed below, while these scholars take different approaches to studying culture, they are all interested in understanding the social responses of groups — rather than individuals — and the dynamics of institutionally constructed cultural alignment with economic production systems.

barge and then railways[22] only recently constructed to transport northern Michigan's mineral and timber resources to the burgeoning industrial development along the southern coasts of the Great Lakes. To fuel his furnace, Otis extracted the area's abundant hardwoods, processing them into charcoal. The steady heat of the hardwood charcoal resulted in a sought after product of superior quality, the legacy of which is evident in the local high school's "Ironman" mascot (See Figure 3 in the Appendix).

Forest extraction in Kalkaska County, however, largely fueled industrial development and capital accumulation outside the county lines[23]. Residents who remained once the timber frenzy moved north were few, laboring primarily as small farmers on the newly cleared lands. During the Great Depression of the 1930s, nearly half of Kalkaska's private lands reverted back to the state when the properties of financially ruined landowners were repossessed, or when land was simply abandoned. Steady industrial development first came to Rapid River and Kalkaska County during the early 1970s when massive oil and gas reserves were discovered in the Northern Niagaran Reef Trend running across the northern half of the county. Success rates for new wells in the trend was unexpectedly high (above 50% in 1972), and coupled with access via state forestland, the county's production of oil and gas steadily exceeded neighboring counties (in 1972, 55 oil and gas wells were producing in Kalkaska as compared with only one active well in Antrim County). These early successes earned the county a new nickname — the "North Slope", after the productive fields of Alaska — and attracted the large industry players Shell and Amoco that continue to operate in the area. Moreover, these new employment opportunities

[22] As reported by the Mancelona Historical Society, Otis speculated that one could bring iron ore mined in the Upper Peninsula and shipped to the Straights of Mackinaw to Mancelona and smelt it there — rather than sending the raw resource south. His idea came to fruition when the trains did eventually come. In 1872, the Grand Rapids and Indiana railways constructed to connect northern Indiana, Grand Rapids, Cadillac, and Petoskey with the port at Mackinaw City, arrived in Mancelona.

[23] This included Antrim Iron Company, but also the growing furniture factories of Grand Rapids, Michigan, as well as markets in Indiana and Illinois.

brought in enough workers and families to double the community's population by the end of the decade (see Table 3 in the Appendix), providing the county with its first population and economic boom.

In visiting these communities today, one finds manufacturing facilities (some operating, many dilapidated) concentrated along a mile stretch of highway south of the village of Mancelona. When Antrim Iron Company closed in 1946[24], local leaders attracted the Detroit area Mt. Clemens Metal Products Company to the community. Later renamed Dura Automotive Systems Inc., this and numerous other automotive parts producers employed much of the community until Dura's closure in 2009. Rapid River's predominant industry — oil and gas production — is scattered amongst the county's vast state forestlands, visible primarily through truck and tanker traffic on county roads, processing and storage facilities spread across the county, as well as on the "Welcome to Kalkaska" sign at the county line (See Figure 4 in the Appendix). The importance of these industries in these communities is evident in the materials produced by local political candidates and the several regional economic development organizations that highlight the "prominent oil and gas industry" in Kalkaska, and the "strong manufacturing sector" in Antrim.

Beginning in 2008, the same developers first approached Rapid River and Kalkaska officials with their bioenergy proposal and, later, when prospects for development there turned sour, engaged with leaders in Mancelona and Antrim. While supported by Kalkaska County officials, members of the county planning commission began raising concerns about the project. When the developer applied for a special use permit, necessary to develop the project on land zoned for agricultural use, the commission requested additional changes, leading the developer to repeal its proposal and engage with leaders in Mancelona. Rather than raising concerns,

[24] Historical records suggest this was due to the rising cost and diminished availability of the area's hardwood.

discourse in Mancelona emphasized the importance of bringing new employment to the community, while editorials in the Antrim paper criticized "biomass naysayers" as being "out of touch with [the] local, real-world economy". In interviews, local officials described the project as a "win-win" and "good fit" with their "industrial community", worked closely with the developer and state senators to secure a tax abatement from the state's treasury department, and arranged for the creation of an industrial development zone to site the project.

In the next section, I discuss how previous research examines the role of culture in shaping social responses to energy development, and suggest that this literature can be fruitfully extended by incorporating insights from a sociology of culture (Swidler, 1986; 1995).

Environmental Problems and Non-Problems as Cultural Opportunities and Constraints

Recent scholarship links analyses of "naturalized", legitimating "ideologies" — which constrain critical responses — with the cultural practices people in particular contexts have organized around powerful industries (Freudenburg, 2000; Beamish, 2002; Bain and Selfa, 2013; Bell and York, 2010). This research calls attention to the ways mobilization against environmental problems is constrained not by publicly asserted political challenges, but through a less visible form of cultural power.

Beamish (2002) addresses the social construction of environmental non-problems by asking how Unocal's oil spill — the largest in the United States at the time, lasting from 1953 to 1990 — failed for so long to emerge as a problematic issue in need of a solution. Pertinent for my study is his examination of the organizational culture at Unocal. Workers described oil leaks as a "a necessary evil" (p. 63), the concern being that any assistance they might provide to regulators for addressing the issue would jeopardize the facility and consequently their jobs.

Regulatory culture, too, curbs mobilization. Due to the underground, and therefore hidden nature of the spill, human health impacts were ambiguous and legal grounds for addressing the problem were elusive. Finally, Beamish uncovers how other poorly managed incidents in the region cast what Stoffle et al. (1991) term a "risk shadow" over the company, evoking sentiments of distrust. Rather than an accident, locals came to understand the spill as "an outcome of negligence" (Beamish, 2002, p. 127).

While the literature on public controversy and contestation over the environmental issues surrounding renewable energy technologies in particular is growing, its focus has largely been on questions of public resistance to local sitings (e.g., Upreti, 2004; Upreti and van der Horst, 2004; Devine-Wright, 2007; 2011). This literature hinges on questions of "the causes and consequences of public opposition" (Upreti and van der Horst, 2004), pointing out that opposition is a barrier to local sitings (Wüstenhagen et al., 2007; Walker, 1995), and attending to factors that may shape public acceptance (Devine-Wright, 2007). Exactly what public acceptance means — and why it is important for the success of these technologies — remain important questions (Secko and Einsiedel, 2014). However, this research agenda is "asymmetrical" (Latour, 1987) in that it fails to apply the same scrutiny to positions of acquiescence or support. Doing so ignores how responding to technology proposals as "non-problematic" also entails processes of social construction. A notable exception is McLachlan's (2009) study of the symbolic interpretations that underlie not only positions of opposition, but positions of support. McLachlan argues that understanding these positions, rather than proving certain positions right or wrong, requires examining the meanings actors' attribute to technologies (i.e., as being in conflict or harmony with nature) and place (i.e., as a resource, locally owned, or as nature). McLachlan concludes by arguing "the multiple interpretations of place and technology...come together to explain different

assessments of ‘fit‘ between place and technology” (p. 196).

While this is an important insight in its own right, McLachlan’s analysis glosses over historical underpinnings to particular claims (cf. Stoffle, et al. 1991), and therefore raises questions that deserve further attention. That is, if place is interpreted as a resource, what events, experiences, or industrial development histories may have contributed to this particular framing? Moreover, are symbolic logics strictly the interpretations of individuals? Or are individual interpretations part of a larger pattern of public practices, linked with place-specific histories and identities? Bell and York’s (2010) analysis of community responses to extractive industries begins to draw attention to these possibilities. They argue that to maintain local support for coal mining, despite ecologically and socially destructive practices, West Virginia’s coal industry amplified the link between a community’s identity and the historically important, but now declining, coal industry. Rather than solely individual responses, the causal explanation is that extractive industries have “come to be seen not simply as sources of employment but rather as key features of individuals’ and communities’ identities” (p. 118).

Bain and Selfa (2013) extend these arguments in their study of several key actor groups and their social responses to corn-based biofuels development in Iowa, where they observe patterns of constraint in addressing environmental problems similar to those identified by Bell and York (2010). While criticisms of the negative environmental impacts of biofuels have grown (Wright and Reid, 2010), Bain and Selfa find that public concern with biofuels in Iowa is “conspicuously silent” (p. 361). Environmental organizations did emphasize environmental risks posed by biofuel production during interviews with the authors, but these issues are not raised publicly, a trend reflecting “the constraints on these organizations to challenge natural resource interests tied to agriculture and to foreground the costs and risks of environmental degradation

they impose on society" (p. 362).

Two insights from the above studies are central here. First, the constraints to responding to industries as problematic operate on organizational and cultural levels. For instance, raising the alarm with respect to biofuels would require environmental organizations in Iowa to challenge agricultural organizations, potentially upsetting delicate relationships that are politically advantageous for confronting environmental issues seen as threatening by both groups, such as coal extraction and combustion. Similarly, in Beamish's study, the actions of Unocal employees are constrained by an organizational culture that necessitates silence and complacency in order to continue operating. Constructing biofuels as problematic in Iowa, or Unocal's hidden oil spill as reason to contact authorities, would, therefore, require overcoming significant cultural hurdles. Second, culture can also be brought to bear more generally, in terms of a constructed place identity. Support for biofuels expansion in Iowa is linked with pride expressed by farmers and non-farmers for their agricultural achievements, and bolstered by proponents' successful framing of "ethanol as central to Iowa's identity and future" (p. 356).

Building on these insights, I examine the organizational and institutional cultures that actors in Rapid River and Mancelona have constructed around the industries in their particular communities. To explain how these cultures shape actors' responses to proposed bioenergy development, I draw from Swidler (1986; 1995; 2000) who suggests scholars reformulate notions of culture from something that emanates from internalized beliefs to a facet of social life that is public and activated externally. From this perspective, actors actively draw upon their "cultural toolkit" to develop strategies of action[25]. That is, actors select from communal, public cultural elements, such as stories, beliefs, attitudes, images, and symbols, and invest "them with

[25] By strategies of action, Swidler (1986, p. 277) is referring not to conscious decision-making about a particular goal, but instead "a general way of organizing action...that might allow one to reach several different life goals."

particular meanings in concrete life circumstances" (Swidler, 1986, p. 281). Polletta (2004) adds that these elements are "observable in linguistic practices, institutional rules, and social rituals rather than existing only in people's heads" (p. 100). This process is dynamic: as certain elements become more central, more meaning is given to them. Ultimately, culture's power is evident in the way it shapes action by providing the "repertoire of capacities" (p. 284) that both limit and enable which strategies of action actors might construct (Polletta, 2004; Swidler, 1986).

Building on theories of Foucault, Bourdieu, and others, Swidler's (2000) work on culture focuses attention on *practices*, understood as routine, unconscious action, rather than that which is consciously chosen. That is, by focusing on practices, sociological attention is moved from the realm of ideas and values to the physical, material, and "to the impersonal arena of 'discourse'" (p. 84). A turn toward discourse and practices provides observable, empirical objects of study. Importantly, discourse then reflects "not the content of what anyone says, but the system of meaning that allows them to say anything meaningful at all" (p. 84). By implication, we can understand discourse itself to be constrained by that which makes sense to actors, and that which falls into the realm of the absurd.

Swidler (1995) suggests two specific ways for unravelling the influence of culture that are of particular use for this study. First, culture's influence on social action can be studied by examining the shared contexts within which groups of people confront similar hurdles and opportunities. For instance, as discussed above, local biofuels development potentially provides both risks and benefits to host communities. Therefore, individual beliefs about benefits and risks associated with biofuels are often ambiguous, whereas public responses appear more consistent. This is evident when surveys providing a snapshot of private responses that may indicate local support are later compared with actual acts of local resistance amongst the same

populations[26]. Swidler (1995) suggests that in politically charged contexts, such as planning meetings and air permit hearings, ideological beliefs that are inconsistent amongst individuals can "crystalize" into specific "demands for action" (p. 36). That is, even while individuals remain privately conflicted, when called upon to respond to an issue, people tend to act along existing political arrangements. Moreover, Swidler suggests that people create culture around institutions — sets of rules and sanctions — leading individuals to "act in culturally uniform ways, not because their experiences are shared, but because they must negotiate the same institutional hurdles" (p. 36). This is evident in Bain and Selfa's (2013) study when environmental groups remain silent on corn ethanol in order to maintain important partnerships with ethanol proponents.

Furthermore, Swidler's work offers at least two ways to deepen our understanding specifically of the role of ideology in the social construction of environmental problems and non-problems. First, Swidler's conceptualization of ideology extends Freudenburg's (2000) argument that powerful ideological beliefs naturalize environmentally destructive practices of industry so that they go uncontested by publics. That is, for Freudenburg (ibid.), ideologies themselves can be both naturalized — operating under the radar of a community's concern — as well as publicly emphasized. This conceptualization of ideology is problematic for Swidler (1986, p. 279), who defines ideologies as "highly articulated, self-conscious belief and ritual" systems. That is, ideologies are always observable rather than covert (cf. Lukes, 1974). For Swidler, an ideology can be thought of as a phase in the development of cultural meaning that ranges from the articulated to unconscious "common sense", defined as "the set of assumptions so unselfconscious as to seem a natural, transparent, undeniable part of the structure of the world" (1986, p. 279). Locating problems and non-problems along Swidler's continuum, rather than

[26] Scholars have termed this a "value-action" gap (Van der Horst, 2007).

Freudenburg's more static conceptualization of ideology, provides a space for sociological attention not only to the way the "privileged accounts" (Freudenburg, 2000) of powerful actors shape (non)responses, but also to the ways a "common sense" specific to particular places can prevent certain issues from reaching the public agenda.

Second, Swidler's (1986) notion of unsettled and settled lives — referring to times when actors construct new strategies of action versus times when existing strategies of action are sustained — is instructive for understanding why certain issues remain unquestioned or become contested. During settled times, existing cultural repertoires "so define common sense that alternative ways of organizing action seem unimaginable, or at least implausible" (p. 284)[27]. On the other hand, during unsettled times, new ways of organizing social life come into competition with alternative strategies of action. In this context, cultural forms

> aspire to offer...one unified answer to the question of how human beings ought to live. In conflict with other cultural models, these cultures are coherent because they must battle to dominate world views, assumptions, and habits of their members (p. 279).

In sum, (environmental) issues go uncontested when they are closely linked with everyday, "common sense" ways of doing things. As the cases discussed below attest to, environmental issues may simply go unnoticed, or, if noted at all, fail to resonate as a "troubling condition" (Best, 2013). However, these same issues are challenged "when competing ways of organizing action are developing or contending for dominance" (Swidler, 1986 p. 279).

The way more settled and unsettled times come into being are here related to a community's response to proposed bioenergy development as more or less of an exogenous

[27] Polletta (1997) reminds us that cultural periods are never entirely settled or unsettled, but are instead fluid.

force. For instance, were bioenergy development to be seen as entirely exogenous and therefore disruptive to the community, contestation may ensue, whereas if the technology were to be seen as more endogenous, i.e. integrated with the community and integral in the local scene (Paulson, 2004; but see also Walker and Devine-Wright, 2008), it may go uncontested[28]. In the sections below, I apply the insights from these literatures to my two case studies of Mancelona and Rapid River.

Methods

I build on Paulson's (2004) suggestion that scholars compare the responses of similar, "strategically matched" places to the same "exogenous force" in order to uncover more nuanced variations specific to unique locales, as well as to investigate the social and material realities that underlie meanings and actions particular to distinct locales. My analysis grows from a larger study of four northern Michigan communities that were actively considering bioenergy proposals (Eaton et al., 2013). While each of these four communities approached bioenergy development in its own unique way, the parallels between Mancelona and Rapid River — despite their differential responses — were compelling: not only were these largely similar places responding to the identical proposal, but public discourse around local bioenergy development justified the community's responses in terms of its previous experiences with local industrial development.

Data collection took place when the matter of local bioenergy development was still under discussion as an open and real possibility for both places. During my initial visits and interviews in early 2010, it was clear that the project would not be sited in Rapid River, and that it might

[28] Paulson (2004) discusses how exogenous forces may come to be seen as endogenous after existing in an area for a long period of time. Even seemingly endogenous forces, such as a long existing highway, or locally-based industrial development, were at one point exogenous. Paulson's point is that examining how exogenous forces become endogenous, that is, part of the everyday, taken-for-granted experience of life in this place, reveals something about the uniqueness of that locale.

happen instead in Mancelona. Public discourse was in tune with these circumstances, and tended to justify the recent actions taken prior to my visits leading to these outcomes. Due to their close proximity, siting a new facility in either community was still considered "local", although these boundaries were constructed more and less strongly at different times by actors in both communities attempting to justify the legitimacy of their responses by distinguishing between locals and "outsiders". Initial data collection was conducted three months after two important events: an air permit hearing held in Mancelona attended by actors from both communities as well as area residents and environmental activists, and the successful attainment of a tax abatement by officials in Mancelona and the developer. Local officials were waiting on one last hurdle before construction could begin: the developer's attainment of a power purchase agreement with an electrical utility.

Data informing my analysis consists of interviews with local actors, a content analysis of three regional newspapers' coverage of the proposals, a transcript of a video of the air permit hearing, as well as historical and technical data collected from several secondary sources. These include planning documents, letters and electronic communications, informational materials created by a concerned citizens group in Rapid River, as well as Census data, public state records of extractive development, data on health impacts from Environmental Health News, and technical data on industrial development provided by local township, county organizations, chambers of commerce, and U.S. Environmental Protection Agency (EPA) and state regulatory agencies.

I began by collecting press coverage from the three newspapers reporting on bioenergy development in the area, one from each county and the third in an adjacent county, including

reports, editorials, and letters to the editor[29]. Along with coding all articles published on the proposals for themes (from 2008 to 2011), I used press coverage to identify and contact key actors from each community, and then followed a snowball sampling approach to identify additional interviewees. I gained entry by discussing my interest in understanding local perspectives on bioenergy development, and conducted on-site interviews lasting thirty to ninety minutes with the developer, six actors in Rapid River, and eight actors in Mancelona[30]. Interviewees were asked to consider the impact bioenergy might have on their community from numerous perspectives and to discuss "why bioenergy was right or wrong for their community".

This data suggests the tendency for public discourse in both communities to justify their community's particular responses to proposed bioenergy development in terms of prior industrial development. This happened in two ways. First, public discourse in both communities connected risks associated with bioenergy with the environmental issues circulating around previous and ongoing industrial development. Second, the capacity of the state's Department of Environmental Quality (MDEQ) and other authorities to manage the risk of future pollution were raised. In both cases, public discourse linked existing and prior industrial development as justification for the problems (Rapid River) and non-problems (Mancelona) associated with future development. The findings presented below are organized around these two themes.

Industrial Development and Cultural Responses in Mancelona and Rapid River

Pollution, Contamination and Toxicity as Material Culture

[29] To protect the identity of interviewees, who were often quoted directly in news reports, active in writing letters to the editor, as well as actually being the editors, I conceal the names of these publications.

[30] While many interviewees appeared eager when discussing their perspectives, several others declined to be interviewed, claiming they were not central to the matter, and referred me to actors I had already met with. Actor's hesitation to participate in this study does not diminish the reliability of the paper's conclusions. Conversely, this attests to a strong degree of sampling saturation.

Over a century of industrial manufacturing in Mancelona, and forty years of oil and gas production in Rapid River and Kalkaska county, has left a significant toll on the area's environment. As demonstrated below, actors in each community have constructed distinct and contrasting attitudes and stories around the predominant industries — and accompanying legacies of pollution — in each locale.

Environmental contamination and toxicity in Mancelona is now well documented by state agencies. From 1882 to 1945, Antrim Iron Company's processing of hardwood into charcoal to fire its smelting furnaces created a tar-like waste residue the company dumped in a nearby low lying area. This created what came to be known as "Tar Lake", now an EPA Superfund site and the location for the proposed bioenergy facility. From 1957 to 1967, a local metals company added dozens of drums of waste to the site, which in 1969 caught fire and burned for months. Over time, several other industrial actors added their wastes to the site, which amassed volatile organic compounds and other contaminants, including high concentrations of heavy metals and phenol that contaminated soil and groundwater (Karl, 2014). Beginning in the late 1990s, the EPA began removing and burning the residual tar off-site and installed equipment to treat contaminated groundwater while the state provided bottled water to residents until the Mancelona Area Water and Sewer Authority was created in 2002. While the clean-up is ongoing, the contaminants have been largely contained. However, the environmental impact of the automotive industry continues to threaten the area's watershed. From 1947 to 1967, the policy of Mt. Clemens Metal Products for disposing the industrial solvent trichloroethylene (TCE), now known to be toxic, was to dump the used chemical in an unlined pit behind the facility. The massive contamination, consisting of three vast and still flowing "plumes", was not discovered until the 1990s when state officials visited the site to address an unrelated contamination issue.

While efforts spearheaded by local organizations have since led to the development of the area's water authority to prevent residents from coming into contact with contaminated groundwater, the spreading toxic plumes continue to threaten new sources of freshwater. So while the source of the contamination is clear — when visiting the office, the water supervisor pointed out the contamination's origin along the community's main road on several plume maps posted on the wall — feasible means for local actors to address the spreading plumes have yet to be devised.

While pollution from oil and gas in Kalkaska and Rapid River is less well documented and tangible than pollution in Antrim, its existence and significance are more contested. Acts of pollution, if reported at all, are documented largely by environmental activists working for organizations that draw attention to spills, contaminated sites, and (the ineffectiveness of) state responses, due largely to inadequate staffing for the necessary oversight (e.g., Cabala, 2007). State technical reports (e.g. State of Michigan, 2014) focus instead on more visible hazards, such as the 1973 accident in Grand Traverse County, adjacent to Kalkaska, where pressure in a well forced gas through rock to the surface, damaging trees and streams and leading to the evacuation of residents.

As discussed above, Kalkaska County contains more state owned land than any other county in Michigan. As such, oil and gas extraction, often on land leased from the state, takes place largely away from residential areas, hidden down the countless seasonal roads and two-tracks traversing the county's numerous tracts of forestland. When interviewed for this study, the former Rapid River Township Supervisor accentuated this point, opening a plat map of the township, pointing at the green (state owned) areas which comprise nearly half the map, and contrasting this "no-man's land" with residential areas. For many area residents then, the only signs of oil and gas development are the trucks, tankers, and other mobile equipment passing

through town (and the resulting rutted roads) rather than the rigs, pipelines, and actual extractive activities that take place largely out of the public's sight.

More insidious, and, again, largely unseen, is the connection between Kalkaska and an incident of polybrominated biphenyls (PBB) contamination, one of state's largest and most contested environmental disasters that began during the early 1970s. Accidentally mixed into animal feed, the highly toxic chemical contaminated thousands of cattle and other livestock. These animals were eventually transported, destroyed, and buried on state land in a remote, inaccessible corner of the county, ultimately against the wishes of county commissioners — although they initially supported the project (Egginton, 1980)[31].

The fact that these incidents 'happened', however, is less important than the meanings actors have vested in them. In each community, discourse reveals popular stories, claims, constructed memories, and expressed beliefs about previous acts of industrial pollution across the area that, together, provide the cultural resources particular to each place around extraction and industrial development. Table 4 (see the Appendix) presents the two cultural elements salient in both places: a) existing pollution and b) future pollution.

Existing Pollution Cultures: Malfeasance versus Ignorance

According to the developer, Rapid River's new plant would require 400,000 tons of wood chips annually from area woodsheds as well as 400 gallons of groundwater per minute for cooling — figures deemed within the technical limits of the resource's capacities by several feasibility studies and the state's Department of Natural Resources. These and other proposed uses of area resources catalyzed discourse on how previous industrial and extractive

[31] Agricultural and environmental organizations continue to debate the severity of the state's PBB contamination (see Vaillancourt, 2009).

development in the area had polluted and abused the area's land, water and air. This included references to several area environmental controversies, including ongoing extraction of area ground water by the bottled water company Ice Mountain (a division of Nestlé), speculated to be lowering the water tables; dangerous emissions from some of the area's operational bioenergy facilities and specific instances of visible fallout; and Kalkaska County commissioner's initial support during the 1970s for the PBB burial pit in spite of mounting evidence of health risks.

Most salient, however, were concerns over the decades of oil and gas extraction in the region, an industry for whom several interviewees worked or were retired from. Interviewees expressed frustration and anger over the improper disposal of contaminated liquids in area streams and on land, as well as unreported incidents of leaks, spills, and other acts of contamination. Importantly, not only had previous industrial activities compromised "the area's integrity"; discourse suggested these degradations were the product of malfeasance in that these industrial actors were fully aware of the implications of their actions. That is, these were intentional acts or, according to interviewees, "shortcuts" consciously taken without regard to the environmental consequences or who would bear them. This is illustrated by a concerned citizen who, like the many others who immigrated to the area in the early 1970s, found work in the booming oilfields:

> That's something you've got to understand about this particular community right here...it's full of oil wells. They've polluted, I mean they've dumped so much oil, chemicals and stuff in this township...I've seen stuff that would make you puke. *And when they didn't have no place to put these toxic things, they poured them right on the ground, thousands of barrels of them*.

Discourse suggested industrial development therefore involved intentional abuses. Damages to the area's natural environment and human health were less inevitable side effects of industry and extraction than they were the result of deliberate efforts to cut costs and dodge regulations. Likewise, the proposed bioenergy project would likely be no different, and therefore required at the very least close scrutiny by those in the township, as opposed to the open invitation extended by Kalkaska county commissioners.

Across the county line in Mancelona, the legacy of pollution left behind by Antrim Iron Company, Mt. Clemens Metal Products, and others — raised with respect to the proposed bioenergy facility's water and forest resource needs — was discussed as resulting not from malicious, intentional acts, but instead as symptomatic of a more naive time. A community organizer interviewed for this study argued that when the news of widespread TCE contamination was initially made public in the 1990s, area residents were "frustrated and angry" by news that their community was contaminated. Interviews conducted at the time of this study, however, emphasized how the TCE plumes, Tar Lake contamination, and other cases of pollution were simply the result of ignorance.

> I'm sure that the people who contaminated this site [with TCE] initially had no idea of the ramifications...they were innocent when they did this, they thought, let's just dump it on the ground, it's not going to hurt anything, where's it going to go? (Township treasurer)

> My sense was and is that we've technologically advanced since [Antrim Iron Company].

> I mean people weren't concerned about the air and the water back then because it was so plentiful...I don't think those people really...I mean for them to put forty-seven thousand tons of tar into a ground depression was, well, what's the problem? (Community organizer)

The attitude suggested here is that, if put in their situation, anyone would have done the same. In this way, accountability is detached from industry, and blame attributed to an ignorance that has long since been corrected[32].

Discourse on the culpability or innocence of prior industrial pollution are important for understanding why proposed bioenergy development is problematic for Rapid River actors, but a non-problem for those in Mancelona. Where actors in Rapid River discussed pollution as intentional and, therefore, reason to raise concerns with future development proposals, actors in Mancelona responded to the legacy of pollution in the community as constraining the range of possible future development options. Residential or amenity developments, for instance, would not be possible on land contaminated by previous industrial development. Instead, in the words of Mancelona's township supervisor, bioenergy development is "the only thing that's really [a] possibility for this area".

Future Pollution: 'Recreancy' versus 'Necessary Trust'

In Rapid River, the claim that malfeasance was at the root of the area's environmental degradation underscored distrust not only of industry, but of the MDEQ. Discourse on the role of the MDEQ was especially salient during an air permit hearing held in Mancelona after the

[32] For example, the buildings remaining from these industries, or the now vacant lot in the case of Mt. Clemens Metal, are "orphan sites" in that their businesses closed before the toxicity was identified by state officials.

project had changed communities. During the hearing, actors from Rapid River argued that some established bioenergy facilities in the area had been operating in violation of their air permits, and yet the MDEQ had done little to "shut them down". MDEQ representatives explained that they could work with facilities to achieve and maintain compliance with air quality standards, a process involving sanctions such as fines, and yet, ultimately, it was not within their power to suspend a facility's operations. Others voiced concerns about carbon dioxide and "ultra-fine particulate" emissions from the proposed facility, drawing comparisons between emissions from bioenergy and coal power plants — a theme also reported on in area press reports critical of bioenergy technologies. MDEQ representatives replied that standards and models had not yet been provided to their agency by the state for the regulation of these emissions, despite, as pointed out by concerned citizens and environmental activists at the hearing, their being under review by the EPA. Ultimately, actors from Rapid River expressed concern that regulatory frameworks were inadequate and MDEQ employees, while having "good intentions", were like "toothless tigers", or "cops on the beat", unable to protect citizens from environmental risks, especially once a new facility was up and running.

Before voicing their concerns at the air permit hearing on Mancelona's proposal, Kalkaska county's zoning ordinance provided an opportunity for actors in Rapid River to take action. While county commissioners supported the project's siting in Rapid River, the county's planning commission (headed by an official from Rapid River) possessed the authority to approve or deny the developer's application to make the necessary amendments to the zoning ordinance. In a letter to residents, the planning commission argued permitting bioenergy development on land zoned for agricultural use would, in turn, open the door to additional threats.

> ...we oppose the idea of rewriting the language of the County zoning ordinance because it would effectively remove the zoning protections that currently prohibit industrial uses of land in residential areas.

The letter also raised the matter of the developer's claims that locating a bioenergy facility could lead to additional industrial development near the facility. While raised in order to entice community leaders, the planning commission presented this as evidence that the bioenergy facility was part of a larger scheme to exploit local resources for private benefit.

Overall, discourse emphasizes self-protection, as those entrusted to protect the public from the negative impacts of extractive and industrial development, i.e., the developer or the State, were not capable of doing so. Instead, only the township could defend itself from bioenergy development's environmental risks. As argued by a concerned citizen in a letter to the editor in the county's newspaper, the township would need to find ways

> to ensure that our region, with its ample supply of ground water, plethora of state-owned forests, low population and questionable economic stability, is not environmentally exploited by those who wish to use local resources for private gain.

These "breaches of trust" (Beamish, 2002) are enlisted as justification for the critical stance against bioenergy development taken by vocal residents and elected officials in Rapid River. Research on technological controversies has introduced the term "recreancy" to call attention to "the failings of key persons and institutions that have been entrusted with the safe management of technology" (Freudenburg and Pastor, 1992, pg. 404). Discourse in Rapid River was rich with

charges of recreancy against a regulatory system that had failed the community in the past, and was, therefore, suspect in its capacity for protection from risks of future development.

Importantly, while oil, gas, and other extractive activities provided the justification for claims of recreancy, it was the bioenergy proposal that bore the brunt of these accusations. While pollution from oil and gas development was problematic, it was treated as a routine, "settled" matter, whereas the future for bioenergy in the community was less an inevitability than an open or "unsettled" possibility that, at the time of my visits, could and should be shaped by local residents (Swidler, 1986). As discussed above, oil and gas is the predominant industry in Kalkaska County, and many who reside there now relocated from elsewhere to work in this booming industry (in the oil fields, at the processing or storage facilities, or in ancillary, supporting business start-ups).

To say the environmental consequences of this industry are settled matters is not to say environmental degradation is acceptable, only that this is how industry is "practiced" (Swidler, 2000) in Kalkaska. There are two parts to this. First, as discussed above, public discourse emphasizes how the oil and gas industry knowingly takes short-cuts and cannot be trusted, while the MDEQ and other state agencies are ultimately incapable of protecting the community from existing or future development. Second, and akin to Beamish's (2002) findings that the invisibility of contamination can inhibit the social construction of environmental problems, pollution from decades of oil and gas extraction and production in Kalkaska County is largely removed from the everyday activities of the community. That is, besides the roughnecks and hotshots drilling and capping the occasional new well, most residents, including oil industry employees, do not presently reside, recreate, or even work in the immediate presence of visible

contamination[33].

This contrasts with Mancelona where industrial development was, over the course of over one hundred years, steadily built up along what became the main thoroughfare through the community. These distinctions are important for understanding the different responses of people in Rapid River and Mancelona to proposed bioenergy development. While Rapid River actors claimed the area's pollution was an important concern, it remained a problem they were able to distance themselves from — both materially and symbolically — as they did not live within view of it. Instead, there were few industrial structures or facilities near residential areas to identify as causing the area's pollution. Pollution was something that happened elsewhere, away from their homes, businesses and local organizations, down the countless seasonal dirt roads heading out into the county's state managed forestlands — the "no man's land" discussed above. So while the spaces of extraction were made meaningful as sites of environmental degradation, this was largely removed from the everyday experiences of life in the community. This then provides a dual reality for many in the community. Interviewees simultaneously referred to symbols such as the area's "clean" and "pristine" lakes and streams, "clean air" and "green," healthy lawns and trees, while moments later lamenting the spills, contamination, and illegal dumping that degraded their community. Moreover, discourse in Rapid River claimed pollution was not only hidden from residents, but from state regulation agencies as well, whose capacity to prevent "intentional acts" of pollution was diminished by the industry's dispersal across expansive, forested terrain.

These findings suggest that this dual reality contributes to the lack of mobilization evident

[33] It seems this may change with new hydraulic fracturing techniques, which are spurring renewed interests in the trends and plays of Kalkaska County. The state's 2010 auction of mineral rights, where more payments to the state were collected in one day than in the previous 81 years combined, is one strong indication of this possibility. More acreage went up for sale in Kalkaska County than in any other county in the state — although at the time of this writing only a limited number of new explorations have proved promising.

against established industries, while at the same time, providing for a latent cultural repertoire (Swidler, 1986) of distrust for regulators and anger and frustration over what were seen as avoidable, intentional, and ultimately recreant acts of pollution by industry. Actors in Rapid River who resisted bioenergy development drew together this repertoire — stories of recreant acts, identities of simultaneously "pristine" and threatened places, claims of distrust and the state's incapacities — into what Swidler (1995) refers to as a "crystalized" ideology, in this case, an ideology articulating industrial development as exploiting local public resources for private gain. Actors in the area construct this ideology in order to upset the region's dominant, generations-long trend of welcoming extraction as an unquestioned means of economic development. That is, drawing on the cultural resources available to them, actors in Rapid River transformed their private ambiguities into a collectively asserted ideology of resistance. This was successfully set against the usual practice of promoting extractive development, aptly illustrated on the sign reading "Welcome to Kalkaska *Space to Grow*" that greets visitors crossing the county line (See Figure 3 in the Appendix).

Furthermore, this suggests the importance of cultural hurdles for constructing bioenergy development in ways other than as a problem in Rapid River. Interviewees in both communities privately expressed doubts and hopes about various aspects of the proposal, ranging from industrial development in general to particular features of the technology. However, these individual ambiguities — or "symbolic interpretations" (McLachlan, 2009) — are less powerful with respect to explaining Rapid River's resistant response to bioenergy development than the shared context within which individuals here confront bioenergy. That is, the doubting or trusting evident in public discourse reflect a web of meanings salient for residents of Rapid River. For example, allowing the developer to site the facility on agriculturally zoned land would

not only subject residents to new risks, but remove barriers currently in place for local control over future development. This is tantamount to allowing those who have exploited the township in the past unfettered access to the area's valued resources. Rather than individual acts of doubt or resistance, we witness a "coherent culture" Swidler, 1986, p. 279) emerging in contrast to the dominant practice across these communities: welcoming industrial development and extraction as necessary for perpetuating life in northern Michigan. Responding to proposed bioenergy development as a *non*-problem in Rapid River would therefore require actors to overcome these cultural hurdles.

Rather than doubt, confidence in industry and state institutions was recurrent in discourse in Mancelona. Punctuating arguments made during the air permit hearing and in numerous editorials, interviewees from Mancelona said explicitly that the capabilities and intentions of the developer, state agencies, regulatory frameworks, as well as the prospect of pollution control technologies ("scrubbers"), were reason enough to set aside the doubts asserted by actors from Rapid River.

> I don't think the [M]DEQ would issue a permit if they couldn't keep the air quality standards where they need to be. (Township treasurer)

> And the laws in the eighties were not the laws we have now. Michigan is one of the most stringent states in the country... (Newspaper editor)

> So if you are building a biomass plant in 2012 or 2010 it's not the same technology that you built the Antrim Iron Works on in 1888. (Community organizer)

> As far as I'm concerned, the state would not allow the cutting unless there's [enough wood]. [The state] has done a lot of research and Jordan Development has done a lot of research for that availability of wood, wood chips. (Township supervisor)

At first glance, statements such as these suggest a high degree of trust in regulatory institutions, industry, and technoscience. However, in interviews, further probing suggested these trusting relationships are perhaps more tenuous than they initially appear. For instance, when asked why he trusted the developer, the community organizer explained

> if [the developer] can look you right in the eye and say this is how we're going to avoid polluting the air, we're not going to put anything into the ground that's a contaminant, I guess there's a certain amount of *leap of faith*

That is, trust for developers is wrapped up with the recognition that this was indeed a gamble — less a guaranteed success than the only reasonable option. As with Rapid River, discourse in Mancelona revealed ambiguities around several environmental issues. This included the impact increased forest harvesting would have on the area's soils and streams, how the proposed facility's operations would interact with TCE plumes, as well as questions regarding CO2 emissions. Probing revealed these and other anxieties remained salient only in private spaces. Publicly, however, private worries failed to align with the concerns of others in the community. Instead, concerns are imputed with two cultural constraints. First, the side effect of raising concerns may be to deter, as was oft repeated, "much needed economic development"; and

second, bioenergy development already had its detractors in Rapid River, and, as interviewees were quick to point out, "Mancelona was not Rapid River".

The context within which trust and confidence is expressed and acted upon is important for understanding why these and other grievances fail to take root. Intertwined throughout discourse on confidence and trust in institutional authorities was a prevalent, but seemingly taken-for-granted caveat: development may impose risks, but such risks are a necessary component of life in this community. Living and working in what was once the quintessential company town, and today identified by interviewees as an "industrial community", requires living with both the benefits, such as employment and a tax base, as well as negative consequences, including the sights, noise, smells, and other disturbances, and especially pollution. The benefits of industrial development, however, had recently largely disappeared. With Dura Automotive's closure in 2009, and the exodus of several additional manufacturer employers in the area, unemployment nearly doubled (See Table 5 in the Appendix).

Some local officials argued the potential for new jobs alone was reason enough to set aside concerns about pollution from bioenergy development articulated in Rapid River, a sentiment echoed in an editorial in the local newspaper:

> I can't believe that anybody who is out of work or worried about their neighbor's ability to put food on the table and keep their home would worry about this plant. In fact, the only worry we ought to have about it is how soon can the project get started.

In this way, the shared context of the community as struggling economically constrains critical responses. The response by the editor of the paper in Antrim County to my interview question

about the potential for the new bioenergy facility to exacerbate pollution in the community is telling:

> We consider [the existing contamination] something that, it's there, but we try to learn from our mistakes, and still provide progress, development, and...it depends, *it's a real fine line*...and a lot of people, with the economic situation, they just prefer to look the other way*, and that's what keeps Antrim County going*.

Balancing the "fine line" and "keeping Antrim going" consists of raising only the "right" sorts of questions about development proposals. Overly critical inquiries, or in the words of the village president, "complaining", must be avoided, as this may forestall local development. The case in point here is Rapid River, discussed by actors in Mancelona as scaring off a promising development proposal. Instead, the village president declared Mancelona was "willing to lead" in the face of risk:

> I've lived here all my life. *I've seen contamination*. I've seen what it can do. *But I've also seen what a loss of jobs can do to small communities*...If we know there's a problem, of course, ask enough questions so you can make a good decision...but if we say no more automotive plants in the state of Michigan, what are we going to do?...I am concerned about my grandchildren and I would never vote for something that I thought...would hurt them. But on the other hand, do I always act in fear and vote no? And they have nothing if they wish to stay?

This discourse suggest that pronouncements of trust by Mancelona actors for MDEQ employees, university scientists, professional foresters and planners, and other experts who attest to bioenergy's low level of environmental risk should not be read simply as individual acts of uninhibited free choice. Instead, as has been illustrated by literature on "virtual" or "as if" trust (Wynne, 1992; 1996; Carolan, 2006a), statements that on the surface appear genuine may hide a deeper mistrust. This suggests that people may be compelled to make statements of trust when they feel they have no other choice (Carolan, 2006b). When considered in the context of the "fine line" discussed by interviewees in Mancelona, the 'trust' expressed here appears part of the normal way of doing things, or what Swidler (1986) refers to as an established way of life. 'Trust' in the institutional authorities that define bioenergy development as "safe" is therefore necessary for "keeping Antrim going."

Incidentally, Mancelona has been "going" along much the same trajectory since Otis first located his blast furnace there in 1882. As discussed above, industrial development, and accompanying pollution, was not only highly visible but centrally located within the community. Numerous generations of Mancelona residents lived with, worked at, and depended on manufacturing and other heavy industries as they had done so since the company town of "Furnaceville" was first founded over one hundred years prior. As discourse around proposed bioenergy development in Mancelona reveals, the negatives (e.g. contamination, pollution, etc.) and positives (e.g. employment opportunities and economic development, tax base, etc.) of industrial development are tightly interwoven — one cannot easily be disconnected from the other. In this way, what is made overtly problematic in Rapid River goes understated here. The constraining power of industrial culture in Mancelona is aptly captured by Swidler's (1986, p. 281) observation that

> people do not readily take advantage of new structural opportunities...because they are reluctant to abandon familiar strategies of action for which they have the cultural equipment.

In Mancelona, constructing proposed bioenergy development as a problem, rather than a non-problem, would require residents to contest, uproot, and recreate not only the claims of the developers, institutional authorities, and technical experts, but what many in the community would likely identify as "common sense" (Swidler, 1986). Life in this company town provided few, if any, resources for assembling a collective response capable of challenging what appears here as little more than the normal way of doing things (cf. Wright, 2005).

Conclusion

In this paper, I presented a symmetric approach to studying the social construction of environmental (non)problems to show how the unique responses of two nearby and seemingly similar communities to the same development proposal were shaped, in part, by differing cultures of industrial development. Building on Swidler (1986; 1995; 2000), I have examined how culture can operate publicly and materially. I have argued that this process is intertwined with both political contexts specific to particular locales and respective authorities as well as the spatial, material arrangements of industrial development in these places that have taken shape over the past one hundred plus years. In sum, in consideration of the way these communities have seemingly embraced extractive and industrial development in the past, it would seem likely that each would have responded to proposed bioenergy development as a non-problem. After all,

university, state, and other institutional authorities and experts claimed bioenergy would be environmentally benign if not beneficial. What we witness instead are divergent responses. Discourse in Rapid River, a self-defined "oilfield community", drew on locally available cultural resources to articulate a unified ideology of exploitation and distrust that successfully contested future development. While uncertainties and concerns were also evident in Mancelona, a place where polluting industrial facilities lined the main streets, responding to proposed bioenergy development as a non-problem was constrained by a way of life in which such potential troubles were deeply enmeshed with normal ways of understanding what it means to live in an "industrial community", and what it will require for future generations to also call this place home.

These findings suggest the usefulness, for researchers, of taking a more symmetrical approach to studying social responses to proposed technology development. Too much literature assumes a focus on resistance, while too little couples this analysis with comparable cases where resistance fails to emerge. But even this reformulation does not go far enough, as it still prioritizes attention to responses that are critical to development, and therefore implicitly assumes resistance itself as problematic. The symmetric approach developed here offers an alternative point of departure, problematizing social responses that construct development and associated environmental issues as both social problems and non-problems. In doing so, scholars can find a foothold for studying critical responses to "green" energy technologies as something more than a hurdle to invested actor's plans, and instead look for ways a range of responses may shape technological futures in socially beneficial ways[34].

Moreover, these findings suggest several avenues for future research on large energy

[34] Two examples of this would be Freudenburg and Pastor's (1992) "laxity-legitimacy loop", which emphasizes the important role of critical public responses in "not just a real toughening of regulations, but also increased attention to the *symbols* of regulation and concern for public welfare" (emphasis in original) (p. 402-3), as well as the work of David Hess (2007) who examines the way civil society can work not only against technology promoters, but with them to achieve more desirable, and less environmentally damaging, energy technology projects.

technologies and environmental non-problems. Building on Freudenburg (2000), scholars such as Beamish (2002), Bell and York (2010), and Bain and Selfa (2013) have shown how powerful and interested actors — oil industrialists, coal barons, and agricultural organizations — were able to construct and perpetuate ideologies and belief systems that prevented either the recognition of environmental risks, or acts contesting their imposition. In the case of proposed bioenergy development, the evidence presented here suggests the need to also investigate the importance of less tangible, and more pervasive, sources of cultural dominance.

I conclude with three observations made explicit by the findings of this research. First, like wind, solar, and other large scale renewable energy technologies, bioenergy benefits from what Wright and Reid (2010) have termed a "master frame of sustainability". That is, proponents can draw on powerful, resonating cultural themes such as "green", "renewable", or "sustainable" when making claims about the need for technological development. In this way, both promoters as well as those actively resisting specific siting proposals often find themselves interacting within a cultural system that implores, by the necessity of steering clear of the absurd, the denouncing of environmental pollution from fossil fuels — a situation that arguably affords renewable energy technology promoters the upper hand. Research on the social construction of renewable energy technologies should give attention to the ways these processes differ between "green" and "conventional" technologies.

Second, while oil, coal, and, more recently, corn ethanol, are increasingly denounced as environmentally threatening by scientific authorities, have garnered significant resistance from environmental groups, and are increasingly scrutinized in public discourse at national levels (cf. Bain and Selfa, 2013), a consensus on the impacts bioenergy technologies will have on the environment has yet to emerge. For instance, the EPA is currently reviewing the science on

bioenergy's impacts on greenhouse gases, and major environmental organizations often find themselves in the awkward position of being at odds with local, grassroots organizations that contest specific proposals that would fall under the promotional agenda of their national chapters. Claims then, expert or otherwise, that bioenergy technologies such as the woody-biomass facility discussed in this paper are environmental problems or non-problems are especially vulnerable to attack from contending experts, authorities, or social movements. That is, the opened-ended, emergent character of renewable energy technologies such as bioenergy provides both important opportunities and hurdles for actors to socially construct it as more or less problematic.

Finally, in the case of bioenergy development, it is less clear who it is that utters what Freudenburg (2000) refers to as "privileged accounts". In Freudenburg's original formulation, powerful, interested actors are behind the social construction of environmental issues as non-problems. These actors and their claims can be identified and located, at least by activists or scholars, as established corporations or industries. Yet in the case of Mancelona, we see how this process transcends the assertions of any one powerful actor's interests, and instead requires an investigation into the ways the everyday practices particular to specific locales censure critical discourse. Future research should examine the "privileged accounts" of not only present day, active, and/or interested actors, but also as existing in the practices and discourses of particular locales. Doing so requires attention to not only articulated ideologies, but to the unselfconscious domain of what qualifies as "common sense" in particular places, and its links not only with identifiable and interested corporate actors, but numerous forms of human interaction with natural resources over several generations.

APPENDIX

Table 3: Total Population in Antrim and Kalkaska Counties, U.S. Census, 1880-2012

	Antrim County	Kalkaska County
1880	5,237	2,937
1890	10,413	5,160
1900	16,568	7,133
1910	15,692	8,097
1920	11,543	5,577
1930	9,979	3,799
1940	10,964	5,159
1950	10,721	4,597
1960	10,373	4,382
1970	12,612	5,272
1980	16,194	10,952
1990	18,185	13,497
2000	23,110	16,571
2010	23,580	17,153
2012*	23,634	17,231

*ACS 2008 -- 2012 (5-Year Estimates)

Table 4: Industrial Cultures in Mancelona and Rapid River Townships

Industrial Cultures	**Rapid River Township**	**Mancelona Township**
Existing Pollution	*Emphasizes* the malfeasance of previous industrial development, which had unnecessarily and knowingly polluted the area's environment and threatened human health.	*Emphasizes* how the area's legacy of pollution resulted from ignorance. Pollution was unintentional as no one knew these acts would threaten the environment or human health, so no one is at fault.
Future Pollution	*Emphasizes* how regulation by the State cannot protect local citizens from risks posed by future development.	*Emphasizes* how the State's regulatory framework is adequate and trustworthy.

Table 5: Unemployment Rates in Antrim and Kalkaska Counties

	Antrim	Kalkaska
1970	7%	15.4%
1980	14.1%	16.8%
1990	9.4%	10.2%
2000	6.4%	6.4%
2012*	13.6%	15.5%

*ACS 2008 -- 2012 (5-Year Estimates)

Figure 2: Map of Mancelona and Rapid River Townships

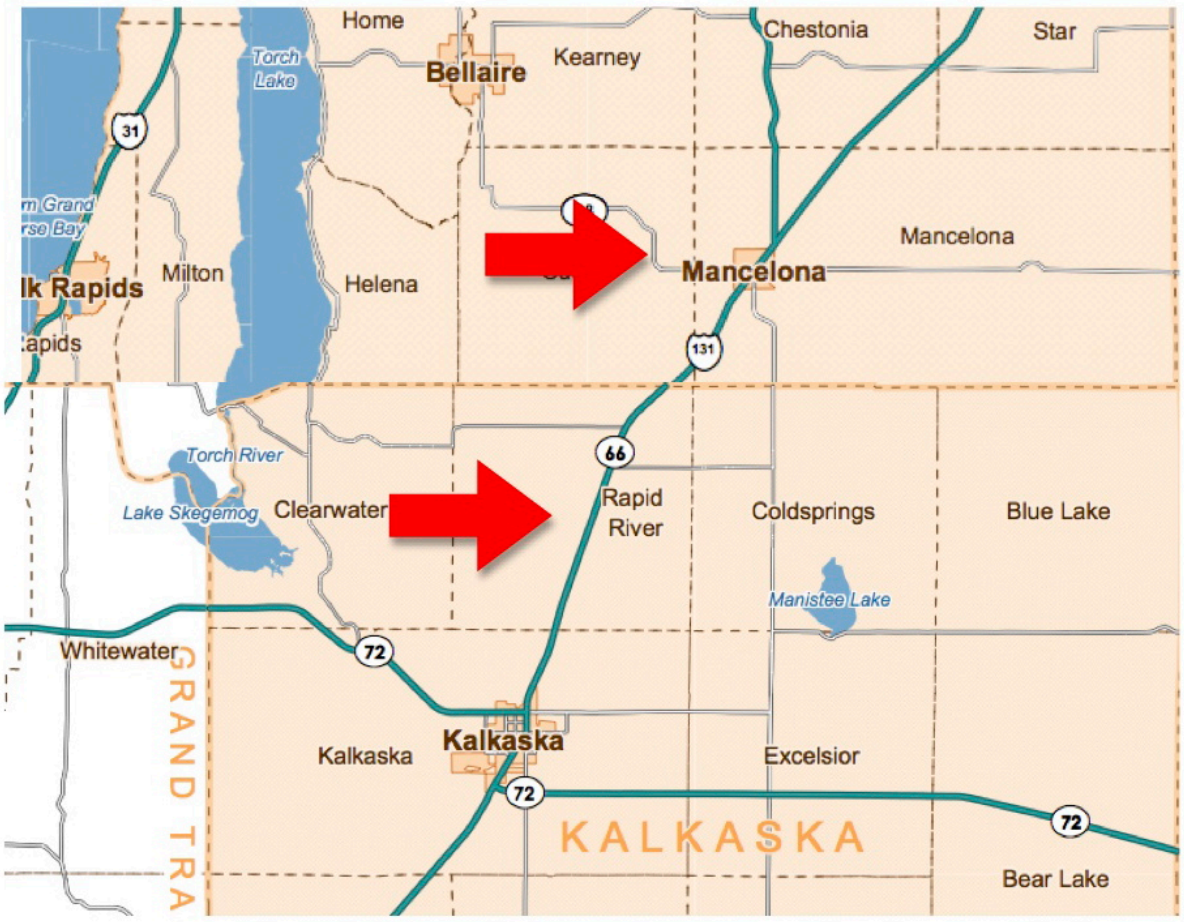

Figure 3: Mancelona High School “Ironman” mascot featuring a worker presumably from Antrim Iron Company

Figure 4: Welcome to Kalkaska sign. Note the prominently featured oilrig and motto “Space to Grow”

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CHAPTER THREE

HOW COULD PEOPLE OPPOSE RENEWABLE ENERGY? REFRAMING CONTROVERSY OVER BIOMASS AS A 'QUEST FOR CONFIDENCE' REQUIRING CRITICS TO 'CLOSE THEIR EYES'

Introduction

Much of the literature on siting disputes over renewable energy technologies (RETs) overlooks the way community responses to RET proposals are shaped by the context of public disputes. By context, I am referring to the way the public format of siting disputes shapes actors' engagement with one another as well as with their environment.

Siting disputes are public affairs. In communities where new developments are proposed, discourse on the potential risks and benefits of a locally sited RET project spans local media, public forums, permit hearings, as well as everyday discussions. This public format is an understudied, but important factor in shaping the disputing process as it constrains what qualifies as a legitimate argument on behalf of, or in opposition to, a proposed development project. For instance, actors arguing in favor of a specific RET proposal cannot expect to gain support by referring to the private benefits their family would accrue were the project to be sited locally. Nor would an argument about the potential benefits to a specific industry be likely to engender the public's confidence. Instead, arguments that qualify as legitimate must evoke a sense of the common good.

The argument I develop here suggests we take seriously the idea that publics are important for decision-making processes around the implementation of RETs (cf. Hess, 2007). Said differently, my aim is to demonstrate how the public context of RET disputes shapes their outcomes. Over the past six years, I have met with elected officials, concerned citizens, and numerous other groups grappling with the development of various bioenergy projects in their

communities. While development proponents often bemoan intervention from state regulatory agencies, environmental groups, and concerned citizens, many tend to observe that it is much more difficult to exclude the public today than in the past. What we witness then in contemporary RET siting disputes is a struggle on the part of technology promoters to engender the confidence of critical actor groups.

To conceptualize this struggle, I draw on Luc Boltanski and Laurent Thévenot's (2006; 1999; Thévenot, 2012) sociology of engagement, which suggests actors in non-violent public disputes must justify their arguments by appealing to a limited set of higher principles or "common goods" in order to qualify their claims as legitimate. This suggest actors must produce not only symbolic arguments, but material evidence others can use to "test reality". This is all done in the effort to establish agreed upon legitimacy and truncate debate, reflecting actors' will to relieve the tension of disagreement and converge on some sort of resolution to the crises, be that a new agreement or otherwise. In short, a sociology of engagement suggests actors participating in disputes engage in a "quest for confidence" (Thévenot, 2012), achieved when actors invest confidence in the project, "closing their eyes" to alternatives. At the same time, doubt, or "opening one's eyes" to the possibilities that were sacrificed with placing confidence, is always a possibility.

I draw from this literature in order to develop an alternative approach to studying siting conflicts over RETs. Rather than asking 'why' different actor groups support or oppose particular projects — a line of inquiry plagued by implicit normative assessments — I shift the question to 'what', 'how', and 'when': how do actors justify their particular interests and positions? What evidence is presented to test reality? When do actors open and close their eyes?

I develop this approach with a case studying of a recent siting dispute over a proposed

biomass gasification development in northern Michigan's Traverse City. I begin by reviewing three common approaches to studying controversy over RETs before offering an alternative approach building on a sociology of engagement.

Common Approaches to Studying Siting Conflicts

Controversy over RET development has been studied largely from three perspectives — what I refer to as 'value-conflict', 'social acceptability', and 'political sociology' approaches. These literatures share the assumption that conflict over the implementation or operation of large RETs can be explained in terms of differences between groups of people (e.g., their interests, worldviews, values, cultures, and risk perceptions).

This is evident in 'value-conflict' literature that attempts to demonstrate the validity of efforts to resist RET development. The anecdotal explanation for resistance is that residents exhibit a knee-jerk 'NIMBY' (not-in-my-backyard) attitude (cf. Freudenburg and Pastor, 1992). Despite attempts by social scientists to demonstrate otherwise (Burningham, 2000, Devine-Wright, 2011; 2007), this explanation remains common for frustrated planners, developers, promoting city officials, and university scientists whose efforts to implement new RET projects have been derailed by concerned citizens. Rather than irrational or selfish acts, these social scientists argue local people have good reason to oppose projects that might jeopardize "their well-being and their livelihood" (Rootes, 2007, p. 732-3). From this perspective, controversy over RET development underscores a conflict between opposed beliefs, interests, and values.

This is perhaps best expressed in Rootes' (2007, p. 733) argument that a "fundamental contention" divides residents and project proponents: "[t]he transient, exploitive culture, rooted in exchange values of globalising capitalism, and the culture of rooted, sustainable communities

are simply irreconcilable, reflecting two radically opposed conceptions of being-in-the-world". This argument echoes Schnaiberg and Gould's (1994) contention that economic development and environmental protection are fundamentally incompatible, as well as scholars who posit siting disputes as emerging when risk-takers impose projects on risk-bearers (cf. Beck, 1992) Similarly, Lidskog's (2005) study of siting conflicts emphasizes a clash of interests between local groups (who see projects as a "nuisance"), and national groups (for whom it is a "necessity"). Tensions between these groups reflect "the structure of contemporary society", which "implies a multiplicity of lifestyles and value systems, all of which exist more or less side by side and which are embraced by different individuals and groups" and "flourish in a siting conflict" (p. 191).

In short, the 'value-conflict' approach suggests siting conflicts illustrate an inevitable clash of values in a pluralist society. Closure then is possible only through force as groups involved in disputes are fundamentally opposed.

A second body of scholarship takes a more optimistic view of technological development. From the perspective of a 'social acceptability' approach, while not a panacea, RETs are a step in the right direction -- that is, a step away from total reliance on fossil fuels. The purpose here is to identify what it is people find risky about the technology in order reduce the number of failed attempts to develop RETs (Upreti, 2004; Upreti and van der Horst, 2004; Sinclair and Lofstedt, 2001; Walker, 1995; Walker et al., 2010). From this perspective, conflict over proposed sitings raises questions of social acceptability: what factors shape public acceptance (Devine-Wright, 2007)? What are the "causes and consequences of public opposition" (Upreti and van der Horst, 2004)?

In their studies of conflict over biomass energy development in the U.K., Upreti's (2004)

and Upreti and van der Horst's (2004) findings uncover specific grievances expressed by local communities. These include "the location of the plant, perceived risks, and negative effects to ecology and landscape as compared to few economic benefits to local people", as well as "feelings of injustice [and] weak public relations strategy" (Upreti, 2004, p. 785). Upreti and van der Horst (2004) expand on these findings. Beyond specific grievances, conflict over and the eventual failure of the proposed biomass facilities in their study relates to "two distinctively rigid characteristics among the key stakeholders...the 'not-in-my-backyard' attitude of the public and the 'there-is-no-alternative' attitude of the developers" (p. 61), as well as the public's mistrust of developers. Sinclair and Lofstedt (2001) also draw attention to the importance of trust in siting conflicts over RETs. Specifically, they employ survey methods to uncover local residents' levels of trust for five key institutions involved in the debate over a biomass plant proposed in the UK.

From the 'social acceptability' perspective, the *public's* trust is of the upmost importance if new RETs developments are to be successful, and conflict emerges when citizen's grievances go unaddressed by decision-makers. Inquiry into decision-makers' levels of trust, however, are noticeably missing, which suggests this approach's a priori investment in the success of a particular industry.

A third 'political sociology' approach examines not only resistance to technological development, but asks why potential issues fail to be defined as troublesome. Scholars working in this vein tend to study the practices of established industries, as opposed to more emergent RETs, focusing largely on their environmental abuses and negative social impacts (Freudenburg, 2000; Beamish, 2002; Bell and York, 2010). The purpose of this research has been to answer questions as to why, despite mounting evidence of environmental exploitation, challenges to industry fail to arise, even when social benefits have all but disappeared (Bell and York, 2010).

Freudenburg (2000), building on earlier work that draws attention to how potentially important issues fail to be recognized as public issues (Lukes, 1974; Crensen, 1971), argues that industrial actors' "privileged access" to natural resources is made possible through powerful ideological beliefs that "naturalize" potentially or actually destructive environmental practices.

Extending these questions into the field of RETs, Bain and Selfa (2013) ask why concern over the environmental impacts of corn ethanol development in Iowa remains "conspicuously silent" (p. 361), despite the growing level of concern evident at national levels. Their explanation argues that the ethanol industry has successfully framed its ongoing production as "central to Iowa's identity and future" (p. 365), evident in the billboards promoting corn farming in the state, and the pride expressed during interviews with farmers for being able to contribute to a successful industry. While the typical response from supportive farmers and others in the supply chain was that the negative impacts had been overstated, actors working for environmental groups did raise criticisms. These, however, remained private, as their public expression would compromise important partnerships these groups had established with agricultural groups.

In sum, from the 'political sociology' perspective, conflict over RETs development involves deliberate attempts by powerful, interested actors to manipulatively frame their industry in ways that distracts the public's attention from environmental risks.

While the approaches sketched above have provided important insights into conflict over RET development, in focusing primarily on differences between groups of people, they each gloss over the way the public setting of siting disputes shapes actors' behavior.

Justification as a Community Context Shaping Siting Disputes

Boltanski and Thevenot (1999; 2006) developed an "engagement" approach to studying

conflict in the tradition of French Convention Theory and John Dewey's pragmatic philosophy, both of which shift attention away from group characteristics and toward the way action is justified in concrete situations. Their concern is with not only human interactions, but the way people respond to and interact with their material environment in public disputes. To understand the importance of the situation of public disputes, researchers first must conceive of actors in disputes as "endowed with an ability to differentiate legitimate and illegitimate ways of rendering criticisms and justifications" (Boltanski and Thevenot, 1999 p. 364). This assumes a level of critical capability that goes unaddressed by political sociology's attention to cultural and ideological manipulation. While important for answering questions of, say, ongoing support for scientifically debunked technologies and industries (Bell and York, 2010), or why some places support technologies that are openly criticized elsewhere (Eaton, 2015), an emphasis on cultural or ideological manipulation by powerful, interested actors risks bracketing out of the analyses the processes by which participating actors qualify a project as legitimate or illegitimate.

This process begins when actors express doubt concerning the claims or plans of others. In these "critical moments" (Boltanski and Thevenot, 1999) actors working to justify their claims assemble evidence in an effort to produce arguments others will respond to as legitimate. This is precisely what is meant by the term "engagement" — a quest for a "social good" that supports confidence (Thevenot, 2012). The public format of disputes is important as it obligates actors to justify their arguments in terms of some agreed upon 'common good', however that be defined. Arguments that fail to appeal to some high principle violate the expectations inherent in public situations and, therefore, are vulnerable to accusations of illegitimacy. Attention to actors' assessments of the 'good' -- as well as 'evil' -- puts the normative claims of actors at the forefront of analysis. Indeed, as I demonstrate below, actors discuss the proposed RET project as

"right" or "wrong", "just" or "unjust". Thevenot (2009b) suggests a justification approach is different from sociology's usual attention to "values" or "interests", which are merely "avatars" for the "delineations of the common good". Instead, justifications are appeals to normative ideals made in a public format, and are therefore bounded by a shared understanding of the importance of public benefits. Importantly, justifications involve not the multiplicity of values as assumed in the above 'value-conflict' literature, but only a limited plurality of higher goods, or "worlds of justification". These are shown in Figure 5 in the Appendix.

A second component draws attention to the way actors in disputes must wrangle together material evidence in order to qualify their arguments. Each world of justification entails its own "test of reality", a term reflecting the material evidence actors enlist to support their appeal. More than "information", which presupposes a neutral, generic format, reality tests reflect the ways actors must construct or "take hold" (Thevenot, 2009b) of their environments differently in different situations. For instance, actors in this study often appeal to the Ecological world, which suggests that a proposed biomass project would provide environmental benefits or detriments. This corresponds with, say, technical reports as to the positive impacts a new local biomass industry would have on area forests, or scientific findings regarding the potential for negative impacts on local air quality. Overall, to qualify as legitimate, the validity of such tests would need to be agreed upon by all parties.

However, no reality test can guarantee confidence and an end to a dispute, but are instead susceptible to two primary forms of denouncement (Boltanski and Thevenot, 1999). First, accusations can be made that the world appealed to conceals an ulterior justification, and thus criticisms can emerge from within one world in particular. For example, an argument that a proposed RET is right for a community based on the technology's efficiency (Industrial world)

can be denounced as veiling an ulterior motive (e.g., economic benefit for interested actors -- Market world) -- the accusation being that the 'good' of the RET actually belongs to another world. Against such criticisms actors work to tame ambiguities by "purifying" future tests.

Second, reality tests can be denounced as unfit for the given situation. Arguments that a certain RET will provide the community with, say, new employment opportunities and tax income (Market world), may be denounced as inappropriate considering the potential for negative impacts on the local air quality (Ecological world). The latter is a more "radical" dispute in that one reality test is matched up against another. In such cases, closure requires deciding upon one appropriate reality test (ibid.).

In this study, actors justify arguments through appeals to higher principles and enroll material evidence in the attempt to qualify a RET project as credible and, therefore, *deserving of confidence*. In the process, new actor groups emerge. These emergent groups raise questions and concerns, in effect unpacking "black boxes", opening their contents to reexamination by a winder number of actors (Callon, et al., 2011).

Drawing from this literature, I examine the dispute over proposed biomass development in Traverse City as a "quest for confidence" (Thevenot, 2012), where actors attempt to demonstrate the qualifications of their arguments to skeptics. Unlike the 'social acceptability' literature discussed above, my approach is symmetrical rather than biased in that I take into account how actors move back and forth between positions of confidence (or "closing one's eyes") and doubt ("opening one's eyes") (Thevenot, 2012).

Confidence requires "sightlessness" to the "other forms of possible coordination that are sacrificed in the establishment of the form" (p. 795). In this position, judgment ceases precisely at the "letter of convention" (ibid.) as formulated by institutions. Doubt is suspicion over what is

sacrificed when the current form is invested in. This happens for all actors in disputes -- not just for the publics (e.g., citizens, local activists, environmental groups, etc.) discussed in the above siting dispute literatures. 'Proponent' groups (e.g., in the case given here, the city's utility, university foresters, and, later, the utility's board and some city commissioners) who champion projects also 'doubt'; for instance when they initially confront new technologies. This point is especially relevant in the context of RETs, which are often emergent, unsettled, laden with uncertainties, and, perhaps most importantly for this paper, largely unfamiliar. Therefore, local actors must rely upon the expertise of others.

Understanding positions of confidence and doubt requires an analysis of actors' justifications (the worlds appealed to when arguing the project is "right" or "wrong" for the community). That is, as compared with the existing siting disputes literatures, which tend to impose their own normative stance on their evaluation of particular technologies or key actor groups at the center of disputes, this approach suggests that disputes reflect the unfolding of what people define and respond to as being right or wrong for the community. Said differently, rightness or wrongness is exactly what is at stake in disputes. The point then is to understand the consequences of these positions for the dispute, including both how these positions shape action and how others respond to these positions.

Background and Methods

My analysis centers on a case study of the recent siting dispute over a proposed biomass gasification project in northern Michigan's Traverse City, a community whose character suggests amenability to RET development. Located on the northern shore of Lake Michigan (see Figure 6 in the Appendix), Traverse City is a destination community, known for its close proximity to

sand dunes and beaches, orchards, wineries and breweries, public lands and trails, world class streams and shorelines, as well as lush forests -- all of which is eagerly protected by a strong environmental ethic. While much of north-central Michigan can be characterized as rural, with shrinking communities whose economies remain tied with a legacy of resource extraction and industrial manufacturing (Eaton, 2015), Traverse City, the heart of Leelanau County of north-western Michigan, is instead a growing amenity community with strong environmental and public participatory cultures evident in numerous environmental organizations, law firms, and public initiatives.

And whereas siting disputes most often involve an 'outside' private developer's proposal, this dispute is unique in that Traverse City Light & Power (TCL&P), a municipal utility operating under the direction of a board and reporting to city commissioners, proposed the project. I collected data for this study during the first four months of 2010. At this time, the city's coal plant along with three hydro-electric projects had recently been decommissioned, while long-term coal contracts were fast approaching expiration. This provided an opportunity for the city to reassess its relationship with the fossil fuel sources that supplied 99 percent of its energy. In an effort to not only meet but exceed the State's recently enacted Renewable Portfolio Standard (RPS) of 10 percent renewable energy by 2015, city commissioners and TCL&P developed a strategic plan calling for 30 percent renewables by 2020 (30 by 20), thus opening the door to discussions of developing one or more 10 megawatt biomass facilities as a means to achieve this goal. In short, I selected Traverse City for this study as it appears to be an ideal candidate for the successful development of a RET project considering the absence of explanatory factors for the emergence of disputes identified in the existing literatures (see above) were noticeably absent. Nevertheless, controversy emerged shortly after the city began

discussing biomass technologies with the public. As is shown in the Figure 7 in the Appendix, after a several months long quest for confidence, the project was abandoned early that summer.

Rather than presenting an exhaustive account of the dispute, my purposes here are limited to examining the justifications and phases of confidence and doubt of key actor groups actively participating in the dispute. This includes five groups: TCL&P staff, the utility's board of commissioners, local environmental organizations, statewide environmental groups, and concerned citizens. To this end, I draw from three data sets. First, I interviewed 17 actors actively participating in the ongoing dispute. Interview questions were designed to elicit responses as to why biomass development was "right" as well as "wrong" for their community. Second, I coded over eight hours of videotaped "study sessions" held between January and April, 2010. Study sessions were open to the public and consisted of utility board members discussing evidence from TCL&P staff and other expert testimony on biomass technologies and public relations and concluded with a limited time for public comment. Finally, I content analyzed local news coverage primarily from the two print sources covering the dispute, but also reviewed several additional minor print and online publications reporting and commenting on the dispute. All data sources were coded for arguments that appealed to the worlds of justification described above, as well as for indications of "confidence" versus "doubt" in local biomass development. For example, justifications based on the technology's qualification as renewable as compared with natural gas technologies were coded as appealing to the 'Ecological world', and identified as being tested, in this instance, according to State law. To discern phases of confidence and doubt, I noted actor's own expressions as to their stance on biomass.

Analysis: Public Justifications and Reality Tests of Biomass Development

The following analysis is organized across what I categorize as three phases of the dispute (although these phases often actually overlap). In the first, TCL&P board members weigh arguments from utility staff and industry and university experts when deciding upon a plan for achieving the 30 by 20 strategic plan. The important questions here are how commissioners whittle away at a range of options and finally invest their confidence in biomass technologies as the best option. A second phase opens when TCL&P begins a public relations campaign designed to elicit "public buy in". Here I draw attention to appeals to four worlds of justification and the tests constructed by the utility to convince others of the credibility of their plan. Lastly, I draw attention to critics' responses to proffered reality tests and how these responses are also shaped by the public context.

Phase One: "Getting Comfortable" with Local Biomass Development

The quest for confidence begins well before the utility's PR campaign. First, utility board members themselves must decide that biomass technologies ought to be utilized and other options set aside. Below I provide one illustration of how biomass development was justified and tests developed to qualify the technology — beginning with arguments of TCL&P's staff — and the corresponding shifts in board member's positions of confidence and doubt. What is central in this phase of the dispute is how, amongst several possibilities, biomass technologies emerge as not only the utility's preferred choice, but the only option.

Biomass development first emerged as a possibility after TCL&P staff and two city commissioners participated in a tour of Scandinavia's wind turbine industry in 2005. Ten years prior, TCL&P became the first public utility in Michigan to install a wind turbine, thus the initial focus on wind for future RET investments. However, technologies that rely on wind, or the sun

for that matter, were of only marginal interest to the utility as they were deemed incapable of replacing the energy soon to be lost in the expiring coal contracts. Beyond wind turbines, the tour also visited several biomass Combined Heat and Power (CHP) generating facilities that utilized forest resources and municipal refuse to create electricity and heat. While biomass facilities were discussed as enticing for a number of reasons, their capacity to provide constant, base load power was most heavily emphasized.

Following the trip, TCL&P began devoting resources to studying biomass development and, in late 2008, worked with city officials to develop and take action on a strategic plan with four components: local generation, competitive pricing, diversified generation, and renewable energy. A few months later, the utility announced to the public their goal of 30 by 20, and began discussion of biomass technologies as the means to that end.

Until this point, the utility and board were evidently unaware biomass development would be challenged in any serious capacity. However, a first "critical moment" emerged when plans gave way to action and the utility began negotiating a land purchase for siting a biomass facility. These plans enter the public domain through press coverage critical of the utility making decisions in lieu of public input. It is here, after the land purchase faux pas, that a dispute emerges between board members who invest their confidence in TCL&P staff's recommendations and those who instead advocate for further study of alternative means to achieve 30 by 20.

This tension is evident below in the exchange between TCL&P board and staff during an early January, 2010 study session. By now, the utility had devoted five years to researching biomass, including commissioning three feasibility studies. Moreover, a public relations consultant has been hired to assist the city in articulating and communicating its plans to the

public in light of mounting criticism. A binding decision on biomass development, however, had not yet been made.

Addressing city commissioners, TCL&P Executive Director draws attention to impending deadlines, including already missed opportunities for federal tax dollars, saying "Opportunities are coming to us, but we're not able to take advantage of them, so they're lost".

A board member who is also a city commissioner, who participated in the visit to Scandinavia, and who supports biomass, says, "All we're doing now is saying how are we gonna sell it to the public."

The Vice-Chairman of the board recaps the past two years, pointing out that the utility's earlier attempt to buy land did not include the public. Purchase negotiations were halted "because we got feedback that the public was not on board. At some point we need to tell everybody -- the public, [TCL&P] staff, ourselves -- this is the date. We need to make a decision. Are we going down the road to biomass? Are we going down the road to coal? Or are we going down a different road?

A second board member asks, "Why are we focused only on woody-biomass? That's all we talk about."

Vice-Chairman: "How much more time can we ask [TCL&P] staff to look at [other options]?"

The second board member again, referring to the recent criticism directed towards the utility's investigation of biomass: "Well, the public says they don't want biomass"

Vice-Chairman: "We've heard from some yes, but there's 11,000 others we haven't heard from" -- a reference to the number of TCL&P's ratepayers.

The board discusses its plans to continue developing a public relations strategy with the consultant. A timeline of 90 days is suggested for this process, after which the board will make a decision. The discussion turns again to what range of options the board needs to consider, and, therefore, what TCL&P would need to examine further, in order for the board to make their decision.

The Vice-Chairman then interjects with the following argument: "We've already said 30% renewables. But coming down to achieve that 30%, we need base load generation, we need a significant…amount of it, and we've got it narrowed down to a handful of things. And for renewables, I understand that natural gas doesn't qualify. Coal does not qualify. We don't have any big rivers around here to produce hydro. What do we have left? So clearly its about biomass."

The second commissioner: "Energy efficiency is asked for..."

The Chairman argues, yes, energy efficiency is fine, but they also must consider growth, which requires base load.

The second commissioner addresses TCL&Ps executive director: "what other renewable base load is available to us?

TCL&P Executive Director: None. Solar, wind, they are not base load -- although we want these in our portfolio.

The board then discusses the merits of choosing biomass gasification technology, which offers more flexibility in terms of fuel sources, as compared with the less advanced, less costly, but more limited stoker-grate fired boilers.

The Chairwoman turns the discussion back to making a decision about biomass technologies more generally: "The reason we are doing all of this is to gain comfort, because if we were comfortable, we'd be moving"

P.R. consultant: "Right, well you were comfortable, but it closed to you. That's what this is about. It's about providing comfort for your rate payers, your community, and yourselves to make a really big decision for the future".

After further discussion by the P.R. consultant on the matter of staying on track with messaging, the Vice-Chairman again asserts their options are limited: "We've had our staff tell us biomass is the only option. We want...this feel good process, we want to hear all the options. How much longer do we need to hear them? This discussion is about biomass."

Other commissioners argue that the public is interested in discussing a range of options to which the Chairwoman responds: "Why would we waste our time looking at options that are not base load?"

At this point, the P.R. consultant argues for the importance of the board to not appear "closed around one option at this time. I think that it is essential to the success of the project. If there is a sense from the public that the board has closed -- we're going to pursue biomass -- and this is just gonna be making the case, in this community, there will be lots of problems with that".

The board then discusses the paradox of, on the one hand, their desire to make a case to the public for the recommendations TCL&P is making to them, while at the same time not appearing to have made a decision, but remaining open to a range of options.

Vice-Chairman: "How is this conversation not going to happen? How can we talk about biomass but remain open-ended?"

This vignette draws attention to a phase of the dispute where doubt is most visibly demonstrated by some utility board members, and illustrates the way action is constrained in the context of public disputes. Biomass technology is justified as the appropriate technology because it is the only technology that can meet the utility's strategic plan, and is justified largely in terms of the Industrial world's emphasis on efficiency. The "reality tests" are premised on TCL&P staff expertise, and the expertise and studies staff have assembled. Denouncing this test would

require board members to produce an alternative set of contradicting evidence — an unlikely feat considering nearly all technical expertise (internal or external) is the purview of utility staff, not its board. Instead of locating criticism within the Industrial world, commissioners expressing doubt justify their counter-arguments by appealing to the public's already evident concerns for this technology (discussed more thoroughly below), thereby grounding their justifications in appeals to the Civic world (in that they emphasis public concerns over more private decisions). In response to criticism, commissioners who express confidence in the utility's recommendations denounce citizen calls for the utility to increase their investment in alternative RETs as irrelevant by again stating how only biomass technologies qualify as renewable and base load.

At this point, the utility's attention shifts to what emerges as an increasingly evident conundrum: in order for the utility's plans to qualify as legitimate in the public arena, the utility must present a plan that suggests their openness to a range of possibilities, while simultaneously justifying biomass technology as being the only available option. The next section examines how the utility constructs several reality tests in the attempt to "close the eyes" of critics and entice them to invest in their plans.

Phase Two: Justifying Biomass to the Public

Successful implementation of TCL&P's plans requires transforming doubt into confidence. During study sessions, several utility board members discussed this task in terms of communicating "facts" with residents: i.e., biomass technologies were the only renewable option for base load, they were cheapest, foresters deemed forest resources available, and so on. As explained by the utility board's vice-chairman:

> "The more people know, the more information we given them, the more they are going to be able to understand, the more acceptable — hopefully the more amenable they will be"

Some suggested facts could be listed on a "FAQ sheet", and the case for the utility's plan could be made through door-to-door visits with ratepayers. That is, by allowing the "facts" to speak for themselves, what were discussed as the "myths" and "misinformation" some in the community were spreading concerning biomass technologies would be dispelled.

However, following the advice of their P.R. consultant, who discouraged framing the utility's case in terms of "facts", these tactics were modified into what was discussed as a "message-based" approach. The central message would be "we have a big decision to make, we want your input". Three public forums would be held in order to provide opportunities for the public to weigh the utility's "messages" (viz. we all want 30 by 20, what options are there for achieving this?) for themselves. In short, these messages and corresponding situations (i.e., public forums, but also letters and claims reported by the local press) were crafted with the intent of steering public discourse away from doubt and toward confidence. I discuss these "messages" in terms of reality tests — deliberate arrangements of material evidence and appeals to particular worlds of justification for asserting what is right, good, or just. The utility's most prominent messages appealed to four worlds and tests: Industrial, Civic, Ecological, and Market.

Industrial tests

The test of the efficiency of biomass technologies was employed by the utility's executive director, chairman, and vice-chairman to convince others on the board to invest in biomass development. Biomass technology's capacity to provide ninety percent operating capacity, i.e.

base load power, was a central justification, supported with technical specifics given during presentations made by the executive director. The test's success becomes evident when board members begin echoing claims previously given by utility staff. That is, once utility staff statements are "translated" (cf. Callon, 1986) into the statements of board members. For instance, in a March, 2010 interview, a board member who previously expressed doubt now argued:

> "We need to supply power and it has to be base load because we have to keep the lights on. I mean, if the sun's not shining and the wind's not blowing, what do we do?"

Importantly, this statement was given to me, a researcher, as well as to the press; that is, the test had gone public. While potent for convincing board members to set aside alternatives, this test was less effective with the public as it risks too strongly revealing the level of investment the utility has already made in one technological solution in particular. Tests less vulnerable to denouncement would be needed.

Civic tests

Civic tests hinge on contrasting public with private interests. In this case, the utility must provide convincing evidence to support the argument that their plans are in the community's best interest — and not merely their own. In mid 2009, when the board had yet to whittle down the range of options to biomass technology, the executive director was quoted in the press giving what can now be seen as a prescient statement:

> "If we don't educate the population about things, it doesn't take long to go down a negative road and that can halt a project. If we can't gain local acceptance of these small biomass plants, then we have to look at other options."

Obtaining "local acceptance" is more than a symbolic gesture. As a municipally-owned and -operated power company, the permits, land purchases, and bond proposals necessary for developing new energy infrastructure require approval from the city commission — who are themselves beholden to local public opinion.

At the same time, whether "local acceptance" exists is precisely what is tested. The utility must produce convincing accounts of the public's supportive response to their plans. At the outset of the utility's P.R. campaign, board members expected some level of resistance — yet the tenacity of resistance to biomass technologies appears to have taken some by surprise. As one board member/city commissioner explained to me:

> "No matter what you do, you're always going to have people who are going to be against that. If we just went for wind, we have wind dragons. If we just went for coal we have the coal dragons, and I've seen wind and coal dragons. This is the first time I've seen biomass dragons."

To construct a test capable of countering what were considered a "vocal minority", the utility pointed to two commissioned surveys where respondents indicated support for the utility's plans. Evidence in hand, the chairman of the board offered this test to a reporter inquiring about the concerns expressed by some during the first two public forums:

> "This is democracy in action ... it's what we wanted, we wanted to know what people think. But when our survey says two to one (in favor of biomass), we have to be really cognizant of that and understand who we work for."

The fact that the utility organized public forums, and that "more than 300 people attended" was also presented as evidence supporting the argument that the utility was operating in the community's best interest.

Yet at the same time, ecological concerns — which the utility believed, following the guidance of foresters, were "addressable", and therefore, did not qualify as reason to abandon the technology — were reopened by concerned citizens, local environmental organizations, and reporters.

Ecological tests

Ecological tests evaluate environmental impacts. Throughout the course of the controversy, the utility designed tests (summarized in Table 6 in the Appendix) for preempting environmental concerns. On trial were industry and university claims, echoed by the utility, that biomass technologies were essentially "carbon neutral", while other base load options (natural gas and coal) were not. More tangibly, concerns over the health of forests were met with the authority of research foresters as well as findings in other "independent studies", which argued the area's forests were more than capable of providing a sustainable supply of forest resources.

Two related tests warrant further attention here. First, biomass facilities are both similar and distinct from fossil fuel power plants. On the one hand, although facilities run the gamut of

technical design-, biomass, natural gas, and coal-fired power plants combust fuel for the purposes of creating energy; and as a result, release emissions. Biomass facilities are therefore much more akin to, say, a coal-fired power plant than they are to a wind turbine. But the biomass facilities proposed by TCL&P would be permitted to burn wood, not coal. And it is precisely "biomass is not coal" that is offered as an ecological test: on the one hand, one may support biomass and oppose coal, or, on the other, criticize and resist biomass, and in so doing, be accused of supporting coal. As board members discussed in interviews with me as well as with the press, and as they were told by the utility's staff at nearly every open-to-the-public utility board meeting, the utility's energy portfolio was approximately ninety-nine percent reliant on fossil fuels. Biomass facilities were therefore qualified as 'clean' and 'green' largely because they were *not* coal. The urgency of this distinction is evident, again, in the words of a dual utility board member and city commissioner: "My concern has always been — as an environmentalist I've been told to get off fossil fuels".

Further, the "rightness" of biomass technologies was tested in terms of a second test: "renewability". State law defines renewable resources as those that can be replenished in a human lifetime — such as forest matter. The test given here then is whether existing policy qualifies biomass technologies as renewable. Again, the same utility board member aptly demonstrated this test during an interview:

> "I'm telling my friends, you can fight us and stop us, but you really should be fighting Lansing, fighting Washington and changing the regulatory issues around biomass if you don't want biomass because currently its listed as a *renewable* resource."

When examined individually, each of the above ecological tests would sufficiently demonstrate how the utility arranged evidence to bolster their ecological justifications. Examining these collectively, however, is important as doing so underscores the mounting criticism — analogous with using one's fingers to hold back a leaking dam — the utility and board was actively responding to. The evidence needed to support ecological tests writ large had to be drawn from numerous sources — university research foresters, industry experts, experts from the state, the personal experiences of board members and opinions of staff, technical documents, proposed standards for forest harvesting and those in the process of being developed — and then arranged together in order to increase the test's strength. Boltanski and Thevenot (1999) use the term "ambiguous situations" to describe the difficulty of engendering confidence with "less pure" tests. What is needed instead is a less ambiguous, or tamed test — one that asserts its case based on broadly agreed upon assumptions, as opposed to emerging and contested science and policy.

Market Tests

TCL&P's coal contracts were set to expire at the end of the year, and only new short term contracts were available (a reflection of uncertainty from discussion on capital hill of a possible "carbon tax"). A more diverse energy portfolio would therefore provide economic advantages, including Renewable Energy Credits (RECs) provided to under Michigan's then new RPS. And as one board member explained, sourcing fuel locally has its own benefits:

> "One of the things [biomass development] does help is it keeps the money in the community. Right now we're…sending about probably fifteen million dollars out. We're

> sending a lot of it out to Missouri, out where the coal is to bring it back and we're giving it to the coal people and we're also giving it to the train people to transport it. And coal is going to get more expensive."

At this point, however, tests provided for the market worth of biomass development remain overly complex as 'passing the test' would require evaluating the vagaries of fossil fuel value chains. That is, ambiguous tests invite others to participate in the evaluation of and in the construction of additional reality tests, which runs contrary to TCL&P's goal of engendering confidence in the plans they are now "comfortable" with. What is needed instead is one "pure" test that clearly distinguishes between an agreed upon good and evil. This is attempted by TCL&P's executive director in a letter sent to ratepayers after the first two but, importantly, weeks before the final April 7 public forum:

> "TCL&P is convinced that the alternative plans would cause significantly higher electric rates which could cause severe economic hardships to Traverse City citizens and businesses. This, in turn, would erode the financial well being of our community."

While this is a "purer" test, it still entangles appeals to two worlds: Market and Civic. The test frames the situation thusly: support for biomass is "good" as it equals lower rates for everyone, whereas recalcitrance is "bad" as everyone will have to pay more.

Phase Three: Denouncing Plans for Biomass

As the above analysis suggests, the public context of siting controversies requires actors to

behave in certain ways. As the first two phases demonstrate, actors in this study are less "free" to justify their responses to challenges as they see fit than they are restricted to a set of common requirements (Boltanski and Thevenot, 1999). Phase one demonstrates the importance of justifications that appeal to the efficiency of biomass as compared with other RETs, while phase two demonstrates how the utility must construct new tests across numerous worlds. In the next phase of the controversy, I demonstrate how attempts to denounce tests are also shaped by public context, and how even the strongest and purest of reality tests can be subverted with appeals to alternative worlds.

Denouncing Industrial, Market and Civic Tests with Appeals to the Civic World

The initial tests of efficiency constructed by utility staff asserted that biomass technologies provided the only reasonable means for achieving the 30 by 20 goal. This test was inherently vulnerable to denouncement from other actors as its assertion precludes discussion of options other than biomass, suggesting a violation of previous statements made by utility spokespersons about remaining "open" to a range of options to achieve 30 by 20.

Rather than challenge the efficiency of biomass technologies directly, critics instead denounce this Industrial test as violating a test in the Civic World. This new test accuses the utility of having "made up its mind on biomass", and, importantly, having done so before the final public forum. This final forum is significant as, up until then, critics appear to be operating under the pretext that the concerns and challenges they raised at the earlier two forums would be acknowledge with a revised plan.

While several events together seem to have convinced critics otherwise, two were most salient. First, hours before the final forum was held, the city's mayor blogged a several page

explanation as to why his own research had convinced him biomass was the best, if not only, option for TCL&P. Second, and more visibly, the letter from TCL&P's executive director to ratepayers (discussed above). The timing of the utility's letter was not overlooked. In a letter to TCL&P and local environmental organizations, the chair of one grassroots environmental group wrote:

> "The content and timing of the letter suggests to us that TCL&P has no intent to listen seriously to the concerns of the community about biomass or to look objectively at the alternatives. It feeds directly into the suspicion expressed by many people regarding the sincerity of TCL&P's public involvement efforts."

Residents who attended the final forum raised the same accusation, evident in this statement captured by a local reporter: "You meet, meet, meet, and you've made up your minds on biomass, and now you're going to ask us what we think?" This accusation is echoed as well by a spokesperson for a local environmental policy group:

> "[TCL&P] said they would do two things. One was to listen to the public — and the public is bucking biomass — and number two, to show different scenarios at [the final forum] based on the input of the two public sessions. I think the letter they just sent out is in conflict with that commitment and it was a real disappointment"

"Mind made up on biomass" then becomes a mantra, suggesting how the utility had failed to pass an important Civic test. The utility's own Civic test (surveys) are denounced as failing to

utilize proper methodology (Industrial World) as the survey's question on biomass was precluded by a narrative, which, for critics, "clearly support[ed] one side over the other".

All of this is to say that the tests, evidence, and worlds of justification asserted by TCL&P are not simply contested in some linear, 'world-on-world' fashion. That is, challenges to the utility's tests regarding the efficiency or cost of the technology are less important for the outcome of this controversy than criticism of the very world of justification on which the reality test is based. The above criticisms could be described in this way: What is really important here is not whether biomass technologies can provide base load, or provide less expensive power, but whether the utility is listening to voices other than those that support the project (cf. Boltanski and Thevenot, 1999). In order to bring these critical voices into the controversy, critics closely examined the ecological tests offered by the utility, and enlisted their own experts to denounce the ecological worth of biomass development.

Denouncing the Ecological Worth of Biomass

TCL&P's Ecological tests are subjected to a different sort of criticism than those discussed above. Rather than contesting the principle on which Ecological tests rest, critics instead demonstrate what Boltanski and Thevenot (1999) have discussed as a "shift of worth", where the 'social good' on which Ecological justifications are based are accused of instead belonging to different worlds. As discussed above, TCL&P produced four essential Ecological justifications and corresponding tests. Unlike challenges to the utility's Industrial, Civic, and Market tests, which accused the utility of focusing on the 'wrong' tests, each of these are the 'right' tests. The criticism then reads like this: The utility is not accurately measuring the Ecological worth of biomass development. This is demonstrated in following statement given by an environmental

activist after the utility had abandoned its plans for biomass:

> "We are all for getting off coal, getting off fossil fuels, but not at the cost of potentially committing to…huge amounts of funds to plants that either will not have the ability to purchase the wood because it's too expensive or not available, or to do so would cause devastation to the forests. And we may end up investing in these (biomass plants) when actually there are better choices..."

Denouncements for testing assertions of biomass technology's "carbon neutrality" and "sustainability" track this pattern. Critics ask, how can something that requires chainsaws, trucks, and equipment that requires diesel and gasoline be carbon neutral? And how can increased pressure to harvest the area's forests encourage more sustainable forest management? While proponents of the utility's plans back away from the carbon neutral test over the course of the controversy (in consideration of a highly publicized study concerning carbon emissions from forest biomass development in Massachusetts-, as well as the Environmental Protection Agency's then pending decision on how to regulate the biomass industry's emissions) the test of sustainable forestry was presented as key evidence for biomass development's "green worth".

Here the positions of confidence taken by the utility's board, versus the doubt expressed by critics is clearest. By confidence, I am again referring Thevenot's (2012) notion of "closing one's eyes" to alternatives, while doubt suggests "opening one's eyes" — or a dissatisfaction with losing those alternatives. These ideas are helpful for unravelling what, from the perspective of TCL&P, was a common and frustrating experience. For instance, in a study session where a university forester presented evidence on the availability forest resources for biomass

development, citizens who witnessed the presentation continued to raise concerns for negative forest impacts. Visibly exasperated, the board's vice-chairman broke typical form by not only responding to a public comment ("Did [the forester] not just talk about that?"), but by asking the forester to respond as well ("Those issues are addressable"). Here we can see how the utility's doubt stops at the authority of the forester's expertise, while, conversely, this same expertise does little to "close the eyes" of critics to what would be lost were they to invest in the forester's expertise. At stake, then, is the legitimacy of justifications for supporting or questioning the utility's plans.

TCL&P's final two ecological tests — that biomass qualifies as a renewable resource, and, more blatantly, that biomass development is not coal — benefit from state policy, as well as the common sense appeal of "getting off coal". This complicates the act of denouncing such tests as it risks relegating criticisms to the realm of the absurd, or at least the taboo-. Criticisms of these tests negotiate these hurdles by maintaining an emphasis on the importance of ecological goods in this situation, while accusing test purveyors of evaluating the worth of biomass development based instead on other worlds of justification. While different statements span the matrix of worlds of justifications discussed above (e.g., "burning stuff for energy is not renewable", "There is no worse return per cord of wood than burning it" appeals to Industrial and Market Worlds respectively), central denouncements revolve around the accusation that TCL&P failed to incorporate, on the one hand, expert views critical of biomass technologies, and on the other, experts without a conflict of interest. This is demonstrated well by the response of a concerned citizen responsible for organizing others to oppose the utility's plans.

"You have a laudable goal of 30% renewables…there's been several of these energy

> presentations and not once has somebody with a divergent point of view, or a debate been allowed to occur, or back and forth…we get no chance to question the experts, to bring in our own experts…you bring in people who have a vested financial interest, and experts that you choose, and no one else is invited to the party"

After the final forum, where experts supporting TCL&P's plan gave presentations, critics appeared convinced the utility was not "listening to their concerns". In response several anti-biomass speakers, hot off the campaign trail against biomass in other parts of the country, were invited speak in Traverse City. Topics discussed included attacks on the supposed carbon neutrality of biomass development, concerns over deforestation not only locally but globally, and, most significantly, accusations as to the impact on air quality and human health were magnified. These claims were then bolstered with local press coverage, corresponding claims from a statewide environmental organization, and a local editorial by a physician attesting to the negative health consequences of particulate emissions from biomass facilities. These discourses were punctuated with a petition to give residents the "right to vote on [TCL&P's] plans for a biomass plant", and street visibility, including a protest at city hall and appeals to city commissioners that "It is up to you to stop biomassacre…we appeal to you because [TCL&P] appears impervious to public will". Shortly thereafter, the board shelved their plans for biomass development.

Discussion and Conclusion

Where other scholarly approaches tend to overlook the situational constraints imposed by public disputes, this paper draws attention to how behavior is shaped by this public context. In

looking at situational constraints, arguments concerning the irreconcilable differences between actor groups become less tenable. Rather than revealing incontrovertible differences, we witness how justifications and accompanying reality tests operate across a shared matrix of normative appeals. This is important as it suggests the trajectory of conflict over RET development is less inevitable than it is subject to the critical capacity of actors. I conclude with two short elaborations of this insight.

The first draws from Thevenot's (2012) notion of "two faces of engagement": confidence resting in the invested form and doubt in what investment has sacrificed. The above findings show actor groups shifting between these positions; but it is the timing of opportunities for standing in either position that is important here.

Early in the controversy, doubt is not only permitted, but is necessary to fend off accusations of prematurely setting aside alternatives. Phase one closes when openness becomes counterproductive for the utility. This signals a new phase of the controversy which, paradoxically, requires the simultaneous projection of openness and confidence in the now thoroughly invested biomass project. Yet as critics denounce the utility's plans, maintaining this tension becomes untenable, and investment is revealed and then supported with threats of sanctions (opposing biomass development will increase everyone's costs).

Shifting our point of departure to the perspective of critics reveals similar shifts between open and closed positions. To avoid outright accusations of irrelevance, critics applaud the utility's renewable energy goals in principle, while criticism of bioenergy is cast in terms of denouncing worlds directly, or, when this is not possible, switching worlds. As the formal PR campaign begins, however, controversy takes the shape of a quest for confidence in which the project's success hinges on shutting critics' eyes to match those of proponents. For critics,

success can only come with opening what critics argue to be the closed eyes of the utility.

We can see then opportunities for doubting, i.e., holding onto a range of options, are mismatched between the utility and other publics in that they are looking in different directions. While actors in this controversy are clearly taking different stances on the matter at hand, to suggest that this implies people ultimately act according to fundamentally opposed values, beliefs, or principles overlooks how actors in public disputes shift back and forth between phases of confidence and doubt (open and shut eyes), as well as how opportunities/constraints for the expression of either position are in flux. Indeed at different points in the above analysis the moments between these positions are so close "blinking" (Thevenot, 2009a) would be a more accurate description.

Second, these findings suggest that the seeming recalcitrance of critics to set aside doubt may be less about a failure to understand the 'information' provided than the situation in which evaluation takes place. The point here is that information provided in the context of public disputes operates less as a neutral account of reality than evidence intended to test one out of several proposed realities. Rather than singular, the reality tests presented by actors in public disputes suggests that reality is "multiple" (Mol, 2002) in that it is different in different contexts. What is therefore often missing from our analyses of publics' *and* decision-makers' evaluation of RETs is an appreciation for and a conceptual framework capable of taking into account how people invest in particular "forms" (Thevenot, 2012) — the ideas, technologies, scientific claims, and other material and non-material objects that make up the evidence required to convince all parties that reality tests are legitimate.

This paper then suggests that future research should pay closer attention to how actors in public disputes qualify what is "good" or "bad", "right" or "wrong". Doing so will require

developing a heightened sensitivity to the way scholars impose their own *a priori* disciplinary perspectives about what is "right" or "good", all the while closing their eyes to their own research subject's justifications. The next step will be to examine the justification processes and phases of confidence and doubt pertinent to situations where proponents were able to convince critics their plan was credible.

APPENDIX

Table 6: Ecological Justifications for Biomass Technology's Qualifications as 'Green'.

Ecological Justification	Evidence for Reality Test
Biomass technology qualifies as renewable as it is designated as such by state and federal policy	State policy
Biomass technology qualifies as sustainable as university foresters tell us there is plenty of wood available for feedstock	University expertise
Biomass technology qualifies as "carbon neutral" as this is how industry experts calculate life cycle analyses	Industry expertise
Biomass technology qualifies as 'clean' and 'green' because it moves the utility away from dependence on fossil fuels, especially coal	Ecological worth

Figure 5: Worlds of Justification and Reality Tests

(1) *Industrial* worlds prioritize efficiency, productivity and the capability for producing material things. Tests use technoscience to measure effectiveness.
(2) Appeals to *Civic* worlds are concerned with common, public goods. Tests measure the equity of benefits, and a broadening of private interests.
(3) *Domestic* worlds refer to social interaction, personal relations, and familiarity. Tests measure adherence to hierarchy, tradition, and familiarity.
(4) *Market* worlds prioritize the marketability of things. Tests assess profitability.
(5) Appeals to *Ecological* worlds concern environmental goods and protection, for both humans and non-humans. Tests evaluate how specific actions will impact the environment.

Figure 6: Map of Traverse City, Michigan

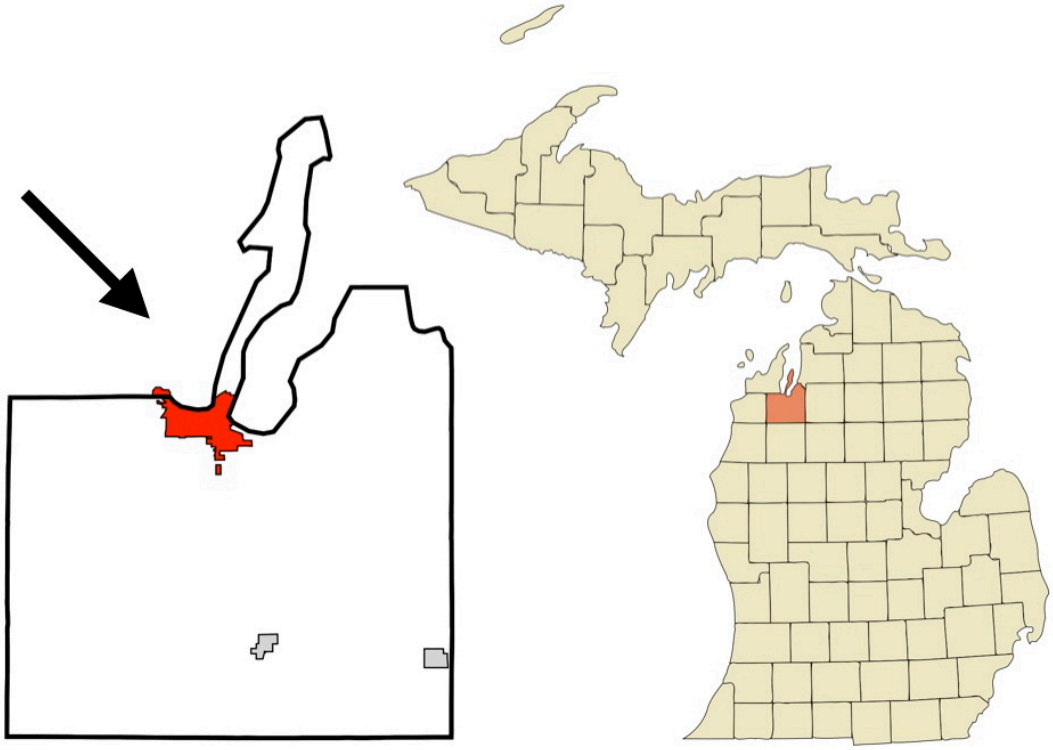

Figure 7: Timeline of Key Events in the Biomass Controversy in Traverse City

1912
Traverse City Light and Power (TCL&P) begins operation, utilizing local hydro resources to supply the growing city's power

1996
TCL&P becomes the first public utility to install a wind turbine in Michigan.

2005
TCL&P's coal plant, by then relegated to only peak power support, is removed.

TCL&P's three local hydro-electric dams are decommissioned, as requirements set out in a Federal Energy Regulatory Commission study conducted that year were not considered economically feasible by the public utility.

TCL&P begins a Biomass District Heating Study with a grant from Michigan's Public Service Commission (MPSC).

Fall 2005
TCL&P staff and board members spend two weeks in Germany, Denmark and Sweden on a state funded trip to study wind and biomass energy

March 15, **2006**
TCL&P holds a public conference on their biomass study and European district heating models, bringing in European experts and local consultants.

September, 2008
TCL&P holds public forums about the utility's strategic plans for energy generation

October, 2008
The State of Michigan passes the "Clean, Renewable and Efficient Energy Act", P.A. 295, establishing a Renewable Portfolio Standard (RPS) of 10 percent by 2015

2009
TCL&P hires a local college to survey customers concerning its strategic goals. The utility's board considers buying land for a proposed power plant. Due to public opposition, however, the board decides to hold off this decision until after a series of public forums scheduled for early 2010.

February 2009
TCL&P announces its strategic renewable energy goals in a public forum and their plans to develop local power generation in the form of woody-biomass power generation.

2010
Local resistance grows, concerns for forest health and pollution covered extensively in local media. A concerned citizens group forms. Area environmental organizations denounce the proposed plant.

January 2010
The utility hires a locally known consultant to organize TCL&P's public relations campaign concerning biomass.

January 21, 2010
Public invited to a "study session" with a forestry professor and an area wood energy entrepreneur.

February 22, **2010**
A local environmental organization hosts talks a nationally recognized biomass opponent.

Figure 7 (cont'd)

February 25 and 27, 2010
Public forums held by TCL&P on plans to pursue biomass with a format designed to elicit public responses to general and specific renewable energy proposals.

March, 2010
An Integrated Resource Plan (IRP) contracted by TCL&P in 2009 is released to the public. The utility points to this IRP as reason for the community to support the development of biomass.

March, 2010
TCL&P executive director sends letter to rate payers warning of the utility's expiring downstate electrical contracts and encouraging customers to support woody biomass, which the utility claims represents the most cost effective source of base load, renewable energy, warning other options would cause economic hardship. A local environmental organization responds, calling the letter poorly timed in light of the upcoming final public hearing

March 30, 2010
A local environmental organization present the utility with an alternative to their energy plan in a white paper. This alternative plan calls for a reduced role for woody biomass and increased role for energy efficiency measures.

April, 2010
Results of telephone survey conducted by local college made public by utility. The survey shows the majority of the community supports the proposed biomass plant. Opposition highly critical of the survey, siting inherent bias in the survey questions.

April 7, 2010
A final public forum is held on TCL&P's plans. Experts from forestry, state energy agencies and private industry are on hand to give information about biomass. The utility's executive director makes public plans for the proposed biomass plant to utilize gasification technology. Event boycotted by citizens opposition group, convinced the utility had already made up its mind on biomass.

April 20, 2010
Utility board votes to go ahead with biomass plans. Opposition groups vow to retaliate politically.

May, 2010
Utility abandons proposed site for new biomass plant in conflict with airport construction

Opposition group collects signatures on petitions to adjust city charter to require a public vote for the biomass plant and dissolve the utility's appointed board, bringing the utility under direct control of elected city officials.

June 22, 2010
Local biomass opposition group host a second national biomass opponent.

June 23, 2010
Utility announces natural gas as its new power priority, citing public opposition to the project and a poor PR campaign as its reason for abandoning biomass planning.

July, 2010
TCL&P formally cancels biomass development, plans meetings to decide on new direction to meet renewable energy goals, questions whether its strategic plans can be met without biomass.

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CONCLUSION

Now that the specifics surrounding controversy over bioenergy development in Michigan have been conceptualized from three particular perspectives across several research sites, a theoretical synthesis of these findings is due.

Throughout this dissertation, my argument has been that understanding community responses to proposed RET development requires an examination not only of social interaction between humans, but how social interaction is shaped by locally salient symbolic and material environments. As the above papers demonstrate, cultural resources, physical settings, and industrial histories vary from community to community, and people living in these places construct meaning around these realities in ways that have important consequences for RET development. And yet while each paper focuses attention on specific attributes of particular places, and enlists unique conceptual tools, my concluding argument is that the findings from this research can usefully be generalized into a partial theory of community level responses to proposed RET development. I do this below by braiding back together the approaches and key insights introduced above. I begin by briefly summarizing each paper in order to highlight the conceptual contributions to a more general theory. I conclude by suggesting avenues for future research this dissertation opens.

In the first paper, I examined how local discourse and action around bioenergy development interacts with national level discourse. To do this, I examined discourse in four northern Michigan communities where bioenergy development was actively proposed, focusing my analysis on patterns in discourse across these study sites. I built on the concepts of "socio-technical imaginaries" (Jasanoff and Kim, 2009) and "key frames" (Goffman, 1974; Mooney and

Hunt, 2009) to develop a conceptual framework capable of taking into account how national imaginaries for RET development are interpreted and responded to in "sharpened" and "flattened keys" in local places.

The key insight here is that understanding these divergent interpretations requires asking not only how the future is imagined, but the past as well. Discourse around RET development evokes national imaginaries — i.e., for energy independence, energy reliability, or for "better", "cleaner" technologies and feedstocks (cf. Wright and Reid, 2010). However, local discourse on national imaginaries was dependent on conflicted framings or "remembered histories" of the past. Importantly, rather than reflecting agreement, these frames were "keyed". The insight then is that disagreement over the future is contingent on divergent understandings of the past. That is, actors imagined the future in terms of conflicted understandings of the past, rather than agreeing on one legitimate interpretation of previous events. This insight will make up the first component of the more general theory I discuss below.

I built on this insight in a second paper that investigated how community responses to proposed RET development were linked with other locally salient realities, especially industrial development and pollution. Here I narrowed my study design to include two seemingly similar communities with contrary responses to the same bioenergy development proposal. This differs from paper one where I analyzed several communities, thereby sacrificing an analysis of unique place histories in an attempt to uncover broader framings shared across the region. The puzzle the second paper addressed was why bioenergy development was responded to as problematic in some places, but as a "non-problem" in others. To solve this puzzle, I drew from Swidler (1986: 1995) to investigate how locally predominant industrial development provided particular sets of

cultural resources, and how actors drew upon these resources when constructing their divergent responses to the same bioenergy development proposal.

This paper's key insight was that previous industrial development (and accompanying pollution) is linked with community level responses to proposed RET development. However, this link is less linear than it first appears. Uncovering whether or not extant industrial development was identified by community actors as a problem or non-problem was important, but only a first step. To understand how previous development shaped community responses to future projects, I also needed to examine the links between previous industrial development, the cultural resources local actors have constructed around these industries, and ultimately how cultural resources both limit and make possible community responses to proposed RET development.

The third paper in this dissertation suggested that processes and outcomes of community level disputes over RET development are shaped not only by human interactions, but also by the context or situations in which human interactions take place. In this paper, I argued that the public setting of siting disputes imposes limits and opportunities for social interaction. To develop this argument I limited my analysis to only one study site, a community where successful bioenergy development seemed likely, but was ultimately derailed by concerned citizens.

Building on Boltanski and Thevenot (1999), I suggested that community controversies over RETs could be usefully analyzed as attempts by invested actors to truncate the doubts of critics. This requires actors to justify their particular stances by appealing to a limited set of higher principles and to ground these justifications in material evidence.

This finding has important implications for how we research and understand the processes involved with controversies around RET development. Importantly, attention to the way the public setting itself shapes disputes raises questions about previous scholarly explanations of conflict, in particular explanations that assume conflict manifests from inherently imposed value systems. This is not only a common assumption in the literature, but also in the public discourse analyzed for this dissertation. This third paper's findings instead suggested that only a limited number of higher principles and corresponding justifications are effective. That is, the full range of human value systems are less important in the context of public disputes over RETs than is commonly assumed — and while scholars may have overlooked this, actors participating in these disputes evidently have not. In short, conflicts over RET development are not inevitable. Rather, different outcomes are always possible, but these possibilities are enacted in terms of shared normative principles.

A Partial Theory of Community Responses to RETs

While important for the future of RET development more generally, sociological analyses of technical controversies and social movements around RETs tend to gloss over communities of place as a unit of analysis. As the above papers discuss in detail, what existing literature instead provides are insights into how and why individual actors interpret RET development in the ways they do, studies of individual risk perceptions around emerging technologies including RETs, case studies of particular controversies around RET development, scholarly critiques of popularly expressed assumptions about resistance to RET development, and survey research reporting on how individuals would hypothetically respond were RET developments to be proposed locally. Another set of scholars (e.g., Bain and Selfa, 2013; Wright and Boudet, 2012)

have begun to draw attention to factors that emerge as salient when communities become the focus of analysis. Building on this later work, the findings reported in the above papers provide an outline for an emerging theory of community-level responses to proposed RET development.

Sociologists have defined communities in a myriad of ways, but what seems most relevant here is Beamish's (2002, p. 110) definition of community as a "loosely defined formation of institutions or human associations specific to a location". This provides a useful starting point for generalizing from the above findings. Building on Beamish, a theory of community responses to proposed RET development suggests that community actors draw on the institutions and associations particular to their communities of place — including local discourse and practices — when constructing their responses. More specifically, the notion of "community level responses" implies individual actors are somehow experiencing proposed RET development in ways that are more or less collective or shared across the places where people live, work, and play. I do not mean to suggest actors tend to agree with those they live or work near about proposed development — clearly this is not the case! Instead, my argument is that community life, no matter how varied, provides some sort of mutual basis for response — and that our understanding of this 'factor' or 'basis' for constructing responses to proposed RET development is limited. Doubting, trusting, raising of questions, ignoring of the matter, relying on the judgement of others, or any other "responses" are less individual than relational practices that tend to manifest in community-based interactions with RET questions. Put more simply, community-based actors tend to assess proposed RET development not only as an abstract public issue, or a private or family issue, but in concrete and immediate terms of how this might impact their interactions with others and their environment in daily life in the places they live, work, and play with others. As an overly simple illustration, the above papers have at the very least shown

how people in particular places tend to frame bioenergy development as something that will change, for better or worse, not only their individual lives, but life in the community, and that this change is more immediate or "epistemologically close[35]" than more abstract notions of life as a resident of the state or country. In short, scholarly inattention to factors pertinent to communities that shape local and, in turn, broader social responses to RETs is no longer tenable — as is evident by the growing number of locally based movements for and against RET development.

The findings of the above three papers suggest at least four components of a theory of community level responses to proposed RET development. First, community level responses manifest around active and concrete RET proposals. Proposals are happening now, rather than solely in the future, and here, rather than someplace else. Local actors respond not to the abstract idea of development, but to plans that are a real possibility — that is, at least for active participants in the controversy. This sheds light on the tendency for local proposals to engender the levels of conflict many observers have analyzed. But this is a community level, or public conflict, with implications unique from areas of private, family, or institutional or organizational conflict. As Swidler (1995) has noted, public disputes tend to reveal how people can be forced into expressing a position, rather than remaining publicly ambiguous — no matter privately held positions on the matter.

Moreover, active proposals are salient and relevant not only locally, but suggest important implications for the broader project of transitioning away from fossil fuel based technologies. In short, while these projects originate in laboratories and in interaction with socio-

[35] Carolan (2006) speaks of "epistemological distance" of things that beyond our direct perception, such as modern environmental risks. My argument is that sitings proposed in communities somewhat closes this distance for community residents. While the risk may remain abstract, the implications, whether positive or negative, are made concrete.

technical imaginaries (cf. Callon et al., 2011), they are largely sutured into reality in communities that host their development.

Second, community level responses to proposed RET development are shaped by sociotechnical imaginaries not only for the future, but for the past as well. Locally proposed development sparks the formation of new groups who raise questions that were previously closed (Callon et al., 2011). Proponent framings of the project draw from and reiterate broader national visions for RET development that tend to ignore latent relevant concerns — such as the concerns for forest health so common in Michigan discussed above. These latent concerns, or "remembered histories" provide for divergent interpretations, which, in turn, are drawn upon when local actors construct their responses to locally proposed RET development. Furthermore, this aspect of controversies over RET development — particular remembered histories that are effective in raising concern over particular projects or technologies — manifests initially in places where projects are proposed, and in turn, are drawn on by actors in other communities.

Third, the unique responses of particular communities (such as responding to local RET development as a problem or non-problem) correlate with the salient meanings actors in particular communities have constructed around locally relevant industrial development and pollution. This expands the immediately above point by focusing attention on how actors have, over time, assembled particular cultural repertoires that provide the familiar strategies drawn upon when constructing responses.

Fourth, community level controversies are public events, and this public setting determines what actors recognize as feasible and effective ways to make claims and justify particular stances on locally proposed RET projects. Taking this into account requires us to imagine community actors as having the critical capacity to evaluate proposed RETs. New,

emerging RETs, and less emergent technologies as well, may be new or unfamiliar to local actors. But claims and justifications around these technologies are less emergent or unfamiliar than they are comprised of commonly held understandings for moral notions of "good" or "bad", "just" or "unjust", "clean" or "dirty", "efficient" or "outdated" (Boltanski and Thevenot, 1999). That is, the justifications and corresponding material evidence actors draw upon to bolster their positions are shaped by the public context of community disputes, and future research should investigate how these processes unfold around different technologies and in different places.

Future Research

Additional research is required in order to both test and fill out the parameters of a theory of community level responses to RET development. Below I suggest several avenues for future research.

Socio-technical Imaginaries

While the above findings suggest socio-technical imaginaires look both forward and backward in time, it is less clear how malleable imaginaries are. Under what circumstances do the salience of imaginaries persist or recede?

It is suggested in the above papers that communities may construct their own imaginaries, and that these visions for the future impact community decision-making processes about RET investment. What shapes the construction and selection of these local visions and how might these visions originate, shift overtime, and recede?

Moreover, while this dissertation begins to explain how socio-technical imaginaries are contested, and how this relates to collective action, more general questions as to the relationship

between socio-movements and socio-technical imagines go unaddressed. How do social movements around technologies contribute not only to the criticism of socio-technical imaginaries, but to their conception as well?

Furthermore, how do "remembered histories" vary across a range of RETs? For instance, how are socio-technical imaginaries for wind, solar, or new methods of oil and natural gas extraction taken up or reinterpreted by actors in local places in terms of previous events circumstances? Comparing imaginaires across these technologies can help us understand differences in the level of success or support between technologies.

Finally, in paper one it is suggested that national socio-technical imaginaries are contested in terms of "key frames". But this contestation is explored largely in terms of community- or state-level controversy. How is contestation in local places responded to on national scales?

Locally Salient Cultural Resources

Findings reported above point out how a community's particular arrangement of cultural resources around previous forms of industrial development shape responses to proposed future development. This raises several additional questions for future research.

First, under what conditions are people willing to set aside familiar strategies of action? That is, it is implied that cultural resources both provide for and limit action. Swidler (1986) has suggested that people reassess existing resources during "unsettled" times, but this concept remains vague in terms of the context of community level controversies. How might familiar strategies of action be upset at the community level?

Second, and similar to the above suggestion that researchers investigate local responses to a range of socio-technical imaginaries around RETs, how might the cultural resources community actors have developed around 19th and 20th century industrial extractive development provide for or limit responses to other RETs? Investigation here should pay attention to varying degrees of familiarity actors express for various technological arrangements, as well as how familiarity varies across different places.

The Public Context of Siting Disputes

The above findings, which build on French Convention Theory and practice theory, suggest that community responses to and controversies around proposed RET development are conditioned not only by various locally salient cultural repertories, but also by the public context of disputes that begets the process of justification. However, the implications for this perspective are less clear. Future research should ask how "worlds of justification" relevant for particular communities and community controversies compare with justifications processes that prove effective elsewhere.

Moreover, what, if any, new worlds are actors bringing into being in community level controversies around RET development? Above findings suggest the salience of particular worlds identified by Boltanski and Thevenot (1999), but also point to other possible worlds. Specifically, and again drawing attention to the overlooked importance of a community-level analysis, it appears as if the higher social principles described by these authors are responded to by local actors in terms the community. That is, general ideas of "right" and "wrong" *in principle* — the moral language that Thevenot (2012) especially is interested in shifting to the forefront of sociological analyses — are transposed in terms of "right" and "wrong" *for the*

community. This opens a space for investigating, again, why communities respond in the range of ways they do, but also provides a counterpoint for the expectations society places on communities to "accept" what are in principle understood as being "good" technological developments.

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