PUBLIC OPINION ON RENEWABLE ENERGY: THE NEXUS OF CLIMATE, POLITICS, AND ECONOMY

by

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ABSTRACT

Public Opinion on Renewable Energy: The Nexus of Climate, Politics, and Economy

by

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Utah State University, 2017

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Increased use of renewable energy sources in the generation of electricity is a crucial component of transitioning to a less polluting energy system in the United States. Technologies like solar photovoltaic cells and wind turbines are being deployed at a rapid rate around the country, which means that an increasing portion of the public is becoming aware of renewable energy systems. The construction of these new industrial facilities has resulted in a variety of public reactions, positive and negative. Citizen opposition has been widely observed toward a variety of renewable energy facilities, and citizen groups can influence policy-making at the national, state, and local levels. Further research is needed to understand under what circumstances the public may take oppositional stances.

To examine this topic, I analyze public perceptions of renewable energy using three different datasets. First, I used data from a survey conducted in 2014 in five communities in Utah, Wyoming, and Idaho experiencing renewable energy development (n=906). This dataset allowed me to untangle what factors help explain both individual as
well as community-level variation in support for renewable energy. Second, I employed nationally representative survey data (n=13,322) collected from 2008 to 2015 to examine the influence of a number of factors hypothesized to shape individuals’ level of support for renewable energy policies including socio-demographic characteristics, political beliefs, belief in anthropogenic climate change, and nearby extractive industry activities. Last, I analyzed discourse about renewable energy in sixty-one semi-structured interviews with individuals representing various community sectors in three energy-producing rural communities in Utah.

My research findings, on a whole, suggest that several place-based factors are significant in shaping public opinion about renewable energy, including community experience with renewable energy and local economic reliance on extractive industries. I also find pervasive climate skepticism across study sites. These findings indicate the need for broad-based and non-partisan discursive frames for renewable energy. Last, these findings speak to the importance of the ‘just transitions’ concepts, and the need to incorporate those communities most marginalized by the current system of fossil fuels extraction and production as society moves forward toward a cleaner energy economy.

(253 pages)
Public Opinion on Renewable Energy: The Nexus of Climate, Politics, and Economy

Shawn K. Olson-Hazboun

This dissertation research examines the factors underlying public opinion toward renewable energy in the United States. U.S. citizens in general support the continued development of renewable energy, yet opposition has been widely observed toward a variety of renewable energy facilities at the local level. Previous research on public responses to renewable energy has focused on one or a small number of communities experiencing renewable energy development. In this research I examine public views more broadly, in communities with and without renewable energy development, and also using nationally representative opinion data. I ask the following questions:

What local experiences influence how members of the public form opinions about renewable energy, especially local experiences with different types of energy production?

How related are environmental beliefs to individuals’ views on renewable energy, specifically the belief that Earth’s climate is warming due to human activities?

To pursue these research questions, I conducted three different research projects. First, I used data from a 2014 survey conducted in five different communities in Utah, Wyoming, and Idaho experiencing renewable energy development. Second, I examined nationally representative public opinion data to determine how individual characteristics – such as political views and belief in anthropogenic climate change – along with county-level extractive industry activities, influence opinions about renewable energy policy.
Last, I conducted sixty-one interviews with individuals in three energy-producing rural communities in Utah, discussing their views on renewable energy, energy production, and climate change. This research was funded with combination of support, including a grant from the USDA Utah Agricultural Experiment Station as well as support from the Office of Research and Graduate Studies at Utah State University.

My findings suggest that both individual as well as place-based factors are important in understanding public opinion about renewable energy. Both community experience with renewable energy and local economic reliance on extractive industries have an important role. Environmental concern and belief in human-caused climate change, however, do not seem to be influential. Furthermore, I found that renewable energy (and especially policies supporting it) can be a politically charged topic and are viewed in some fossil fuels communities as a threat to the local economy. These findings indicate the need for broad-based and non-partisan discursive frames for renewable energy. These results also speak to the importance of being attentive to those communities most marginalized by the current system of fossil fuels extraction and production as society moves forward toward a cleaner energy economy.
ACKNOWLEDGMENTS

I distinctly remember the first time I drove into Cache Valley. It was March, and snow covered the mountains as I drove from the Salt Lake City airport north to Ogden, then Brigham City, then turned east to head through Sardine Canyon. When I popped out of the canyon into Cache Valley, my breath caught at the expanse of valley itself, flanked dramatically on one side by the Wellsville Mountains and on the other by the Bear River Range. I knew immediately it was a place I could happily make a life for four years while attending Utah State University. My time here has been more than happy. I have found a dear community of friends, skied my heart out, learned to garden and preserve food, played a lot of music, met my husband, and received the support of some of the most well qualified, kind, and dedicated academics that I ever expect to meet.

Many thanks to Rick Krannich – I could not have found a more supportive advisor. Rick, you’ve been an experienced and skillful guide through the forests of academia – you’ve provided a clear and useful map while never being heavy-handed and always encouraging me to pursue my intellectual interests. You’ve always had my back and felt like an ally – thank you.

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Shawn Keating Olson-Hazboun


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CHAPTER I
INTRODUCTION

The development of renewable energy has emerged as one of the predominant strategies for tackling the reduction of greenhouse gas emissions from energy production. Studies show that more than enough resources exist to power the world with renewable energy (Delucchi and Jacobson 2011; Jacobson and Delucchi 2011). However, the deployment of renewable energy is faced with economic, political, and social obstacles. Continued analysis of these barriers is crucial for laying a smoother path for renewable energy development in the United States.

While the majority of research has focused on policy, technical, and financial barriers to renewable energy deployment (Sovacool 2014), less research has been conducted on its social dimensions, yet public opinion is highly pertinent. Citizen opposition has been observed in a variety of contexts with regard to the construction of both wind and solar energy facilities (e.g. Moore and Hackett. 2016; Phadke 2010; Swofford and Slattery 2010). Citizen groups have the capacity to influence decision-making at state and national policy levels (Matisoff 2008) and to cause delays in renewable energy development at the local level through lobbying of local officials, lawsuits over permitting, and other appeals (Ogilvie and Rootes 2015).

Research on public responses to renewable energy has found widespread generalized public support (Leiserowitz et al. 2016), yet contentious localized debates – a phenomenon known as the “social gap” (Bell, Gray, and Haggett 2005; Bell, Gray, and Haggett 2013). Utility-scale renewable energy systems are very large and very visible, posing threats to citizens’ place attachment, place meanings, and place-based identities.
(Devine-Wright 2009; Devine-Wright 2011; Jacquet and Stedman 2013). Renewable energy systems raise a variety of other concerns for citizens, including fear of higher energy prices, costs to property values, impacts on wildlife and habitat, and unreliability as an electricity source. Much of the research examining social responses to renewable energy development has focused on instances of opposition (Brannstrom, Jepson, and Persons 2011), finding explanations for opposition stemming from aesthetic and identity-based concerns (Devine-Wright 2011; Phadke 2011) and/or the problems raised by the (un)democratic manner in which large-scale renewable energy systems are planned, sited, and built (Bohn and Lant 2009; Leitch 2010; Pasqualetti 2011), resulting in sometimes highly uneven distribution of benefits and burdens (Haggerty, Haggerty, and Rasker 2014).

Less attention has been paid to the influence of individuals’ environmental views (including their views on climate change) on their stances toward renewable energy. We may be quick to assume that pro-environmental attitudes influence support for renewable energy, yet there is some evidence suggesting this relationship is weak or nonexistent in some contexts (Brannstrom, Jepson, and Persons 2011; Jepson, Brannstrom, and Persons 2012) and highly nuanced in others (Jessup 2010). Yet, increasingly, renewable energy is framed by the media, energy professionals, governmental agencies, and activists as an environmental issue and as a vital component of climate change mitigation (Barry, Ellis, and Robinson 2008; Pralle and Boscarino 2011; Stephens, Rand, and Melnick 2009). Furthermore, with environmental problems like climate change being highly politicized in the United States (McCright, Dunlap, and Xiao 2014; McCright, Xiao, and Dunlap 2014), the climate-environmental framing of renewable energy may hold unintended
negative consequences for public opinion especially in states where the majority of constituents and political leaders are politically conservative. Indeed, communications research has found that the way issues and policies are framed can significantly influence how individuals respond, form opinions, and mobilize around different policy options (Chong and Druckman 2007).

Political viewpoints and economic factors also influence individuals’ views toward renewable energy. The politics of renewable energy policy are often polarized by ideological stances on whether or not the government should ‘intervene’ in the free market via incentives for renewable energy, as well as the decades old ‘jobs v. the environment’ debate in which regulation of polluting energy sources is portrayed as an attack on blue-collar Americans. Local economic reliance on extractive industries has been shown to play a part in public views on energy production (Bell and York 2010; Boudet 2011; Boudet et al. 2016; Forsyth, Luthra, and Bankston 2007; Freudenburg and Gramling 1994; McAdam and Boudet 2012), though its influence on renewable energy attitudes specifically has not been studied to date.

This research investigates factors underlying attitude formation toward renewable energy. Specifically, I examine how public attitudes may vary in places with different types of experiences with energy development, including large-scale renewable energy facilities as well as fossil fuels production. I will also explore the relationship between pro-environmental attitudes, including concern about climate change, and attitudes toward renewable energy. The goal of this dissertation as a whole is to understand the elements connected to public opinion toward renewable energy, including the role of place-based factors, political and economic concerns, and individual environmental
attitudes. This information will aid policymakers and energy professionals alike in better predicting, managing, and planning for public responses toward renewable energy development in both place-specific contexts as well as within the larger arena of public opinion and policymaking, a major driver of the United States’ energy transition. This research will also contribute to sociological knowledge of public environmental attitudes by examining public opinion at several scales and by specifically interrogating the relationship between individuals’ characteristics, experiences, and attitudes toward environment and energy. This work considers how direct experience – a variable often theorized to be important in shaping environmental beliefs (Heberlein 2012) – with various types of local energy facilities underlies individuals’ perspectives on different energy sources. Last, this research investigates the importance of local culture, history, and social norms, or ‘behavioral regularities’ (Heberlein 2012), in shaping the stances individuals form toward new and alternative energy technologies.

This dissertation uses terminology that warrants clear articulation. While we may in popular usage employ “attitude,” “belief,” “opinion,” and so on interchangeably, these terms have particular meanings in the realm of social psychology and sociology. Throughout the chapters, I follow the suggestion of Thomas Heberlein (2012) and employ the terms “attitudes” and “beliefs” to mean two different things. By “attitudes” I refer to the stances that individuals take up about a particular issue or object (such as renewable energy). For example, an individual’s attitude about renewable energy might be one of support for the permitting of a particular facility, or one of opposition toward a governmental tax incentive encouraging renewables. As a different example, an individual’s attitude toward climate change policies might be that the government should
not prioritize action. Thus, public “support” or “opposition” for a policy item is referring to their attitude on that particular policy.

By contrast, a “belief” refers to “the cognitive component of attitudes” (Heberlein 2012: 12). Like attitudes, beliefs relate to a particular objects or issues, but they underlie attitudes toward that issue. In the example of renewable energy, individuals who exhibit supportive attitudes of renewable energy policies may do so because of a variety of beliefs – one person may believe renewable energy growth will strengthen our national security, while another individual may believe that renewable energy development is vital to mitigate global climate change. To provide another example, individuals may oppose government action on global climate change due to different beliefs – one individual may believe that there is nothing our government can do because climate change is part of a natural cyclical cycle of the Earth, while another may believe that humans are causing global warming but that doing something about it would be too expensive for society. Thus, it is possible that individuals with different beliefs about a particular issue could nevertheless express the same attitude. This distinction is important for this dissertation because I examine the relationship between pro-environmental beliefs (such as the belief that government policies are important to protect the environment, or that humans are causing global warming) and pro-renewable energy attitudes.

In this research, the phrase “level of environmental concern” is used to refer to the beliefs an individual has about the health of the environment. If an individual displays a high level of environmental concern, then they believe that the environment is in peril. Typically, this belief is connected with pro-environmental attitudes toward particular
policy issues, such as the proposal to ban the release of waste from coal mining into streams or rivers.

Throughout the dissertation, I also employ the terms “opinion,” “perspectives,” “views,” and “stances” interchangeably to refer generally to individuals’ general perception of various issues, without getting into the specifics of “beliefs” versus “attitudes.” These are catch-all phrases utilized for the sake of simplicity.

WHY STUDY PUBLIC OPINION?

Understanding the dynamics underlying public support or opposition for renewable energy is critically important if the United States is to heed the call of climate science to cut back on greenhouse gas emissions, perhaps now more than ever given Americans’ increasing political divisions over environmental and energy issues (Brulle, Carmichael, and Jenkins 2012). It is also a vital piece of the larger national debate over regulation of carbon-intensive energy production, which has taken a new turn with the 2017 inauguration of a Republican president and a Republican-controlled Congress. Because the United States has no federal mandate requiring increased deployment of renewable energy, the speed at which renewable energy is deployed in the U.S. (as well as its geographic distribution) is driven by federal tax incentives, grants, and state-level policies to encourage renewables development (Edenhofer et al. 2012; Gan, Eskeland, and Kolshus 2007; Komor 2004; Menz 2005). Each of these policy measures require supportive and motivated political leaders, which ultimately requires a supportive constituency.
There are three main policy mechanisms driving renewable energy development: the Production Tax Credit (PTC), the Investment Tax Credit (ITC), and state-level Renewable Portfolio Standards (RPS). The PTC comes up for renewal in Congress each year, and this short-term cycle imposes economic insecurity for wind energy developers, ultimately depressing the overall amount of wind energy development (Barradal 2010). The ITC mainly applies to solar energy production and has a multi-year cycle that provides more stability for developers. Renewable Portfolio Standards policies vary by state; to date 29 U.S. states and the District of Columbia have RPS mandates and seven states have non-binding “goals.” The specific renewable energy target for electricity production varies widely by state, from ten percent in Wisconsin to thirty-three percent in California (Barbose 2013), and recent efforts to increase RPS laws in some states have been met with fierce opposition from both policymakers and industry groups. Federal investment in renewable energy research and development are also important, and federal funding for renewable energy under President Obama increased. However, public support for investments in renewable energy using public money has become an increasingly politically charged issue, especially after instances such as the ‘Solyndra debacle’ of 2011, in which solar panel manufacturer Solyndra filed for bankruptcy and defaulted on a $500 million federal loan from the US government (Bishop 2014; Carlisle et al. 2015).

In the United States, the renewable energy policy atmosphere is characterized by uncertainty, contention, and fragmentation, and this has stunted investments in renewable technologies (Barradale 2010; Busby 2008; Elliott 2013; Ernst 2013; Hess 2016; Shrimali, Lynes, and Indvik 2015). The debate between political party leaders over policy support for emerging cleaner technologies has become increasingly divisive in recent
years (Goldfarb, Buessing, and Kriner 2016) and the political polarization on energy policy demonstrated by leaders and elites has also been shown to increase polarization amongst the public (Bolsen and Cook 2014). Studying public opinion on renewable energy is also connected to a larger project of understanding why political polarization over environmental issues, including climate change and energy policy, has increased over the last several decades (McCright and Dunlap 2011; McCright, Xiao, and Dunlap 2014; McCright, Dunlap, and Xiao 2014).

Understanding public opinion toward renewable energy is important in terms of the influence it can have on policy creation. Though considerable and worthwhile debate is ongoing in political sociology and political science as to how much influence or power the public truly has in a democracy (e.g. Erikson and Tedin 2015; Lukes 2005; Neuman 2005), others argue there is ample evidence suggesting an important link between public opinion and public policy (Burnstein 1998). In the case of renewable energy, public experiences with renewable energy facilities and public policy preferences are an important factor in shaping the trajectory of local, state, and national policies. Locally, public support or opposition can drive county- and municipal-level permitting and siting policies for renewable energy, and can also influence whether or not local economic leaders recruit renewable energy developers as part of economic development efforts. At the state level, the establishment of RPS policies in lieu of a nationwide policy can significantly drive renewable energy growth, both in the home state as well as for producer states supplying energy to outside population centers. At the federal level, public funding of research and development into renewable energy technologies is
subject to public scrutiny, and ultimately elected lawmakers must feel pressure from their constituency to take up policy efforts, such as a nationwide renewable energy mandate.

The majority of research tracking the factors involved in the growth of renewable energy nationwide has largely come from disciplines such as economics and engineering and has focused on technological barriers, difficulties with current utility rate structures, interconnection, environmental permitting, and transmission issues (Sovacool 2014). However, other social sciences such as sociology, anthropology, policy studies, and social psychology focusing more on the factors underlying public opinion have shed light on other barriers to growth. The current state of social science knowledge is explored in the sections below, including public opinion at large as well as locally relevant factors and responses.

**PUBLIC OPINION ON ENERGY: RENEWABLE & NON-RENEWABLE**

Public opinion on energy is influenced by a variety of factors, such as political debates and the shifting saliency of energy in the public’s eye over time. Political ideology has been shown to be strongly related to public opinion about energy in many studies (Boudet et al. 2016; Boudet et al. 2014; Clarke et al. 2016, Cacciatore, Scheufele, and Shaw S2012; Delshad and Raymond 2013; Goldfarb, Buessing, and Kriner 2016; Larson and Krannich 2016; Mukherjee and Rahman 2016), though it appears more weakly related in other studies (Ansolabehere and Konisky 2009; Klick and Smith 2010; Lilley and Firestone 2013). Political conservatives often support fossil fuels over other energy sources because of concerns about job losses, support for industries reliant on cheap fossil fuels, and support for free-market policies, while political liberals often
oppose fossil fuels due to environmental concerns, including concerns about global climate change (McCright and Dunlap 2011).

The partisan divide appears as well in the case of renewable energy, with individuals who identify as Democrats or politically liberal generally more supportive of renewable energy (Carlisle et al. 2015; Goldfarb, Buessing, and Kriner 2016; Hess 2016). However, other researchers find that political ideology is a weak predictor of renewable energy attitudes, with other factors such as environmental beliefs, local context, and beliefs about the economic facets of renewable energy being much more important factors (Klick and Smith 2010; Olson-Hazboun, Krannich, and Robertson 2016). Furthermore, though Democrats as a whole may be more supportive than Republicans of renewable energy, there is debate amongst liberals about the environmental benefits versus harms of technologies such as wind and solar energy, essentially weighing wildlife and landscape impacts against the pollution and carbon savings benefits – this has been referred to as the ‘green on green’ debate (Warren et al. 2005).

The extent to which individuals adhere to a free-market ideology helps explain the political polarization over energy policy. Free-market ideology, or neoliberal ideology, refers to support for a free-market economic system that is unhampered by governmental intervention and regulation (Block and Summers 2014; Harvey 2007; Heath and Gifford 2006). Underlying free-market ideology is the assumption that the market, not the government, will provide the greatest good for society because it is able to self-regulate against social or environmental ills (i.e., the “invisible hand,” Smith 1776). Individuals supporting a free-market system typically support the deregulation of business and tend to be less concerned about the effect of the economy on the environment (Jackson et al.
2013; Longo and Baker 2014; Malin 2015). Furthermore, increasing normalization of neoliberal regulatory policies for energy development can influence individuals’ support for certain energy policies (those that devolve governance from the federal to state or local level, for example) over others (Malin 2014). In terms of individuals’ support for renewable energy, a neoliberal worldview suggests that incentives and policies supporting renewable energy comprise too much government intervention in the free market (Carlisle et al. 2015, Chassot, Hampl, and Wüstenhagen 2014; Klick and Smith 2010). Researchers have shown that individuals who adhere to neoliberal ideology are also less likely to believe that human-caused climate change is occurring or to support climate change mitigation efforts, such as the development of carbon-free energy sources (Cook and Jacobs 2014; Heath and Gifford 2006; Lewandowsky and Oberauer 2013).

The salience of public views on energy changes over time in terms of the visibility and perceived urgency of different energy topics. As with most socially defined problems and public responses, public interest and concern over energy and other environmental issues shift in response to an “issue-attention cycle” (Downs 1972) by the media, leading inevitably to a redirection of attention and concern toward different issues and events. Shifts in the political arena and resulting expansion or contraction of policy responses designed to address various environmental issues contribute to changes in how Americans think about such things. Additionally, as high-profile issues such as terrorism threats, economic downturns, or presidential elections become focal points of public and media attention, public debates and policy response are often redirected toward these competing priorities.
To the extent that individuals’ support for renewable energy is related to their underlying environmental beliefs or level of environmental concern, we can look to research indicating predictors of environmental attitudes. Many scholars have found, and argue, that individuals’ relative position within the social structure is the most important factor underlying pro-environmental attitudes (Dietz, Stern, and Guagnano 1998; Stern, Dietz, and Guagnano 1995). Certain socio-demographic correlates have been recognized as predictors of pro-environmental attitudes, though results are mixed (Dietz, Stern, and Guagnano 1998). Age has been found to be significant in some studies, with younger individuals exhibiting more pro-environmental attitudes in some studies but not in others (Dunlap et al. 2000; Jones and Dunlap 1992). Gender has also been found to be important in some studies but not in others (Dietz, Kalof, and Stern 2002; Jones and Dunlap 1992; Xiao and McCright 2012; Zelezny, Chua, and Aldrich 2000). Race and ethnicity have been found to be significant correlates of environmental concern in some studies but not others (Johnson, Bowker and Cordell 2004), though most studies on race/ethnicity have been limited by a tendency to measure the variable simply by classifying individuals as either white or non-white. Urban residents have been found to have the most pro-environmental attitudes in some studies but not in others (Hamilton et al. 2014; Jones, Fly, and Cordell 1999). Generally a higher level of educational attainment is thought to foster pro-environmental attitudes (Jones and Dunlap 1992; Klineberg, McKeever, and Rothenbach 1998), while the effect of income appears to be mixed (Jones and Dunlap 1992; Klineberg, McKeever, and Rothenbach 1998) and possibly dependent on political orientation (Hamilton 2011). Political orientation has been found to be significant in predicting both environmental concern as well as levels of support for government.
spending on environmental issues, with strong evidence for increasing polarization over environmental issues in the United States (McCright and Dunlap 2011; McCright, Dunlap and Xiao 2014, McCright, Xiao, and Dunlap 2014).

However, environmental concern isn’t necessarily a precondition or a proxy for renewable energy support, and indeed some studies have found otherwise (Brannstrom, Jepson, and Persons 2011; Jepson, Brannstrom, and Persons 2012; Warren et al. 2005). There is a gap in understanding as far as how much and whether environmental and climate change concern motivate support for renewable energy – I review this next.

**DO ENVIRONMENTAL ATTITUDES AND BELIEF IN ANTHROPOGENIC CLIMATE CHANGE MATTER?**

Nationally representative survey data consistently show broad public support for renewable energy (Ansolabehere and Konisky 2012; Ansolabehere and Konisky 2014; Leiserowitz et al. 2016). The most recent study from the Yale Program on Climate Change Communication found that that 82% of registered voters in America either “strongly” or “somewhat” support government funding of research to further develop renewable energy technologies, and 81% support using more renewable energy (Leiserowitz, et al. 2016). But how connected is this support to individuals’ beliefs about the state of the environment, and particularly the belief that humans are causing global climate change? Renewable energy is frequently framed by the media, policymakers, and activists as a climate imperative (Stephens, Rand, and Melnick 2009; Wolsink 2007), yet role that climate change beliefs play in shaping the attitudes individuals have toward renewable energy remains debatable.
Overall, the increasingly divided partisan views in the United States on energy policy are undoubtedly connected to increasing polarization over climate change and other environmental issues (McCright and Dunlap 2011, McCright, Dunlap, and Xiao 2014; McCright, Xiao, and Dunlap 2014). The connection between environmental attitudes and energy policy preferences is relatively well established (Carlisle et al. 2015; Engels et al. 2013; Greenberg 2009; Manley et al. 2013; Mukherjee and Rahman 2016; Truelove 2012; Zografakis et al. 2010). Yet, while some research suggests that most Americans are concerned about the environment and that the environment is an important factor driving different energy preferences (Ansolabehere and Konisky 2009; DeCiccio 2015), other studies highlight the importance of other factors such as risk perceptions and expectations about the affordability of different energy sources.

For individuals living near renewable energy developments, their level of environmental concern may or may not factor into how they feel toward renewable energy. Wolsink has argued that the environmental framing of renewable energy “is not in line with the frame that is applicable from a local perspective” and furthermore that “attitudes towards wind power are fundamentally different from attitudes towards wind farms” (2007: 2695) because a whole new range of factors come into play once individuals have personal experience with renewable energy development. Some researchers have noted that even environmentalists are divided over renewable energy (Abbott 2010; Warren et al. 2005), while others have found that environmental ‘skeptics’ can be some of the most ardent supporters (Jepson, Brannstrom, and Persons 2012).

The relationship between environmental beliefs and renewable energy support is not well understood. Some studies have found that concern about the environment is
positively related to individuals’ level of support for renewables (Larson and Krannich 2015; Mulvaney, Woodson, and Prokopy 2013), while others have found the opposite effect (Fergen and Jacquet 2016). Even those with a high level of environmental concern may be divided, with both sides citing environmental impact-based concerns (Warren et al. 2005). Some research has also shown that individuals who identify as ‘environmentally skeptical’ – meaning, individuals who do not think humans are detrimentally impacting the planet – and who did not view fossil fuels as harmful are often some of renewable energy’s biggest supporters (Jepson, Brannstrom, and Persons 2012; Slattery et al. 2012). In these instances, individuals clearly link benefits other than environmental protection to of renewable energy, such as economic development and national energy security. Larson and Krannich (2015) found that environmental concern was positively related to support for renewable energy when surveying individuals about their general level of support for renewables, but that the influence of environmental beliefs drops out completely when the same individuals are asked how they would feel about nearby development of wind or solar energy facilities.

Other researchers find that only concern about local environmental issues are relevant to individuals’ energy preferences, rather than larger-scale environmental issues that might be experienced as physically or psychologically distant (such as climate change, biodiversity, rainforest deforestation, etc.). Ansolabehere and Konisky (2014) find that individuals do factor in environmental considerations in their energy preferences, but only with regard to nearby environmental issues such as air and water pollution and local health issues. They also find that that belief in anthropogenic climate change is either weakly correlated or not at all correlated with individuals’ preferences.
about which fuel source is used to generate electricity, including renewable energy (Ansolabehere and Konisky 2012: 68).

Both environmental and political views play a role in determining individuals’ energy preferences, but they are not the only driving force. Individuals’ personal, local experience with energy production also shapes energy policy preferences. I next review the literature examining community responses to renewable energy development, the most extensive body of research currently available on public attitudes toward renewable energy.

COMMUNITY RESPONSES TO RENEWABLE ENERGY DEVELOPMENT

A significant portion of research on public responses to renewable energy has taken place at the community level, with researchers conducting either case study or comparative approaches across communities (e.g. Fast and Mabee 2015; Groth 2014; Linden, Rapeli, and Brutemark 2015; Swofford and Slattery 2010). Community research is justified due to a) increasing incidents of community-level opposition toward renewable energy developments, b) a need to understand how these new technologies are affecting nearby individuals and communities. While a popular demarcation attributed to opposed citizens is self interest (the NIMBY label, or “Not In My Backyard”), many social scientists have outspokenly argued that this is a gross oversimplification of what is truly going on (Devine-Wright 2005; Devine-Wright 2011; van der Horst 2007; Wolsink 2006; Wolsink 2007). Scholars argue instead that local debates over local renewable energy development are complex, multifaceted, and qualified by a range of contextual considerations (Bell, Gray, and Haggett 2013; Devine-Wright 2005; Warren and Birnie
Unease regarding landscape aesthetics and interruption of place attachments (Devine-Wright 2009, 2011), effects on energy prices, community participation in planning (Leitch 2010), wildlife impacts, and uneven distribution of burdens and benefits (Haggerty, Haggerty, and Rasker 2014; Ottinger 2013; Phadke 2013) are just a few of the variety of concerns raised by the development of industrial-scale renewable energy facilities. A multiplicity of mechanisms drives attitude formation toward renewable energy at the local level. Several of these are discussed in greater detail below.

One of the most commonly cited reasons for opposing renewable energy development (especially wind energy) is its perceived impact on the aesthetics of surrounding landscapes (Wolsink 2007: 2695), or, to put it succinctly, the belief that wind turbines are ugly. Devine-Wright and others (Devine-Wright 2005, 2009; Devine-Wright and Howes 2010) propose that landscape impacts go beyond aesthetics, posing disruptions to identities individuals form in relation to a particular landscape construction or meaning. Place attachment theory highlights how individuals become emotionally ‘attached’ to places, and how proposed changes to those places can incite distress, anger, and political action to protect those places from change (Devine-Wright 2009; Devine-Wright 2011; Jacquet and Stedman 2013). The place-protection thesis was developed to counter the “NIMBY” / self-interested allegation often employed by planners, the media, and energy developers to explain local opposition to proposed renewable energy development (Burningham, Barnett, and Walker 2015; Dear 1992; Wolsink 2000).

Another explanation for how the public forms opinions about renewable energy employs a relative deprivation framework. This hypothesizes that communities in greater need of economic development will be more likely to accept, and even welcome,
renewable energy development (Devine-Wright and Howes 2010; Linden, Rapeli, and Brutemark 2015; Toke, Breukers, and Wolsink 2008; van der Horst 2007). The expectation of economic returns appears to be one of the top reasons why local residents support nearby wind energy development, at least in some contexts (Jepson, Brannstrom, and Persons 2012; Slattery et al. 2012). Several scholars have proposed that greater economic benefits for individuals and communities may be key in creating more acceptable projects (Bohn and Lant 2009; Pasqualetti 2011), though others have identified major problems with this notion (Aitken 2010; Cowell, Bristow, and Munday 2011) and noted that “the flows of revenues from community benefits are dwarfed…by the revenue streams that might be channeled to rural areas through a broader community ownership of wind energy projects” (Munday, Bristow, and Cowell 2011: 1). Moreover, economic benefits such as payments to landowners and tax payments to counties appear to be distributed very unevenly (Brannstrom, Jepson, and Persons 2011; Haggerty, Haggerty, and Rasker 2014; Munday, Bristow, and Cowell 2011).

The lack of opportunity for local residents to be engaged in renewable energy planning and siting processes is another common explanation for why community opposition may arise (Bohn and Lant 2009; Eltham, Harrison, and Allen 2008; Pasqualetti 2011; Phadke 2011; Leitch 2010; Wolsink 2007). Hindmarsh and Matthews (2008) referred to this as the “democratic deficit” in wind energy planning. This explanation often invokes dimensions of justice and fairness (Ottinger 2013; Phadke 2013).

There has been debate about the role of proximity, with some research showing that the closer individuals live to renewable energy facilities, the more likely they are to
display opposition (Linden, Rapeli, and Brutemark 2015; Swofford and Slattery 2010; Van der Horst 2007). However, others studies have found no effect or the opposite effect (Brannstrom, Jepson, and Persons 2011; Jones and Eiser 2009; Warren et al. 2005), and “the nature, strength and spatial scale of this effect may vary according to local context and 'value' of the land” (van der Horst 2007: 2705).

Another community-level factor that may play a large role in shaping energy attitudes is local experience with fossil fuel-based extractive industries, covered in the next section.

**LOCAL EXPERIENCE WITH FOSSIL FUELS EXTRACTION AND PRODUCTION**

Individuals living in or closer to areas where various types of resource and energy extraction are occurring are more supportive of fossil fuels-based energy development than the public at large. In a nationally representative study of the United States, Boudet et al. (2016) find that individuals living in counties with higher employment in the natural resources and mining sector and individuals living in a shale play were more likely to be supportive of hydraulic fracturing, or ‘fracking’. In another study, individuals who lived closer to the route for the proposed Keystone XL Pipeline Expansion were found to be more supportive of that project (Gravelle and Lachapelle 2015). Mukherjee and Rahman (2016) found that residents of fossil fuels-rich states appear to be more supportive of extraction activities such as offshore drilling. Several other studies have shown that individuals living in areas undergoing intense natural gas development were more likely to view fracking positively, often for the economic development it was expected to bring
(Jacquet 2012; Kriesky et al. 2013; Rabe and Borick 2011; Stedman et al. 2012; Theodori 2009).

Local experience with fossil fuels-based energy development is also related to policy attitudes regarding climate change. At the level of local governments, Zahran et al. (2008) found that whether or not officials develop climate mitigation strategies depended on how prominently fossil fuels factored into the local economy. A similar correlation has also been found at the individual level. In a survey of public opinion about climate policy in Norway, Tvinnereim and Ivarsflaten (2016) found that individuals employed in fossil fuels industries were less likely to support the policies that were more costly to their industry (such as reducing oil production), though they were just as likely as everyone else to support less costly climate policies (such as carbon capture technologies). Cragg et al. (2012) found that how members of Congress vote on climate policy depends on the carbon intensity of their districts.

These observations as a whole suggest that community-level factors such as local experience with particular industries could be as influential as individual characteristics (such as political views) in shaping public attitudes toward energy issues (Bell and York 2010; Freudenburg and Davidson 2007), including renewable energy. There may be several reasons for this. First, communities may be truly economically reliant on the fossil fuels industry, and renewable energy could be perceived as a disruption to the status quo. Second, economic reliance on any one sector comes with numerous vulnerabilities, especially for isolated rural communities located far from larger population centers and economic activities. Energy-dependent communities may become ‘overadapted’ to particular types of employment and labor skills, making it difficult to
envision or implement changes as larger economic and production systems shift around them (Gramling and Freudenburg 1992).

Additionally, individuals may feel a connection to fossil fuels industries and practices that extend beyond economic reliance into the realm of local culture and identity. Scholars have found that a unique community identity often forms around extractive activities such as coal mining or logging (Bell and York 2010; Ceresola and Crowe 2015; Dampier et al. 2014; Evans and Phelan 2016; Silva and Crowe 2015). Even if the majority of individuals in a community themselves are not directly employed by the local extractive industry, it is reasonable to expect they would exhibit support for industries underlying local history, norms, and collective understandings about everyday life (Freudenburg and Davidson 2007).

In sum, local experiences with various types of energy production may play as much of a role in individuals’ views toward renewable energy as their environmental beliefs and even political views. The aim of this research project is to examine each of these elements from various vantage points using a mixed-method research design.

RESEARCH DESIGN

This dissertation consists of three separate empirical research endeavors (Chapters II, III, and IV). Though each project utilizes unique data and methods and targets distinct research questions, the three projects are interrelated. As a whole, this dissertation is organized around the following central questions: What local experiences influence how individuals form opinions about renewable energy, especially local experiences with different types of energy production? How important are environmental beliefs,
specifically the idea that Earth’s climate is warming due to human activities, to individuals’ level of support for renewable energy development and policy? What are the policy and scholarly implications inherent in the answers to the above two questions?

These questions will be addressed using mixed methodology involving both statistical analyses of attitudinal survey data as well as qualitative analysis of semi-structured interviews. A mixed-methods approach is justified due to the nature of the research questions, which require a richer understanding of the dynamics involved in renewable energy attitude formation than either approach alone can provide. Mixed methods offer several benefits to my research design. First, approaching the research questions from different angles allows for methodological triangulation of findings (Fielding and Fielding 1986), which increases the overall validity of the research as a whole. Second, utilizing more than one research approach allows for better understanding of, for example, the why behind the what of quantitative survey responses – as such, it can address confirmatory as well as exploratory research questions, so it can simultaneously confirm existing theory as well as create new theory (Teddlie and Tashakkori 2010: 14). Mixed methods can also help reduce researcher bias resulting from blind adherence to one “mental model” or theoretical paradigm (Greene 1997).

Each of the three following projects addresses the central research questions from different vantage points and geographic scales. The first two projects are quantitative analyses examining the statistical relationships between renewable energy attitudes, climate change opinions, and a variety of individual and place-based characteristics. The third project utilizes qualitative interviewing to more deeply investigate the discourse and meaning systems that individuals employ to rationalize their attitudes toward renewable
energy and climate change. The research questions and methods for each project are outlined briefly in the sections below and described fully in the later chapters.

**OUTLINE OF CHAPTER II**

Chapter II is titled “Public Views on Renewable Energy in the Rocky Mountain Region of the United States: Distinct Attitudes, Exposure, and Other Predictors of Wind Energy.” The purpose of this project is to quantitatively analyze the factors related to individuals’ attitudes toward renewable energy in communities undergoing utility-scale wind energy development. The unit of analysis is individuals, though I hypothesize that community-level characteristics will emerge as important predictors of individual responses. The research questions addressed in this study are 1) in what ways and to what extent are renewable energy attitudes, environmental beliefs, climate change opinion, and attitudes toward other energy sources inter-correlated? 2) how well do environmental beliefs, including beliefs about climate change, explain renewable energy attitudes, compared with landscape aesthetics, economic expectations, community engagement, and proximity?

I use data from a 2014 drop-off/pick-up survey conducted in five communities in Utah, Idaho, and Wyoming. I examine two dependent variables: individuals’ general attitudes toward renewable energy, and individuals’ attitudes toward the local wind energy facility. The first was measured using a five-item scale that asked for respondents’ level of support for solar, wind, and renewable energy generally. Attitudes toward local wind energy development were measured with one question asking whether or not individuals would have voted for the local wind energy facility, if given the opportunity. I
employ correlational analysis, factor analysis, and multiple regression modeling to examine how climate change beliefs and general environmental beliefs factor into respondents’ renewable energy attitudes. Additionally, I examine the influence of several local contextual factors, such as physical proximity, visibility of wind turbines, and whether or not residents believe wind energy development brings economic benefits.

OUTLINE OF CHAPTER III

Chapter III is titled “The Influence of Extractive Industry Activities on Public Support for Renewable Energy Policy.” This research examines the relationship between local extractive industry activities and public support for renewable energy policies using a nationally representative survey dataset. Specifically, I ask: 1) Does local presence of extractive industry activities influence public opinion about renewable energy policy? 2) What factors help predict public support for renewable energy policy? Unlike the last chapter, which examined individuals’ attitudes toward renewable energy technologies and facilities, this chapter explores public opinion toward policies supporting the development of renewable energy.

Using multi-level modeling at the individual, county, and state levels, I examine several independent variables hypothesized to be related to individuals’ views toward renewable energy policies. The main predictor variables represent local extractive industry activities – specifically, whether or not the county that the respondent resides in is a producer of oil or natural gas, and whether or not the county is economically dependent on the mining sector. I also examine several individual socio-demographic
characteristics including political ideology, and whether or not the respondent believes that anthropogenic climate change is occurring.

This project overall provides an opportunity to investigate how place-based, county-level characteristics as well as individual-level characteristics may play a role in shaping public opinion about renewable energy across the United States.

**OUTLINE OF CHAPTER IV**

Chapter IV is titled “Double Benefit Or Double-Edged Sword? Local Discourses on Renewable Energy in Rural Utah” and diverges from the previous two chapters in that it uses qualitative techniques to address the research questions. This project provides richer insight into the findings of both Chapter II and Chapter III. In Chapter II, I find that local community context can matter in terms of how individuals’ perceive renewable energy and how supportive they may be of renewable energy development in their local area. Furthermore, Chapter II indicates that environmental beliefs are not very relevant for understanding individuals’ views on renewable energy, at least in communities where renewable energy development is occurring. In Chapter III, I find that climate change beliefs are important predictors of support for renewable energy policy. I also find that residents living in counties with extractive industry activities are less likely to support such policies. Both Chapters II and III were based on quantitative data and statistical analysis, limiting my ability to understand the underlying reasons and rationale for why certain community and individual characteristics are related to their views on renewable energy. Thus, I designed a qualitative research project in order to delve further into the “why” behind the “what” of the previous two chapters.
In this chapter, I explore discourses about renewable energy across three different rural Utah study sites, each with a different energy production context: one where several large-scale renewable energy facilities have been constructed, one where coal mining and power production are predominant, and one with significant oil and gas development. To compile the qualitative dataset, I conducted sixty-one interviews with sixty-eight individuals across the three different rural places. The research questions motivating this project are: 1) What master narratives are prevalent about renewable energy across different rural contexts? 2) How do discourses about renewable energy vary between energy-production contexts? 3) To what extent are perceptions of renewable energy related to environmental beliefs, including beliefs about anthropogenic climate change?

SUMMARY

Understanding the dynamics underlying public support for or opposition to renewable energy is critical to the clean energy transition, especially given Americans’ increasing political divisions over climate change, energy, and other environmental issues (Brulle, Carmichael, and Jenkins 2012). By looking across different contexts in each of the three empirical chapters, I am able to glean insight into the local experiences, community contexts, and particular stances that may foster opposition toward renewable energy technologies and policies. This information will be useful to practitioners and policymakers alike who are working to increase the amount of electricity generated through cleaner, more sustainable sources than fossil fuels.

This investigation of public opinion on renewable energy advances the scholarship in several ways. First, though previous social science research has
investigated community and individual responses to energy development in both renewable energy contexts (e.g. Jepson, Brannstrom, and Persons 2012; Larson and Krannich 2015; Mulvaney 2013) and fossil fuels based contexts (e.g. Ceresola and Crowe 2015; Silva and Crowe 2015; Theodori 2009), little work has sought to understand how opinions about both energy sources may be connected. Second, to date I could find only one study (Goldfarb, Buessing, and Kriner 2016) examining how individuals’ attitudes toward renewable energy policy might be related to proximity to fossil fuels-based energy activities – this is an area that should be highlighted for future research, and I make a contribution with my findings in Chapter III. Finally, this research as a whole provides an opportunity to interrogate a commonly assumed relationship between individuals’ climate change and renewable energy attitudes – a relationship that my findings show is nuanced and inconsistent across different contexts.
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CHAPTER II

PUBLIC VIEWS ON WIND ENERGY IN THE ROCKY MOUNTAIN REGION OF THE UNITED STATES: DISTINCT ATTITUDES, EXPOSURE, AND OTHER KEY PREDICTORS OF WIND ENERGY 1 2

ABSTRACT: Renewable energy is often framed by policymakers and the media as an environmental or ‘green’ issue motivated by global climate change and the need for greenhouse gas reductions. However, some researchers studying social responses to renewables have found that factors other than beliefs about climate change may be more influential in determining support for renewables. This study analyzes survey data from a study of five communities in the Rocky Mountain region of the U.S. experiencing wind energy development to examine the relationship between environmental beliefs, including beliefs about climate change, and support for renewable energy. Results show that views on renewable energy comprise a distinct dimension of public views on energy, environment, and climate, suggesting that public support for renewable energy is less related to environmental beliefs than to some other factors, including beliefs about economic benefits and concerns about landscape impacts. Findings also indicate that the frequency with which individuals see nearby wind turbines is strongly related to their level of support for renewable energy, while physical proximity is not. Overall, results suggest that ceasing to frame renewable energy as an environmental issue and instead

1 This manuscript was published in 2016 in Energy Research and Social Sciences. The co-authors of this article are Richard S. Krannich (Utah State University) and Peter G. Robertson.
2 Research supported by the Utah Agricultural Experiment Station, Projects UTA01219 and UTA 00839.
3 For example, in the states encompassing our study sites: since 2005, the installed...
framing it in a way that invokes locally relevant social values may garner broader public support.

*Keywords*: environmental beliefs; renewable energy; wind energy; United States

1. Introduction

Renewable energy enjoys broad public support across the world [29], yet often experiences significant challenges due to social opposition at the local or community level [4,5]. Understanding how and why local residents respond to nearby large-scale renewable energy generation systems is an important factor in paving the way for a smoother transition to a renewable energy future. Not only can public acceptance of renewable systems influence the rate of development, but understanding the experiences of individuals and communities residing near large-scale renewable energy facilities is critical since, as is the case for fossil-fuel based energy production, adverse impacts may arise that highlight issues of power, rural disparity, and environmental justice [38]. Furthermore, debates over local renewable energy development have been shown to be complex, multifaceted, and qualified by a range of contextual factors [11,52,4], such as impacts on the local economy, local landscape aesthetics, and community autonomy.

Continued social science research is needed to increase scientific knowledge about how and why individuals form their opinions about renewable energy, and to consider issues of power and justice that may be present in the renewable energy development process.

However, across the field of energy studies, social science makes up less than 20% of research, and overall remains relatively limited compared to research from disciplines such as engineering, economics, and business [43]. As Sovacool (2014) points...
out, “human-centered” research methods, such as surveys, interviews, and focus groups, are even more underutilized, yet are “necessary if one is to uncover the multidimensional role that attitudes, habits, and experience have in shaping energy consumption” (p. 11) – and, we would add, in shaping individuals’ energy preferences and policy support.

This study analyzes how residents of communities in the Rocky Mountain region of the United States located in close proximity to new or proposed wind energy facilities are forming attitudes about such developments, and what variables are related to these opinions. The Rocky Mountain region has experienced notable growth in installed renewable energy capacity over the last decade. Furthermore, the region has been documented as having significant potential for additional growth in both wind and solar energy generation [48]. Last, this area of the western United States is notable for its large tracts of open space, rural communities, and public land ownership. Thus, findings from this study may be particularly useful in similar contexts across the world where large-scale renewable energy facilities are being constructed in less densely populated areas that are valued for recreation, landscape aesthetics, and/or communal prerogatives.

We focus on the factors that influence how individuals and communities in the Rocky Mountain region respond to renewable energy development, including whether they support or oppose such development, and why. We are interested in the role that both general environmental beliefs, as well as local factors – such as where in space wind turbines are built, for example – play in shaping the way that individuals judge renewable energy. While renewable energy is frequently framed by the media, policymakers, and activists as an environmental issue, particularly in terms of mitigation of global climate change [46,53], the influence of individuals’ environmental beliefs on their level of
support for renewable energy remains debatable. Some researchers have noted that even environmentalists are divided over renewable energy [1,51], while others have found that environmental ‘skeptics’ can be some of the most ardent supporters, supporting renewable energy for economic or other reasons [24]. Environmental issues such as climate change have become increasingly polarizing in several national contexts, such as in Australia, the United Kingdom, and especially in the United States [34,33]. As such, local responses to renewable energy development may be influenced by the extent to which renewable energy is construed as an environmental issue. For example, Olson [37] found that a central component of oppositional discourse toward wind energy in central Wyoming was the belief that renewable energy development was part of the ‘liberal environmental agenda’.

This study directly addresses a research question highlighted in Sovacool’s important state-of-knowledge article, urging energy researchers to ask “What types of politics can make the numerous energy and climate policies we discuss achievable?” [emphasis in original] (2014:21). That is, we believe that in certain regions and contexts, overlaying an environment-based rationale over renewable energy development might unnecessarily and detrimentally politicize the issue and present additional obstacles going forward. The Rocky Mountain region of the US is an important geographic area in which to study public responses to renewable energy because of its conservative politics and its legacy of tension between local and extra-local interests over environmental regulations, land use, and felt anger over ‘federal overreach’ on both these issues [32]. Thus, any insights about how renewable energy might be received by communities in our study area
could be very useful for predicting human responses to new energy systems across the world in regions with similar political and geographic contexts.

Utilizing survey research from five communities (n=906), we examine the role that general environmental beliefs, climate change beliefs, opposition to environmental policies, and support for different energy sources play in shaping renewable energy attitudes. We also explore the influence of proximity and visual exposure to turbines, beliefs about impacts on landscape aesthetics, and beliefs about economic impacts, providing further insight into what factors are relevant in shaping public views toward renewable energy.

2. Literature Review

2.1 Environmental beliefs and public responses to renewable energy

Nationally representative survey data consistently show broad public support for renewable energy [29,2,3]. The most recent study from the Yale Program on Climate Change Communication found that that 82% of registered voters either “strongly” or “somewhat” support government funding of research to further develop renewable energy technologies, and that 81% think the U.S. should use more renewable energy [29]. How does support for renewable energy connect to individuals’ environmental beliefs? Ansolabehere and Konisky [3] find that while most Americans factor environmental considerations into their energy preferences, they tend to do so at the local level rather than in the abstract, incorporating concerns over local health and pollution issues into energy attitudes instead of relying on general environmental beliefs, such toward global climate change. The authors also found that attitudes about climate change are either
weakly correlated or not correlated with individuals’ preferences about which fuel source
is used to generate electricity, including renewable energy [2].

The relationship between environmental beliefs and renewable energy attitudes
may become even less strong at the local level, once residents have some type of personal
experience with nearby renewable energy development. Wolsink [53] has argued that the
environmental framing of renewable energy “is not in line with the frame that is
applicable from a local perspective” and furthermore that “attitudes towards wind power
are fundamentally different from attitudes towards wind farms” (pg. 2695) because a
whole new range of factors are introduced by personal experience. While some studies
have found that a pro-environmental orientation is positively related to individuals’ level
of support for renewables [28,35], others have found the opposite effect [16]. Even those
with a high level of environmental concern may be divided, citing environmental impact-
based rationales on both sides of the debate [51]. Some research has also shown that
individuals who identify as ‘environmentally skeptic’ and who do not view fossil fuels as
harmful can be some of the biggest supporters of renewable energy [24,42]. Larsen and
Krannich [28] find that pro-environmental orientation is positively related to renewable
energy attitudes when surveying individuals about their general level of support for
renewables, but that the influence of environmental beliefs drops out completely when
the same individuals are asked about how they would feel about nearby development of
wind or solar energy facilities.

Clearly, there is more to understand in terms of the relationship between
environmental beliefs, beliefs about climate change, and renewable energy attitudes.
Meanwhile, the framing of renewable energy as an environmental issue could have
unintended and adverse effects in certain social and political contexts. It is important to continue to examine this relationship in order to understand the factors influencing how communities and individuals respond to renewable energy development.

Researchers like Devine-Wright [11] argue that public reactions to renewable energy systems are of a “complex, multidimensional nature” (pg. 129), appear to be context-dependent, and change over time [16]. Scholars have theorized a range of factors that may help to explain and predict public support or opposition. Before describing our study, we briefly review several of these.

2.2 Landscape aesthetics and place attachment

One of the most commonly cited reasons for opposing renewable energy development (especially wind energy) is its perceived impact on the aesthetics of surrounding landscapes. Or, as Wolsink [53] puts it succinctly, "It's the landscape, stupid!" (pg. 2695). Devine-Wright and others [12,10,11] propose that landscape impacts go beyond aesthetics, posing disruptions to identities individuals form in relation to a particular landscape construction or meaning. Place attachment theory highlights how individuals become emotionally ‘attached’ to places, and how proposed changes to those places can incite distress, anger, and political action to protect those places from change [23,10]. The place-protection thesis was developed to counter the self-interested or “NIMBY” allegations often employed by planners, the media, and energy developers to explain local opposition to proposed renewable energy development [8,54,9].
2.3 Economic rationale

Another idea used to explain why communities or residents support or oppose renewable energy employs a relative deprivation framework. In this framework, communities in greater need of economic development are believed to be more likely to accept, and even welcome, renewable energy development [31,12, 47, 49]. The expectation of economic returns appears to be one of the top reasons why local residents support nearby wind energy development, at least in some contexts [42; 24]. Several scholars have proposed that greater economic benefits for individuals and communities may be key in creating more acceptable projects [6]. Additionally, economic benefits, such as lease or royalty payments to landowners and tax payments to counties, appear to be distributed unevenly, creating potential inequities between those who are positioned to benefit from renewable energy development and those who are not [19,7,36].

2.4 ‘Democratic deficit’

The lack of opportunity for local residents to be engaged in renewable energy planning and siting processes is another common explanation for why community opposition may arise [21,39,41,30,6,15]. Hindmarsh and Matthews [20] referred to this as the “democratic deficit” in wind energy planning. This explanation often invokes dimensions of procedural justice and fairness [40,38].

2.5 Proximity

There has been debate about the role of proximity, with some research showing that the closer individuals live to renewable energy facilities, the more likely they are to
display opposition [31,45,49]. However, other studies have found no effect or the opposite effect [7,26,51], and “the nature, strength and spatial scale of this effect may vary according to local context and 'value' of the land" [49, pg. 2705]. Given these mixed findings, the present research examines the influence of visual accessibility (how often individuals see or anticipate seeing the wind turbines) on residents’ perceptions of renewable energy.

A multiplicity of mechanisms seem to be driving attitude formation toward renewable energy, which may be different for the general public in the abstract than for local residents confronted with the reality of a specific renewable facility. Given the environmental framing of renewable energy in the media and policy arenas, the mixed research findings on this relationship, and the possible adverse consequences of this environmental frame, this research assess the relative influence of environmental beliefs on renewable energy attitudes, compared to a range of other factors. We use survey data from five communities in the Intermountain West experiencing wind energy development. The central questions guiding the present study are: 1) in what ways and to what extent are renewable energy attitudes, environmental beliefs, beliefs about climate change, and attitudes toward other energy sources inter-correlated? 2) how well do general environmental beliefs and beliefs about climate change explain renewable energy attitudes, compared with landscape aesthetics, economic expectations, community engagement, and proximity? Overall, we expect that attitudes toward local renewable energy development will be less influenced by general environmental beliefs and beliefs about climate change than they are by other factors, such as beliefs about economic benefits and landscape factors, such as visual accessibility of turbines.
3. Materials and Methods

3.1 Study sites

This research uses data from a 2014 survey of five communities in the Intermountain West (total n=906): Milford and Monticello, Utah; Ammon/Iona/eastern Idaho Falls, Idaho (referred to hereafter as ‘eastern Idaho Falls’); and Rawlins and Saratoga, Wyoming. These areas were chosen purposively to represent a spectrum of community experiences with and responses to renewable energy development. Two of the areas (Milford and the Ammon/Iona/eastern Idaho Falls site) have over the past several years experienced the construction and operation of large-scale commercial wind power facilities located in close proximity to those communities. The other three study areas (Monticello, Rawlins, and Saratoga) are located near proposed commercial wind power projects that were in advanced permitting stages but not yet developed at the time of data collection. Key informant interviews conducted in March 2014 provided preliminary insights about support and opposition within each community. The locations of the five study sites are shown in Figure 1, and descriptions follow.

3.1.1. Utah study sites: Milford and Monticello

Both Utah study areas are rural towns characterized by small populations and remote locations. Milford (population 1,420 at 2010 Census) is located in the southwest part of Utah in Beaver County, 230 miles from Salt Lake City. Between 2009 and 2014, First Wind (now part of SunEdison) constructed in two phases a 306-megawatt wind energy facility across a flat desert valley about ten miles north of Milford. Key informant interviews with community leaders prior to survey research highlighted a notably high
level of community support for this project (perhaps partially because the developer involved a local high school teacher and his students in the development process). This is currently the largest wind facility in Utah.

Fig. 1. Map of study locations.

Monticello (population 1,958 in 2010) is located in San Juan County 54 miles south of Moab, the state’s popular red rock, mountain biking and off-road vehicle destination, and 288 miles from Salt Lake City. Monticello is characterized by its legacy
as a former uranium-processing town and continues to exhibit the effects of a major economic downturn that followed the end of the uranium boom in the 1960s. In 2006, Wasatch Wind proposed a 60-megawatt wind farm on private land immediately west of Monticello. At the time of data collection a conditional use permit had been obtained from county officials and environmental studies were complete, though construction did not begin until 2015. Key informant interviews with community leaders and media research revealed some community tension over this project, partially because it was sited on the lower shoulder of a nearby mountain and some residents believed it could negatively impact landscape aesthetics as well as recreation and tourism.

3.1.2 Wyoming study sites: Rawlins and Saratoga

Both Wyoming study sites are located in Carbon County, to the northwest (Rawlins) and southeast (Saratoga) of the proposed Chokecherry and Sierra Madre Wind Energy Project. As proposed this would be among the largest of wind energy facilities in the US, with a total of 1,000 turbines producing up to 3,000 megawatts of energy. The project would be built by the Power Company of Wyoming in a “checkerboard” area comprised of both federal public lands administered by the US Bureau of Land Management and private land owned by Anschutz Corporation. Since this project includes public lands, the siting and permitting process requires a substantial public involvement process along with extensive environmental review and approval through the Environmental Assessment process as required by the U.S. National Environmental Protection Act (NEPA). At the time of data collection a conditional use permit had been approved by the Carbon County commission, and the project was in the midst of the
federal NEPA review process.

Rawlins (population 9,259) is a small urban community located on a major interstate highway in the south-central part of the state, 149 miles west of Cheyenne. For several decades Rawlins has served as a regional hub for conventional (coal, oil and gas) energy development activity and related industries. Saratoga (population 1,690) is located about 40 miles southeast from Rawlins and 20 miles south of Interstate 80. Situated alongside the North Platte River, Saratoga is a destination for fly-fishing and hunting enthusiasts as well as substantial numbers of retirees and seasonal residents attracted to the rural and natural amenity conditions of the area.

3.1.3 Idaho study site: Ammon/Iona/eastern Idaho Falls

This study site was selected to encompass a “rural-urban fringe” area on the eastern edge of the Idaho Falls metropolitan area (metro population of 136,108). Between 2006 and 2012, four different wind energy facilities with a combined total of 215 turbines were constructed along ridgelines immediately to the east, with turbines highly visible from most locations throughout the area. Key informant interviews with community leaders prior to the survey data collection highlighted that these wind energy facilities were built relatively quickly and without much public awareness or input. The study area included the small towns of Ammon (population 13,816) and Iona (population 1,803), as well as surrounding unincorporated portions of Bonneville County.

We believe the five selected study areas represent a reasonable cross-section of the Rocky Mountain region, where commercial-scale wind power development has
grown considerably in the last ten years.\textsuperscript{3} The Rocky Mountain region refers to states that contain part of the Rocky Mountain Range, which runs north to south through Montana, Idaho, Wyoming, Colorado, Utah, and New Mexico. However, we also recognize that the specific nature of the study areas and their populations may nevertheless impose limitations on the research. Because all had direct experience with nearby utility-scale renewable energy development, residents’ views may be different from what might occur within more broadly representative statewide or regional samples or in areas where such developments have been sited at greater distance from local communities. The “public lands” context of the region and broad-based anti-federalist sentiments may also influence local reactions to such projects, even though across our study areas only one (Milford) had experience with renewable facility development involving mostly public lands. Finally, four of the study communities are rural and one is a rural-urban fringe area, contexts that differ greatly from the major metropolitan areas where a majority of the region’s population resides.

3.2 Data collection

Data were collected using a drop-off/pick-up survey methodology \cite{44} and tailored survey design principles \cite{13}. A list of all residential properties was created for each community (including both rental units as well as resident-owned properties) using public utility and tax assessment records, supplemented where necessary by visual

\textsuperscript{3} For example, in the states encompassing our study sites: since 2005, the installed capacity of wind energy in Idaho has grown from 75 megawatts (MW) to 973 MW, in Wyoming has grown from 288 MW to 1,410 MW, and in Utah has grown from virtually no wind power to 327 MW. See the US Department of Energy website: \url{http://apps2.eere.energy.gov/wind/windexchange/wind_installed_capacity.asp}
enumeration of units in multiple-residence facilities such as mobile home parks and apartment complexes. Random samples of 250 addresses were drawn for each area, with additional addresses also randomly drawn to allow for replacement vacant residences or households where no one could be contacted following repeated attempts across multiple days. Survey materials were personally delivered to the adult member of each sampled household whose birthday had occurred most recently, a straightforward and effective method for randomizing within-household selection of survey participants [13]. Following delivery members of the project team then returned (usually within 24-48 hours) to retrieve completed questionnaires. Response rates were high in all of the study areas (64% in Rawlins, 72% in Saratoga, 74% in eastern Idaho Falls, 76% in Milford, and 79% in Monticello).

3.3 Measurement procedures

3.3.1 Renewable energy attitudes: general and local

Scale construction details for energy-related latent variable measures are described in Table 1. General attitudes toward renewable energy were measured using a five-item summated scale asking for respondents’ level of support for solar, wind, and renewable energy generally. The scale as a whole was internally reliable as a measure of renewable energy support (Cronbach’s alpha = 0.835). We also measured respondents’ level of support for the development of local wind energy using a single question asking whether or not they would have voted for the local wind farm, if given the chance to vote.
<table>
<thead>
<tr>
<th>Latent variable scales</th>
<th>Reliability (alpha)</th>
<th>Component Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>General support for renewable energy</td>
<td>0.835</td>
<td>Should we increase or reduce the use of solar power in the United States? (5-point Likert scale from &quot;reduce a lot&quot; to &quot;increase a lot&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Should we increase or reduce the use of wind power in the United States? (5-point Likert scale from &quot;reduce a lot&quot; to &quot;increase a lot&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you disapprove or approve of using renewable energy sources to generate electricity? (5-point Likert scale from &quot;strongly disapprove&quot; to &quot;strongly approve&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environmentally harmful do you think wind energy is? (5-point Likert scale from &quot;very harmful&quot; to &quot;not harmful at all&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environmentally harmful do you think wind energy is? (5-point Likert scale from &quot;very harmful&quot; to &quot;not harmful at all&quot;)</td>
</tr>
<tr>
<td>Support for coal</td>
<td>0.877</td>
<td>Should we increase or reduce the use of coal-fired power plants in the United States? (5-point Likert scale from &quot;reduce a lot&quot; to &quot;increase a lot&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environmentally harmful do you think coal fired power plants are? (5-point Likert scale from &quot;very harmful&quot; to &quot;not harmful at all&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you disapprove or approve of using coal to generate electricity? (5-point Likert scale from &quot;strongly disapprove&quot; to &quot;strongly approve&quot;)</td>
</tr>
<tr>
<td>Support for natural gas</td>
<td>0.812</td>
<td>Should we increase or reduce the use of natural gas-fired power plants in the United States? (5-point Likert scale from &quot;reduce a lot&quot; to &quot;increase a lot&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environmentally harmful do you think natural gas-fired power plants are? (5-point Likert scale from &quot;very harmful&quot; to &quot;not harmful at all&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you disapprove or approve of using natural gas to generate electricity? (5-point Likert scale from &quot;strongly disapprove&quot; to &quot;strongly approve&quot;)</td>
</tr>
<tr>
<td>Support for nuclear energy</td>
<td>0.914</td>
<td>Should we increase or reduce the use of nuclear energy in the United States? (5-point Likert scale from &quot;reduce a lot&quot; to &quot;increase a lot&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How environmentally harmful do you think nuclear energy is? (5-point Likert scale from &quot;very harmful&quot; to &quot;not harmful at all&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you disapprove or approve of using nuclear energy to generate electricity? (5-point Likert scale from &quot;strongly disapprove&quot; to &quot;strongly approve&quot;)</td>
</tr>
</tbody>
</table>
3.3.2 Attitudes toward other energy sources

To measure respondents’ level of support for using coal, natural gas, and nuclear fuel sources to produce electricity, we constructed three-item summated scales for each energy source (Table 1). Each scale was found to be internally reliable (Cronbach’s alphas: coal scale = 0.877; natural gas scale = 0.812; nuclear energy scale = 0.914).

3.3.3 Environmental beliefs (NEP score)

To measure general environmental orientation, the survey included ten items from the New Environmental Paradigm (NEP) scale (see Appendix A) developed by Dunlap et al. [14]. The NEP scale intends to measure individuals’ fundamental or “primitive” environmental beliefs, specifically whether or not (and how much) individuals have incorporated awareness and concern about the environment into their worldview. According to [14], individuals with an ecological worldview believe to some extent that human society has the ability to upset the balance of nature and that limits to growth and consumption are necessary to live in harmony with nature. The “new environmental paradigm” refers to the rise of a new public consciousness about the environment and humans’ impact on it, and stands in contradiction to what Dunlap and colleagues refer to as the “dominant social paradigm” in which individuals believe humans stand apart from and are masters over nature. Dunlap and colleagues constructed a multi-item New Environmental Paradigm scale (NEP scale) to measure this latent construct. In the present study, five items from the full 15-item NEP scale were not included due to questionnaire space considerations, as well as evidence from prior research that some items may not
contribute uniformly to a single measurement dimension. Internal reliability was found to be high for the ten NEP items used (Cronbach’s alpha = 0.843).

3.3.5 Opposition to government environmental policies:

To measure the relationship between environmental beliefs, climate change beliefs, and renewable energy attitudes, we considered it important to control for attitudes towards government environmental policies. Anti-federal sentiments related to government regulation of land and natural resources have been a fixture of western U.S. politics for decades. We therefore wanted to disentangle individuals’ environmental beliefs from their attitudes about government regulation of the environment. To measure attitudes toward environmental policies, a scale was constructed based on eight items asking respondents about their broad feelings about environmental regulations in the United States as well as about particular environmental policies (see Appendix A). Internal consistency of this scale was found to be high (Cronbach’s alpha = 0.880).

3.3.6 Proximity and visual accessibility of turbines

A self-reported measure of proximity to the local wind farm was obtained, which asked respondents how far they live from the wind energy facility (or will live, once the

---

4 The items dropped were (1) Plants and animals have as much right as humans to exist; (2) The balance of nature is strong enough to cope with the impacts of modern industrial nations; (3) Despite our special abilities humans are still subject to the laws of nature; (4) Humans were meant to rule over the rest of nature; (5) Humans will eventually learn enough about how nature works to be able to control it.
facility is built). The survey also included a measure of how frequently the respondent sees the wind energy facility (or expects to see it once it’s built). We expect this variable to be more predictive than the commonly used spatial proximity variable, because close spatial proximity does not directly translate into a higher frequency with which individuals may see the wind turbines. Visual accessibility is influenced by topographic and other spatial factors such as how high in elevation turbines are placed and whether or not residents’ line of sight to turbines is blocked by obstructions such as buildings or vegetation.

3.3.7 Landscape concerns, economic beliefs, and participation

The survey measured a variety of beliefs regarding utility-scale wind energy. Using a five-point Likert scale, respondents were asked if they thought utility-scale wind power was an unattractive feature of the landscape. To measure respondents’ beliefs about the economic impacts of wind energy development, a four-item scale (including questions about economic benefits like jobs and tax revenues) was constructed to tap a latent construct indicating belief in the idea that wind power development brings economic benefits to the local area (see Appendix A). The scale was found to be reliable (Cronbach’s alpha = 0.759). Last, to measure whether respondents felt they had been given adequate opportunity and information to participate in the planning process for the

---

5 The proximity measure used a four-option answer consisting of the following: (1) Less than one mile; (2) Between one and five miles; (3) Between five and ten miles; (4) More than ten miles.
6 The visual accessibility measure used a four-option answer consisting of the following: (1) Every day; (2) A few times a week; (3) A few times a month; (4) A few times a year or less.
local wind energy facility, a two-item scale (see Appendix A) was constructed (Cronbach’s alpha = 0.817).

3.3.8 Socio-demographic variables

The survey gathered information from respondents on a number of socio-demographic characteristics. Age, education, and income have been identified as relatively stable predictors of environmental concern [50,25], while the effect of gender has received mixed and inconsistent support, though females generally exhibit higher levels of concern, especially in terms of health and safety risks of environmental problems [56].

Political party affiliation and political ideology have also been identified as consistent predictors of environmental beliefs [25,34]. This study uses a measure of political orientation comprised of a 5-point scale (Very Conservative /Moderately Conservative /Moderate /Moderately Liberal /Very Liberal).

The influence of religion on environmental beliefs has been mixed in research findings, with some scholars finding that Judeo-Christians have lower levels of environmental concern and exhibit less support for environmental policies [17,18], while others find contradictory results [55]. To capture any correlations with religious affiliation, the survey asked whether respondents were Mormon, Protestant, or Catholic (the major religions of our study area), or whether they have no religious affiliation.  

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7 A small number of respondents reporting other religious affiliations were dropped from the analysis.
3.3.9 Community of residence

To capture community-level variation in the dependent variables not captured by the locally relevant variables mentioned above, we include dummy variables for four of the five communities, with Milford, Utah, as the reference category. Milford was chosen as the reference category because it had the highest level of community support overall for renewable energy.

3.4 Analysis

We use a multi-stage analysis to address the research questions. First, bivariate correlation matrices are examined to understand the inter-relationships between respondents’ environmental beliefs (NEP score), attitudes toward environmental policies, beliefs about climate change, level of approval for coal, natural gas, nuclear, and renewables, and level of support for local wind energy development. This first, basic analysis stage provides a foundation for understanding how individuals’ attitudes toward different energy sources relate to their environmental beliefs, and also illuminates how renewable energy opinions compare or relate to attitudes toward other energy sources.

Next, we conduct a principal-components factor analysis (principal components extraction). This approach provides the opportunity to further examine the relationships between environmental and energy attitudes as a whole, while looking for clustering of certain variables. In particular, we examine the dimensionality of individuals’ environmental beliefs and energy attitudes to investigate whether or not renewable energy attitudes comprise a distinct attitudinal dimension.
### Table 2 Descriptive statistics for independent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>N</th>
<th>%</th>
<th>Census°</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>18-24</td>
<td>41</td>
<td>4.7%</td>
<td>8.6%</td>
</tr>
<tr>
<td></td>
<td>25-34</td>
<td>174</td>
<td>19.9%</td>
<td>13.9%</td>
</tr>
<tr>
<td></td>
<td>35-44</td>
<td>182</td>
<td>20.8%</td>
<td>11.7%</td>
</tr>
<tr>
<td></td>
<td>45-54</td>
<td>147</td>
<td>16.8%</td>
<td>12.2%</td>
</tr>
<tr>
<td></td>
<td>55-64</td>
<td>158</td>
<td>18.1%</td>
<td>11.3%</td>
</tr>
<tr>
<td></td>
<td>65+</td>
<td>173</td>
<td>19.8%</td>
<td>11.6%</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td>Under $24,999</td>
<td>110</td>
<td>13.6%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$25,000-$49,999</td>
<td>207</td>
<td>25.6%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$50,000-$74,999</td>
<td>191</td>
<td>23.6%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$75,000-$99,999</td>
<td>129</td>
<td>16.0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$100,000-$124,999</td>
<td>90</td>
<td>11.1%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$125,000-$149,999</td>
<td>41</td>
<td>5.1%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$150,000-$199,999</td>
<td>24</td>
<td>3.0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>$200,000 or more</td>
<td>16</td>
<td>2.0%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Median Household Income</strong></td>
<td>$50,000-$74,999</td>
<td>808</td>
<td>-</td>
<td>$50,919</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>High school or less</td>
<td>509</td>
<td>26.9%</td>
<td>39.80%</td>
</tr>
<tr>
<td></td>
<td>Some college/associates</td>
<td>353</td>
<td>39.8%</td>
<td>36.80%</td>
</tr>
<tr>
<td></td>
<td>College graduate</td>
<td>194</td>
<td>21.9%</td>
<td>16.70%</td>
</tr>
<tr>
<td></td>
<td>Post-graduate</td>
<td>101</td>
<td>11.4%</td>
<td>7.50%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>475</td>
<td>53.6%</td>
<td>50.3%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>410</td>
<td>46.4%</td>
<td>49.7%</td>
</tr>
<tr>
<td><strong>Length of Residence</strong></td>
<td>Less than 1 year</td>
<td>45</td>
<td>5.0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1-2 years</td>
<td>46</td>
<td>5.2%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2-5 years</td>
<td>82</td>
<td>9.2%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>119</td>
<td>13.3%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>More than 10 years</td>
<td>601</td>
<td>67.3%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Religious affiliation</strong></td>
<td>Mormon</td>
<td>317</td>
<td>40.5%</td>
<td>51.1%</td>
</tr>
<tr>
<td></td>
<td>Catholic</td>
<td>110</td>
<td>14.1%</td>
<td>6.0%</td>
</tr>
<tr>
<td></td>
<td>Protestant</td>
<td>196</td>
<td>25.1%</td>
<td>6.30%</td>
</tr>
<tr>
<td></td>
<td>No affiliation</td>
<td>159</td>
<td>20.3%</td>
<td>33.30%</td>
</tr>
<tr>
<td><strong>Political orientation</strong></td>
<td>Very conservative</td>
<td>138</td>
<td>16.0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Moderately conservative</td>
<td>282</td>
<td>32.6%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>332</td>
<td>38.4%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Moderately liberal</td>
<td>86</td>
<td>10.0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Very liberal</td>
<td>26</td>
<td>3.0%</td>
<td>-</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Milford, UT</td>
<td>189</td>
<td>20.9%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Monticello, UT</td>
<td>196</td>
<td>21.6%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Idaho Falls, ID</td>
<td>185</td>
<td>20.4%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Rawlins, WY</td>
<td>158</td>
<td>17.4%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Saratoga, WY</td>
<td>178</td>
<td>19.7%</td>
<td>-</td>
</tr>
</tbody>
</table>

*Age measured as continuous, but reported here categorically for clear presentation.
°Census characteristics for comparison derived from county-level averages.
Last, we estimate two multivariate regression models – one for respondents’
genital support for renewable energy, and one for respondents’ support for the local wind
farm in the community. Multivariate regression allows us to determine which variables
are most useful in understanding what influences individuals’ views toward renewable
energy, including socio-demographic characteristics, community of residence, political
views, environmental views, beliefs about the economic and aesthetic impact of local
renewable energy, participation in the siting process, and both proximity and visual
exposure to the local wind energy facility.

4. Results

Socio-demographic characteristics of survey participants are reported in Table 2.
The majority of respondents were over 45 years old. The gender distribution was
relatively evenly split between male and female. Nearly fifty percent of residents reported
an annual household income between $25,000 and $75,000, with 14% under $25,000 and
21% over $100,000. Twenty-two percent of respondents had a bachelor’s degree, and
11% had a post-graduate degree. While respondents were most likely (49%) to identify as
either “conservative” or “very conservative,” a significant portion (38%) said they are
also identify as politically moderate. Four out of ten were affiliated with the Mormon
faith, while 25% were Protestant, 14% were Catholic, and 20% did not affiliate with a
religion.

4.1 Environmental beliefs and energy attitudes

This study’s first goal was to examine the relationships between various
environmental and energy attitudes. To address this, correlational analysis was conducted. Table 3 reports the Pearson’s $r$ statistic showing the strength and direction of association between all variables. First, respondents’ NEP scores (the measure of an overall pro-environmental orientation / belief system) are strongly and positively correlated with a belief in the seriousness of global warming (0.556), and strongly and negatively correlated with individuals’ level of opposition toward government environmental policies (-0.634). Environmental beliefs are moderately and negatively correlated with support for both fossil fuels energy sources (coal: -0.495; and natural gas: - 0.454) as well as nuclear energy (-0.367). However, environmental beliefs are only weakly associated with general support for renewable energy development (0.174), and not at all associated with level of support for the local wind farm.

Second, the correlation matrix overall reveals an interesting pattern: the associations of the three environmental attitude variables (NEP, environmental policies, and climate change) are consistently stronger with the coal, gas, and nuclear energy variables than they are with either of the renewable energy variables. This suggests that, at least in places that have experience with renewable energy development, factors other than environment-related attitudes and beliefs may be more influential in attitude formation toward renewable energy.

Lastly, the relationships overall between general support for renewable energy and the environmental beliefs and energy attitudes variables were stronger than the

---

8 Several of the variables had highly skewed distributions. As such, we also conducted a Spearman’s Rho analysis (a test used for non-parametric variables) for comparison. Results were very similar – the largest difference in effect sizes between the two tests was still less than 0.1, and more often the difference was 0.03-0.05. Since the difference was negligible, we report Pearson’s $r$. 
### Table 3 Bivariate correlations of environmental beliefs and attitudes toward different energy sources

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NEP score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Opposition to env. policies</td>
<td>-0.634***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Belief in seriousness of climate change</td>
<td>0.556***</td>
<td>-0.653***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Pro-coal</td>
<td>-0.495***</td>
<td>0.661***</td>
<td>-0.546***</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Pro-natural gas</td>
<td>-0.454***</td>
<td>0.533***</td>
<td>-0.465***</td>
<td>0.587***</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Pro-nuclear energy</td>
<td>-0.367***</td>
<td>0.442***</td>
<td>-0.372***</td>
<td>0.389***</td>
<td>0.499***</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>7. Pro-renewable energy (general)</td>
<td>0.174***</td>
<td>-0.415***</td>
<td>0.311***</td>
<td>-0.307***</td>
<td>-0.213***</td>
<td>-0.314***</td>
<td>1.000</td>
</tr>
<tr>
<td>8. Pro-renewable energy (local)</td>
<td>0.046</td>
<td>-0.279***</td>
<td>0.198***</td>
<td>-0.185***</td>
<td>-0.143***</td>
<td>-0.152***</td>
<td>0.577***</td>
</tr>
</tbody>
</table>

*Note: Pairwise correlations; n ranges from 725 to 864 observations.*

Pearson's r correlation coefficient.

*p<0.05, **p<0.01, ***p<0.001.

correlations with the variable measuring support for the local wind energy facility. This finding provides support for Wolsink’s [53] aforementioned argument that “attitudes towards wind power are fundamentally different from attitudes towards wind farms” (pg. 2695).
Next, a factor analysis was conducted to further examine whether variation in the environmental and energy attitudes variables exhibited a common covariance structure, or if instead there is evidence that any of the variables clustered together in a way that might indicate the presence of separate attitudinal dimensions (factors). Table 4 shows results for the principal-components factor analysis (principal components extraction) with orthogonal (varimax) rotation. The factor analysis indicates the presence of two distinct factors. The first dimension includes six variables with high factor loadings: the NEP scale used to measure general environmental beliefs, attitude toward government environmental policies, beliefs about climate change, and levels of support for coal, natural gas, and nuclear energy. This factor grouping reveals that respondents’ environmental beliefs are related to how they judge fossil fuel and nuclear energy. The second, separate dimension includes both measures of support for renewable energy. This finding provides additional evidence that, for individuals in these study communities, renewable energy is not an issue that is closely linked to attitudes or beliefs about environmental protection and climate change mitigation.

4.2 Environmental beliefs compared with other predictors

The second issue addressed by this research examines how well different measures of environmental beliefs explain renewable energy attitudes, compared with other predictors identified as important in the literature. This question is addressed using multivariate logistic regression for two dependent variables: general renewable energy attitudes and support for local wind energy. Because the variable measuring support for renewable energy had a positively skewed distribution, it was transformed into an ordinal
Table 4 Factor analysis of environmental and energy attitudes and energy attitudes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rotated factor loadings*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factor 1</td>
</tr>
<tr>
<td>NEP score</td>
<td>-0.744</td>
</tr>
<tr>
<td>Oppose environmental policies</td>
<td>0.810</td>
</tr>
<tr>
<td>Seriousness of climate change</td>
<td>-0.701</td>
</tr>
<tr>
<td>Pro-coal</td>
<td>0.724</td>
</tr>
<tr>
<td>Pro-natural gas</td>
<td>0.687</td>
</tr>
<tr>
<td>Pro-nuclear energy</td>
<td>0.543</td>
</tr>
<tr>
<td>Pro-renewable energy (general)</td>
<td></td>
</tr>
<tr>
<td>Pro-renewable energy (local)</td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>3.077</td>
</tr>
<tr>
<td>Proportion of variance explained, cumulative</td>
<td>0.805</td>
</tr>
</tbody>
</table>

*Principal components extraction with varimax rotation. Only factors with eigenvalues > 1 were retained.

variable with three categories of support (none to low, medium, and high), and ordered logistic regression was used.\(^9\) Binary logistic regression was employed when the local attitude measure was the dependent variable, because that measure had only response categories (yes and no).

The independent variables were grouped into several categories (socio-demographic characteristics, environmental beliefs, local factors, and community of residence) and each category was regressed upon the dependent variable in two cumulative models, the first with just the socio-demographic controls, political orientation, and religious affiliation, and the second with the attitudinal, proximity, and

\(^9\) The range for the three-item scale was 5-25. The “none to low” category included scores less than or equal to 19, the “medium” category included scores from 20-24, and the “high” category included scores of 25. Various categorization schemes were tested in the multivariate regression, including 3-, 4-, and 5-category constructions. Because results did not differ significantly, the 3-category ordinal variable was used for simplicity in interpretation.
community predictor variables. This method provides insight into the effect of the predictor variables of interest while holding socio-demographic characteristics constant.

4.2.1 Socio-demographic influences on likelihood of supporting renewables

Table 5 presents the results of the general renewable energy attitudes regressions, and Table 6 presents the results of the local wind energy attitudes regressions. Logistic regression odds ratios are reported and can be interpreted as follows: any statistically significant coefficient higher than 1.000 indicates that a variable is associated with greater likelihood of support for renewable energy, and coefficients less than 1.000 indicate that a variable is associated with lower likelihood of having favorable attitudes toward renewable energy.

Looking first at the regression for general renewable energy attitudes (Table 5), results indicate only one significant socio-demographic coefficient in the final model, meaning that once other variables are accounted for, only gender has any relationship with an individuals’ likelihood of supporting renewable energy (negative relationship, with men about half as likely as females to express support). While being more politically liberal (odds ratio=1.587) was statistically significantly related to general support for renewable energy.

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10 Given political polarization over climate change and the relationship between party identity and views on climate change, we were concerned about potential problems of multicollinearity involving these variables. However, multicollinearity tests including calculation of the Variance Inflation Factor revealed that multicollinearity was not a problem in any of the regression analyses (VIF scores for all independent variables were less than or equal to 2.6).
Table 5 Multivariate ordered logistic regression estimates of general support for renewable energy (odds ratios)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-demographic variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.001</td>
<td>1.011</td>
</tr>
<tr>
<td>Income</td>
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<tr>
<td>Education</td>
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<td>0.879</td>
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<tr>
<td>Male</td>
<td>0.496***</td>
<td>0.552**</td>
</tr>
<tr>
<td>Political orientation (1=very conservative, 5=very liberal)</td>
<td>1.587***</td>
<td>1.027</td>
</tr>
<tr>
<td>Religious affiliation (ref.=none)</td>
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<td></td>
</tr>
<tr>
<td>Mormon</td>
<td>1.301</td>
<td>0.756</td>
</tr>
<tr>
<td>Catholic</td>
<td>0.581</td>
<td>0.597</td>
</tr>
<tr>
<td>Protestant</td>
<td>0.661</td>
<td>0.766</td>
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<tr>
<td>Environmental attitudes</td>
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<tr>
<td>NEP score</td>
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<td>0.991</td>
</tr>
<tr>
<td>Opposition to env. policies</td>
<td></td>
<td>0.920***</td>
</tr>
<tr>
<td>Belief in climate change</td>
<td></td>
<td>0.960</td>
</tr>
<tr>
<td>Local factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unattractive feature</td>
<td></td>
<td>0.535***</td>
</tr>
<tr>
<td>Economic benefit</td>
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<td>1.211***</td>
</tr>
<tr>
<td>Participation</td>
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<td>0.997</td>
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<tr>
<td>Location</td>
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<td></td>
</tr>
<tr>
<td>Proximity to wind farm</td>
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<tr>
<td>Visual accessibility</td>
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<td>0.937</td>
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<tr>
<td>Community (reference=Milford, UT)</td>
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<tr>
<td>Monticello, UT</td>
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<td>1.358</td>
</tr>
<tr>
<td>Rawlins,WY</td>
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<td>0.185***</td>
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<tr>
<td>Saratoga, WY</td>
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<td>0.292***</td>
</tr>
<tr>
<td>Idaho Falls, ID</td>
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<td>0.622</td>
</tr>
<tr>
<td>cut1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>-1.138</td>
<td>0.007***</td>
</tr>
<tr>
<td>cut2</td>
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<td></td>
</tr>
<tr>
<td>_cons</td>
<td>1.176</td>
<td>0.186</td>
</tr>
<tr>
<td>N</td>
<td>515</td>
<td>515</td>
</tr>
<tr>
<td>Prob&gt;chi2</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>AIC</td>
<td>2.011</td>
<td>1.639</td>
</tr>
<tr>
<td>BIC</td>
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<td>-2278.293</td>
</tr>
<tr>
<td>Pseudo R2°</td>
<td>0.064</td>
<td>0.263</td>
</tr>
</tbody>
</table>

Ordered logistic regression estimates provided. Odds ratios are provided. *p<0.05; **p<0.01; ***p<0.001; °McFadden's R2 is reported as "pseudo R2".
Table 6 Multivariate binary logistic regression estimates of support for local wind energy facility (odds ratios)

<table>
<thead>
<tr>
<th>Socio-demographic variables</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.986*</td>
<td>0.996</td>
</tr>
<tr>
<td>Income</td>
<td>0.949</td>
<td>1.156</td>
</tr>
<tr>
<td>Education</td>
<td>0.957</td>
<td>1.493*</td>
</tr>
<tr>
<td>Male</td>
<td>0.960</td>
<td>1.601</td>
</tr>
<tr>
<td>Political orientation (l=very conservative, 5=very liberal)</td>
<td>1.835***</td>
<td>1.045</td>
</tr>
<tr>
<td>Religious affiliation (ref.=none)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mormon</td>
<td>1.279</td>
<td>1.058</td>
</tr>
<tr>
<td>Catholic</td>
<td>0.499*</td>
<td>0.269*</td>
</tr>
<tr>
<td>Protestant</td>
<td>0.919</td>
<td>0.644</td>
</tr>
<tr>
<td>Environmental attitudes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEP score</td>
<td></td>
<td>1.014</td>
</tr>
<tr>
<td>Opposition to env. policies</td>
<td></td>
<td>0.950</td>
</tr>
<tr>
<td>Belief in climate change</td>
<td></td>
<td>1.089</td>
</tr>
<tr>
<td>Local factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unattractive feature</td>
<td></td>
<td>0.234***</td>
</tr>
<tr>
<td>Economic benefit</td>
<td></td>
<td>1.506***</td>
</tr>
<tr>
<td>Participation</td>
<td></td>
<td>1.193*</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximity to wind farm</td>
<td></td>
<td>1.165</td>
</tr>
<tr>
<td>Visual accessibility</td>
<td></td>
<td>0.600**</td>
</tr>
<tr>
<td>Community (reference=Milford, UT)</td>
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<td></td>
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<tr>
<td>Monticello, UT</td>
<td></td>
<td>0.474</td>
</tr>
<tr>
<td>Rawlins, WY</td>
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<td>0.285*</td>
</tr>
<tr>
<td>Saratoga, WY</td>
<td></td>
<td>0.133**</td>
</tr>
<tr>
<td>Idaho Falls, ID</td>
<td></td>
<td>0.237**</td>
</tr>
<tr>
<td>_cons</td>
<td>1.427</td>
<td>22.474</td>
</tr>
<tr>
<td>N</td>
<td>542</td>
<td>542</td>
</tr>
<tr>
<td>Prob&gt;chi2</td>
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<td>0.000</td>
</tr>
<tr>
<td>AIC</td>
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<td>0.582</td>
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<td>BIC</td>
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<td>-3006.140</td>
</tr>
<tr>
<td>Pseudo R2°</td>
<td>0.072</td>
<td>0.593</td>
</tr>
</tbody>
</table>

Binary logistic regression estimates provided. Odds ratios are provided. *p<0.05; **p<0.01; ***p<0.001

McFadden's R2 is reported as the "pseudo R2".
renewable energy in the first regression model, this relationship appears to be fully attenuated with the addition of the rest of the predictor variables in Model 2.

The results from the local wind energy attitudes regressions (Table 6) present a different picture. While being older (odds ratio=0.986) and being more liberal (odds ratio=1.835) show an initial relationship with the outcome variable, these relationships disappear with the addition of the other variables in Model 2. In Model 2, results show that those who are more highly educated are about fifty percent more likely to support local wind energy development, while those who identify as Catholic are much less likely to support local wind energy than those who indicated no religious affiliation.

4.2.2 Environmental beliefs, opposition to environmental policies, and climate change

Regression results suggest that general environmental beliefs, attitude toward government environmental policies, and belief in the seriousness of global warming have very small influence on the likelihood that individuals will support renewable energy generally as well as locally. The full model of the renewable energy attitudes regression (Table 5) indicates that the only environmental beliefs variable with a statistically significant relationship to renewable energy attitudes is the variable measuring individuals’ level of opposition to government environmental policies, but the magnitude of this relationship is negligible (odds ratio=0.920). With regard to predictors of support for local wind energy attitudes (Table 6), none of the three variables measuring environmental beliefs show statistically significant relationships to the dependent variable. This finding provides further evidence supporting the findings of both the correlational analysis and the factor analysis: residents of our study areas generally do not
factor in environmental-based reasoning when formulating their opinions about renewable energy development. Other factors are clearly at play, which we now turn to.

4.2.3 Local factors: landscape aesthetics, economics, and participation

Strongly related to individuals’ level of support for renewable energy generally and for local wind energy were feelings about the aesthetic impact of wind energy. Respondents who believed wind energy facilities were an unattractive feature of the landscape were half as likely to support renewable energy in general (odds ratio=0.535) and also much less likely to support local wind energy development (odds ratio=0.234) than were residents who did not think wind energy was unattractive. This finding lends support for the place-protection thesis proposed by Devine-Wright [10] and others.

Conversely, results suggest that if individuals believe the construction of nearby wind energy facilities brings economic development to the area, they are twenty-one percent more likely to have a more favorable attitude toward renewable energy and about fifty percent more likely to support local wind energy development than residents who did not believe wind energy would bring economic benefits. In the model examining support for the local wind energy facility, this economic variable is especially notable because of all the predictor variables it appears to have the strongest positive and statistically significant relationship with the dependent variable (odds ratio=1.506).

The ‘democratic deficit’ thesis appears to be a factor at play in local wind energy attitudes, but not attitudes toward renewable energy generally. Table 6 indicates that respondents who thought there was sufficient opportunity and information for participating in the local wind energy planning process were about twenty percent more
likely to support the local wind farm (odds ratio= 1.193). However, this independent variable did not show a relationship with participants’ general renewable energy attitudes. This makes sense, and we would expect residents who felt they were left out of the planning process for a local wind energy facility to be less supportive of that facility. However, residents would not necessarily expand this rationale to all renewable energy development.

4.2.4 Location: proximity versus visual accessibility

In addition to responses regarding residents’ proximity to wind power facilities, the survey measured how often individuals saw (or anticipated seeing) the local wind farm. The regression results for both general (Table 5) and local (Table 6) renewable energy attitudes indicate that distance from the wind energy facility is not a force driving respondents’ general renewable energy attitudes, contrary to the proximity thesis. Instead, it appears that frequency of seeing these facilities is a much more important factor. Residents who see (or expect to see) the wind farm more often were significantly less likely to express support for local wind energy developments (odds ratio=0.600).

However, this was only a factor in residents’ attitudes toward local wind energy, not renewable energy generally.

4.2.5 The “social gap” in renewable energy support between communities

The results for both dependent variables indicate that different communities react differently to wind energy development, suggesting that there are additional contextual factors at play not captured more specifically in this analysis. All communities except
Fig. 2. Distribution of mean scores by community of general support for renewable energy.

Fig. 3. Percent residents in community that would vote “yes” to the local wind energy facility.
Monticello, Utah, were far less likely to support local renewable energy development than Milford, Utah (the reference community). Figures 2 and 3 provide further evidence of this, showing varying magnitudes of the “social gap” between general support for renewable energy and support for local wind energy [5]. For the measure of general support for renewable energy, the mean scores for all five communities did not differ much, ranging from 20 to 23. However, for the measure of support for the local wind energy facility, responses varied widely across the study areas, with 85% of residents in Milford, 80% in Monticello, 76% in Rawlins, 61% in Saratoga, and only 48% in the Idaho Falls area indicating that they supported the local wind energy facility. These results highlight that the width of the “social gap” varies by community, depending on the community’s overall response to local renewable energy facilities.

5. Discussion and Conclusion

This research analyzed the relationship between a variety of environmental beliefs and attitudes toward renewable energy and other energy sources in communities with some level of experience with local wind energy development. Survey results indicated that respondents’ environmental beliefs, attitudes toward environmental policies, and beliefs about climate change were weakly or not related to how they felt about renewable energy. In fact, results suggest that renewable energy attitudes comprise a separate dimension altogether of environment- and energy-related attitudes. Other factors, such as beliefs about the economic benefits of local renewable energy development and the perceived impact on place aesthetics, were found to be stronger forces driving renewable energy attitudes.
The relationship between environmental beliefs and renewable energy attitudes is clearly not settled, and appears to be locally context-dependent. While some researchers have found environmental beliefs to be a predictor of attitudes toward local renewable energy, the relationship has been found to be sometimes positive and other times negative [16,22,28,35]. Furthermore, other scholars have found that in certain regions where a vast majority of residents are politically conservative, individuals who are highly supportive of renewable energy may simultaneously and openly express environmental skepticism [24]. Given the increasing political polarization over environmental issues in countries like the United States and Australia, connecting renewable energy with an explicitly environmental framing in some contexts may be irrelevant at best – that is, not effectively drawing the public support it intends to draw – and inflammatory at worst, repelling environmentally skeptical individuals or those whose political beliefs position them in opposition with many environmental policies.

The present study indicates that, in the context of several communities in the Rocky Mountain region of the U.S. that are experiencing wind energy development, environmental beliefs are a weak force in determining how individuals respond to and perceive renewable energy, if a force at all. This finding echoes Wolsink’s 2007 argument [53] as well as several more recent studies that have shown the importance of other factors, such as individuals’ beliefs about and experience with the economic development potential of renewable energy [31,24,12, 42,47,49]. This observation, we believe, highlights an important area for future research, especially since renewable energy continues to be framed by the media, policy makers, and activists as a strategy for addressing environmental and/or climate change concerns, both of which are hugely
polarizing issues, especially in the United States. The danger of maintaining the environmental connotation is that policies, funding allocations, and programs designed to foster renewable energy research and development could become even more politically divisive, stalling quick decision-making about further renewables deployment and creating new political roadblocks.

Several possible explanations for the observed disconnect between respondents’ environmental beliefs and their level of support for renewable energy emerge. First, our findings indicate that other factors are far more important in determining how individuals form their opinions about renewable energy – factors that are likely more immediate and pressing in residents’ everyday lives, such as the effects that residents perceive renewable energy facilities may have on the local economy or the local landscape. Jepson et al. [24], made a similar observation qualitatively in the context of wind energy development in Texas, another area of the U.S. characterized by conservative policies and antagonism toward environmental policies but where support for renewable energy development seems relatively high. More broadly, the disconnect between environmental beliefs and renewable energy support in our data may be indicative of the collective environmental consciousness of rural communities in the Rocky Mountain region, informed by conservative politics and a history of tension with environmental interests and the federal government over environmental regulations and land use policies [32]. That is, it is possible that residents in this area are simply less likely to employ an environmental rationale when forming opinions about issues like energy development than might be the case in other regions with differing sociocultural and political contexts.
The large differences in how residents of the five study communities felt about local wind energy are also noteworthy. Some of these differences are likely due to variations in local economic contexts. For example, Saratoga is a natural resource amenity community that has become a retirement and tourist/recreation destination that attracts new year-around and seasonal residents as well as shorter-term visitors from other regions [27]. In that context Saratoga residents would seem more likely to view the construction of a major wind farm as a threat to the amenity-based and tourism economy, due to aesthetic impacts on the surrounding landscape. Conversely, Milford, Utah, is a railroad town situated in the western Utah desert that does not rely on tourism, and the nearby wind farm was constructed on land that had little aesthetic value and that is barely visible from town. In eastern Idaho Falls, the strong negative association is more likely related to an unusually high level of dissatisfaction with several visually prominent wind farms built along higher-elevation foothills to the east. Qualitative research could shed light on these and other potentially important contextual nuances to further our understanding about how the public may respond in different situations.

Last, this research provides evidence suggesting the proximity thesis [e.g. 45] is not a satisfactory explanation for public opposition to renewable energy development, but that the visibility of these facilities is more important. Our results indicate that the frequency at which individuals see (or anticipate seeing) wind turbines is strongly related to how they feel about the local wind energy facility, while their physical proximity to them is not. In making decisions about where to place turbines, one implication of this finding is for planners and developers to balance information on wind resource availability in specific locations with the greater likelihood for social opposition when
turbines are developed in visually exposed areas, such as on higher-elevation ridgelines in close proximity to areas characterized by residential land uses.

Some implications of this study emerge from the finding that, in certain regions, neither general environmental views nor belief in climate change predict opinions about renewable energy. Those engaged in the advancement of renewable energy (whether from political, activist, or business standpoints) in politically conservative contexts may find it useful to cease to frame development of wind or solar energy as an environmentally motivated issue. In the Rocky Mountain region of the U.S., where highly contentious debates over environmental and natural resource issues continue to dominate the dual stage of politics and media, renewable energy may find a broader base of support when it is framed in other terms, such as the economic opportunities that large-scale renewable energy development may bring to communities. In states like Utah where the governor and other political leaders have expressed skepticism about the reality of human-induce global warming, attaching renewable energy development to environmental issues like climate change could negatively influence public opinion and acceptance of renewable energy technologies such as wind power.

Research that continues to seek understanding in terms of what factors drive public opinion – especially public opposition to renewable energy facilities and policies – is an integral component of the global low-carbon energy transition because it can help to forestall unexpected social and political roadblocks. Our study of the Rocky Mountain

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region of the United States illuminates an important dimension of public response to renewable energy likely present in politically conservative parts of other regions of the US, and other countries as well. Future work should continue to explore this aspect of the social and political reactions toward a still-evolving global transition toward increased utilization of low carbon energy technologies.
References


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## Appendix A: Scale construction for predictor variables

<table>
<thead>
<tr>
<th>Latent variable scales</th>
<th>Reliability (alpha)</th>
<th>Items</th>
</tr>
</thead>
</table>
| Environmental beliefs (NEP scale) | 0.843 | 5-point Likert scale response options ranged from: "strongly disagree" to "strongly agree." Four items reverse coded to ensure consistent directionality.  
We are approaching the limit of the number of people the earth can support.  
Humans have the right to modify the natural environment to suit their needs.  
When humans interfere with nature it often produces disastrous consequences.  
Human ingenuity will insure that we do NOT make the earth unlivable.  
Humans are severely abusing the environment.  
The earth has plenty of natural resources if we just learn how to develop them.  
The so-called "ecological crisis" facing humankind has been greatly exaggerated.  
The earth is like a spaceship with limited room and resources.  
The balance of nature is very delicate and easily upset.  
If things continue on their present course, we will soon experience an ecological catastrophe. |

| Opposition to government environmental policies | 0.880 | Environmental regulations in the U.S. … (5-point Likert scale from "are excessively strong" to "need to be a lot stronger.")  
Seven policy items follow; 5-point Likert scale response option ranging from "strongly support" to "strongly oppose." One item was reverse coded to ensure consistent directionality.  
Setting higher emissions and pollution standards for business and industry  
Spending more government money on developing solar and wind power.  
Spending government money to develop alternate sources of fuel for automobiles.  
Imposing mandatory controls on carbon dioxide emissions and other greenhouse gases.  
Opening up more land owned by the federal government for oil and gas exploration.  
More strongly enforcing existing federal environmental regulations.  
Setting higher emissions standards for automobiles. |

Table Continues
| Economic benefit | 0.759 | Utility-scale wind power provides economic benefit to the local area (5-point Likert scale from "strongly agree" to "strongly disagree")
|                 |       | Utility-scale wind power creates new job opportunities for local residents (5-point Likert scale from "strongly agree" to "strongly disagree")
|                 |       | Do you believe increased tax revenues will result from the construction of a utility-scale wind facilities near your community? ("yes" or "no")
|                 |       | Do you believe increased job opportunities will result from the construction of a utility-scale wind facilities near your community? ("yes" or "no")
| Opportunity to participate | 0.817 | Do you agree or disagree that you have had adequate opportunity to participate in public meetings or other parts of the planning process for the wind power facilities proposed near your community? (5-point Likert scale from "strongly disagree" to "strongly agree")
|                 |       | Do you agree or disagree that you have received adequate information about the proposed wind power facility during the pre-construction planning period? (5-point Likert scale from "strongly disagree" to "strongly agree")
CHAPTER III

THE INFLUENCE OF EXTRACTIVE INDUSTRY ACTIVITIES ON PUBLIC SUPPORT FOR RENEWABLE ENERGY POLICY

ABSTRACT: Notable spatial variation in public opinion on climate change and energy policy has been demonstrated at various geographic scales (Howe et al., 2015). Understanding the source of this variation may be useful for policymakers, energy developers, and utility providers in predicting how different locales may respond to newly proposed policies and energy developments, particularly those encouraging the proliferation of renewable energy. Using nationally representative survey data from 2008-2015, we employ hierarchical linear regression to examine variation in public support for renewable energy policy to determine what factors may be at play. We are primarily interested in how residence in areas with extractive industry activities may be related to public views on renewable energy policy. We test the influence of several county-level indicators, including oil production, gas production, and economic dependence on the mining sector. We also test for individual factors, including political ideology and belief in anthropogenic climate change, and examine variation in support for renewable energy policy by state and U.S. Census region. Results suggest that individuals living in both mining-dependent counties and counties with natural gas production are somewhat less likely to support renewable energy policies than individuals living outside such places. Belief in anthropogenic global warming is the strongest predictor of policy support at the individual level, and liberal political ideology,

12 The target journal for this manuscript is Energy Policy. Peter Howe (Utah State University) and Anthony Leiserowitz (Yale University) will serve as co-authors.
being more educated, and being female also exhibit a positive relationship to policy support.

*Key words: Renewable energy, public opinion, fossil fuels production, climate change, politicization*

*Highlights:*
- Individuals in counties with active natural gas production, but not oil production, are less likely to support renewable energy policies.
- Individuals in counties with mining-dependent economies are less likely to support renewable energy policies.
- Results suggest renewable energy is perceived as a threat to fossil fuel-dependent economies.
- Belief in anthropogenic climate change and political liberalism are both associated with support for renewable energy policy.
- Results suggest the need to establish bipartisan frames for renewable energy.

1. **Introduction**

Renewable energy technologies such as solar photovoltaic cells and wind turbines have been deployed at a rapid rate across the United States in the last fifteen years. The installed capacity of utility-scale wind energy – currently the largest renewable energy source – has grown rapidly, from 2,539 MW at the end of 2000 to 75,714 MW by the third quarter of 2016 – a 2,882 percent growth over almost sixteen years (AWEA, 2016). Solar energy has also grown rapidly – including both utility-scale and rooftop solar, solar energy production has grown 1,600 percent since 2006 (SEIA, 2016). Such rapid deployment has meant that an increasing proportion of the public is now aware of renewable energy systems. The construction of these new industrial facilities upon the landscape has spurred a variety of public reactions, both positive and negative, and
opposed citizens can influence whether or not renewable facilities are permitted and built, or not (Olgive and Rootes, 2015).

While national analyses of public opinion in the United States indicate broad support for renewable energy in the abstract, opposition is often found at the local level, in communities adjacent to new or proposed industrial-scale renewable energy facilities (e.g. Bell et al., 2013, 2005). As such, much of the research seeking to understand the factors driving social opposition or support for renewable energy has occurred through community-scale research and comparative case study analysis. Less work has been done at larger scales to identify broad, generalizable patterns that could help policymakers and developers understand the elements that influence public support for renewable energy. Understanding such dynamics is critically important, perhaps now more than ever given Americans’ increasing political divisions over environmental and energy issues (Brulle et al., 2012). It is also a vital piece of the larger national debate over regulation of carbon-intensive energy production, which has taken a new turn with the 2017 inauguration of a Republican president and a Republican-controlled Congress.

There are many factors – social, political, physical, economic, technological – that drive or constrain the transition to a cleaner energy economy, but the role of government policy and the political environment are vital (Edenhofer et al., 2012). Governments can incentivize renewable energy investments, manufacturing, and construction through various policy tools. They can create space for renewable energy in the market by setting pollution standards and penalties for fossil fuels energy production. The use of policy tools to encourage the growth of renewable energy, however, is a political choice made by elected officials and various other players in the political process, such as the
corporate lobby, environmentalists, organized labor, and consumer groups. The politics of renewable energy policy are often polarized by ideological stances on the right of the government to ‘intervene’ in the free market, as well as the decades old ‘jobs v. the environment’ debate in which regulation of polluting energy sources is portrayed as an attack on blue-collar Americans. The latter was a prominent feature of the 2016 presidential campaign season, in which Democratic candidate Hillary Clinton was critiqued for saying “we’re going to put a lot of coal miners and coal companies out of business” (Horsley, 2016). Though her comment was part of a longer answer about how she planned to help working class Americans adjust during the clean energy transition, presidential candidate Trump managed to rally the working class against Clinton and around the issue of maintaining, and even reinstating, jobs related to the fossil fuels industry.

A variety of factors other than politics influence Americans’ energy and policy preferences. This paper focuses on the influence that experience with and dependence on extractive industries may have on public opinion about renewable energy policy. Local reliance on extractive industries has been shown to play a part in public views on energy production (Boudet, 2011; Boudet et al., 2016; Bell and York, 2010; Forsyth et al., 2007; Freudenburg and Gramling, 1994; McAdam and Boudet, 2012;). For example, individuals who live closer to extractive activities such as the production of oil or natural gas have been shown to be more likely to support those industries and the technologies they utilize, and less likely to exhibit concern over environmental or health impacts (Boudet et al., 2016; Clarke et al., 2016). Even if they are not directly employed by the energy industry prominent in their community, residents of such places may adopt
favorable views about that energy source because it supports the livelihoods of friends and family members employed by that industry (Freudenburg and Davidson, 2007). Communities form collective identities around local social and environmental phenomena, such as characteristic land features, recreational activities, and occupational activities (Bell and York, 2010; Rich, 2016). In the case of energy policy, support for renewable energy policies may sometimes be incongruent with locally shared identities, and renewable energy may be perceived as a threat to cultural and occupational identities built around fossil fuels industries.

The present research examines the relationship between local extractive industry activities and public support for renewable energy policies. Specifically, we examine the following two research questions: 1) Does local presence of extractive industry activities influence public opinion about renewable energy policy? 2) What factors help predict public support for renewable energy policy?

2. Literature Review

2.1 The role of policy, politics, and public opinion in renewable energy growth

In the United States, renewable energy policy is characterized by uncertainty, contention, and fragmentation, which has stunted investments in renewable technologies (Barradale, 2010; Busby, 2008; Elliott, 2013; Ernst, 2013; Hess, 2016; Shrimali et al., 2015). Political polarization is high over environmental issues like climate change (Brulle et al., 2012), and this extends to the debate over regulation of carbon-intensive electricity sources, such as coal. The debate between political party leaders over emerging clean energy has become increasingly divisive in recent years. For example, pointing to the
current political polarization over the Production Tax Credit (PTC), a policy encouraging development of wind energy, Goldfarb and colleagues (2016) note that this has not always been the case. In fact, the PTC was a bipartisan issue in the 1990s, but became increasingly polarized in the 2000s. The chance to renew the PTC for a five-year period arose before the Senate in 2015 – while forty-four Democrats were in favor with only one opposing it, only three Republicans were in favor with fifty opposed. Such political polarization regarding energy policy amongst leaders and elites has also been shown to increase polarization amongst the public (Bolsen et al., 2014).

The United States has no federal mandate requiring increased deployment of renewable energy. Rather, the US has relied on federal tax incentives, grants, and state-level policies to encourage renewables development (Gan et al., 2007; Komor, 2004; Menz, 2005). Two of the most important federal policies supporting the development of renewable energy are two tax credit policies, the Production Tax Credit (PTC) and the Investment Tax Credit (ITC). The PTC provides a $0.023/kWh corporate tax credit to developers of wind, geothermal, and biomass electricity generating facilities, applicable for the first ten years of production. The ITC, by contrast, offers a 30% tax credit for individual purchasers of solar systems on residential and commercial properties. Originally enacted in 1992, the PTC continually comes up for renewal by Congress, posing significant uncertainty for developers and investors. The ITC is enacted through 2023, providing much greater market certainty.

State-level renewable energy portfolio standards (RPS) are another important policy tool encouraging the growth of renewable energy. These policies are enacted by states and mandate that a certain percentage of electricity sold in that state by electric
utilities is produced from renewable energy sources. Currently, 29 U.S. states and the District of Columbia have RPS mandates, and seven states have non-binding “goals.” The specific renewable energy target for electricity production varies widely by state, from ten percent in Wisconsin to thirty-three percent in California (Barbose, 2013), and recent efforts to increase RPS laws in some states have been met with fierce opposition from both policymakers and industry groups.

A third avenue for supporting renewable energy comes in the way of federal investment in renewable energy research and development. While federal funding for renewable energy has increased significantly in recent years. However, public support for such investments was negatively affected by the ‘Solyndra debacle’ of 2011, in which solar panel manufacturer Solyndra filed for bankruptcy and defaulted on a $500 million federal loan from the US government (Bishop, 2014; Carlisle et al., 2015).

The use of policy and funding tools such as these depends greatly on the issue priorities of presidential administrations, which can vary widely. Even if a president is motivated by environmental concerns, political contention and ‘veto players’ (Bayulgen and Ladewig, 2016) can delay or halt the continuation of policies and the passage of legislation that would encourage more rapid growth of renewable energy. An example of this was President Obama’s Clean Energy and Security Act of 2009, which would have established a carbon cap and trade system and further spurred the transition to a clean energy economy. The bill was approved by the House of Representatives but was never brought to the Senate floor for a vote. Even when the executive branch of government tries to bypass the legislative branch, certain interests and powerful players can halt forward progress. This was the case with President Obama’s Clean Power Plan, which
aimed to reduce carbon dioxide emissions by about one-third by 2030 through growth in renewable energy deployment and regulation of existing power plants. In February 2016, the Supreme Court halted legal enforcement of the plan. Conservative party leaders and industry vigorously denounced the plan based on concerns about the economic effects and job losses – Senate Minority Leader Mitch McConnell called it “a dagger in the heart of the American middle class” (Condon, 2016).

Though political contention over renewable energy policy remains relatively high, researchers analyzing the public’s view of using renewable energy technologies has found widespread support amongst the general public (Greenberg, 2009; Klick and Smith, 2010; Leiserowitz et al., 2016; Nisbet and Myers, 2007; Stoutenborough, 2015; Truelove, 2012). However, a “social gap” exists in public views on renewable energy, and public support for renewable energy in the abstract is often complicated by community opposition to proposals for nearby construction of renewable energy facilities (Bell et al., 2013, 2005). As such, the majority of research has focused on opposition at the local or community level (Bell et al., 2013; Kontogianni et al., 2014). Utility-scale renewable energy systems have a large footprint and represent a new industrial feature on the landscape. They are highly visible, cover large areas of land, and may pose threats to citizens’ local place attachment, place meanings, and place-based identities (Devine-Wright, 2009, 2011; Jacquet and Stedman, 2013). Indeed, much of the research examining local opposition to renewable energy development has found evidence suggesting opposition commonly arises from aesthetic and place-based concerns (Devine-Wright 2011; Phadke, 2011), feelings that local community autonomy is trammeled by outside interests (Bohn and Lant, 2009; Haggett, 2011; Leitch, 2010;
Pasqualetti, 2011), and concerns about distribution of the benefits and burdens of large-scale renewable systems (Garcia et al., 2016; Haggerty et al., 2014; Ottinger, 2013).

Less research has examined why public opposition may occur at the abstract level in terms of citizens’ energy and policy preferences. Renewable energy systems can also raise a variety of concerns for citizens who don’t live near renewable energy sites, including worry that renewable energy will increase energy prices, that renewable energy technologies are less reliable than fossil fuels technologies for electricity production, and that renewable energy developers receive an unnecessarily privileged ‘leg up’ via government incentives (Carlisle et al., 2015, Klick and Smith, 2010). Three factors that will be examined in this study are the role of political ideology, environmental attitudes (specifically belief in anthropogenic climate change), and local extractive industry activities.

Political ideology has been shown to be strongly related to public opinion about energy in many studies (Boudet et al., 2014; Boudet et al., 2016; Cacciatore et al., 2012; Clarke et al., 2016; Delshad and Raymond, 2013; Goldfarb et al., 2016; Larson and Krannich, 2016; Mukherjee and Rahman, 2016), though it appears more weakly related in other studies (Ansolabehere and Konisky, 2009; Klick and Smith, 2010; Lilley and Firestone, 2013). Political conservatives often support fossil fuels over other energy sources because of concerns about job losses, support for industries reliant on cheap fossil fuels, and support for free-market ideology, while political liberals often oppose fossil fuels due to environmental concerns, including concerns about global climate change (McCright and Dunlap, 2011).
The partisan divide appears as well in the case of renewable energy, with individuals who identify as Democrats or politically liberal generally more supportive of renewable energy (Carlisle et al., 2015; Goldfarb et al., 2016, Hess et al., 2016). However, other researchers find that political ideology is a weak predictor of renewable energy attitudes, with other factors such as environmental beliefs, local context, and beliefs about the economic facets of renewable energy being much more important drivers (Klick and Smith, 2010; Olson-Hazboun et al., 2016). Furthermore, although Democrats are generally more supportive of renewable energy than Republicans, there is debate amongst liberals about the environmental benefits versus harms of technologies such as wind and solar energy, essentially weighing wildlife and landscape impacts against the pollution and carbon savings benefits – this has been referred to as the ‘green on green’ debate (Warren et al., 2005).

The increasingly divisive partisan views regarding energy policy in the last few years are undoubtedly connected to divisiveness over environmental issues, especially climate change (McCright and Dunlap, 2011; McCright et al., 2014a, 2014b). The connection between environmental beliefs – including beliefs about climate change – and energy and policy preferences is relatively well established (Carlisle et al., 2015; Engels et al., 2013; Greenberg, 2009; Manley et al., 2013; Mukherjee and Rahman, 2016; Truelove, 2012; Zografakis et al., 2010). Yet, while some research suggests that most Americans are concerned about the environment and that the environment is an important factor driving different energy preferences (Ansolabehere and Konisky, 2009; DeCiccio, 2015), other studies highlight the importance of other factors such as risk perceptions and expectations about the affordability of different energy sources.
The imperative to mitigate global climate change through reduction of greenhouse gases from the burning of fossil fuels is a near-consensus point of view amongst scientists (Barnosky et al., 2012; Cook et al., 2013; Hansen et al., 2013), and renewable energy is widely viewed as a vital component of the solution (Edenhofer et al., 2012). Yet, the salience of the issue for the public waxes and wanes over time and is influenced by political actors and the media. For example, while discussion of climate change has been a relatively large part of President Obama’s platform, there was a notable lack of attention to the issue recently in the 2016 presidential candidate debates between Hillary Clinton and Donald Trump (USA Today Editorial Board, 2016). Political leaders and media may also suggest certain framings or ways of viewing issues that can increase or decrease public support (Bolsen, 2014; Brulle et al., 2012; Druckman et al., 2013; Lowry and Joslyn, 2014). For example, policies supporting renewable energy may be framed as unwanted government intervention in the free market or as directly threatening the security of fossil fuels jobs, which may be unappealing to conservative political ideology. However, the same policy may be met with support if economic growth, job creation, and domestic energy security are emphasized instead.

We turn next to consider the role that experience with and connection to extractive industries may play in shaping public opinion about renewable energy policy.

2.2 Extractive industries and public opinion about energy

In addition to political ideology and environmental attitudes, individuals’ interest in maintaining the viability of the current fossil fuels-dominant system is also a driver of energy and climate policy attitudes. Several studies have demonstrated how fossil fuels
activities, including employment in the industry, are related to policy attitudes at both the individual and collective levels (e.g. Boudet et al., 2016; Mukherjee and Rahman, 2016). One study found that how members of Congress vote on climate policy appears to depend on the carbon intensity of their districts (Cragg et al., 2012). At the level of local governments, Zahran et al. (2008) found that whether officials develop climate mitigation strategies or not depended on how prominently fossil fuels factored into the local economy.

A similar correlation has also been found at the individual level. In a survey of public opinion about climate policy in Norway, Tvinne and Ivarsflaten (2016) found that individuals employed in fossil fuels industries were less likely to support the policies that were more costly to their industry (such as reducing oil production), though they were just as likely as everyone else to support less costly climate policies (such as carbon capture technologies).

Several studies have also examined the influence that living within the vicinity of fossil fuels extraction activities may have. Even if individuals themselves are not employed by the local extractive industry, it is reasonable to expect that they would be more supportive of the industry propping up the local economy and providing family-wage jobs for their friends and neighbors (Freudenburg and Davidson, 2007). For example, residents of fossil fuels-rich states appear to be more supportive of extraction activities such as offshore drilling (Mukherjee and Rahman, 2016). Several studies have shown that individuals living in areas undergoing intense natural gas development were more likely to view hydraulic fracturing, or ‘fracking’, positively, often for the economic development it was expected to bring (Jacquet, 2012; Kriesky et al., 2013; Rabe and
Borick, 2011; Stedman et al., 2012; Theodori, 2009). In a nationally representative study of the United States, Boudet et al. (2016) find that individuals living in counties with higher employment in the natural resources and mining sector, and individuals living in a shale play area were more likely to be supportive of fracking. In another study, individuals who lived closer to the Keystone XL Pipeline Expansion were found to be more supportive of that project (Gravelle and Lachapelle, 2015).

However, in other instances the extraction and production of fossil fuels is perceived by the public negatively, as an environmental or social ill, and something to resist - the most recent example being the protest over the Dakota Access Pipeline. Goldfarb and colleagues (2016), for example, found that Americans living closer to coal-fired power plants were more supportive of renewable energy policies than those who lived further, and this effect increased when they were specifically prompted to consider the health impacts of pollution from coal burning.

These observations suggest that community-level factors such as local economic reliance on particular industries could be as influential as individual factors in shaping public attitudes toward energy, positive or negative (Bell and York, 2010; Freudenburg and Davidson, 2007). Communities may become ‘overadapted’ to particular types of employment, making it difficult to envision or implement changes as larger economic and production systems shift around them (Gramling and Freudenburg, 1992). Freudenburg (1992) argued that communities become ‘addicted’ to the prosperous times inherent in extractive economies, which are characterized by ‘boom-bust’ economic cycles. Furthermore, individuals’ support for the local industry is also a product of
community identity, which can form around certain extractive activities such as coal mining or logging (Bell and York, 2010).

To date, we could only find one study that specifically analyzes how extractive industry activities influence renewable energy policy attitudes (Goldfarb et al. 2016, discussed above.) In the present study, we hypothesize that renewable energy policies may be perceived as less desirable to individuals residing in places where extractive industry activities are occurring.

3. Data

3.1 Survey data and dependent variable measures

The data for our dependent variable indicating individuals’ level of support for renewable energy policies comes from thirteen waves of the Climate Change in the American Mind (CCAM) survey project (mean N=1,155 per wave). The CCAM surveys are nationally representative surveys conducted between 2008 and 2015 by the Yale Program on Climate Change Communication and George Mason Center for Climate Change Communication. For details on each of the survey waves used in our study, including the dates the surveys were fielded, the sample size, margins of error, and response rates, please see Appendix A.

The data from the separate survey waves were merged into a single combined data set. After removing missing responses from variables of interest, our total sample was 13,233 respondents, who resided in 1,952 different U.S. counties in 49 states (Alaska was excluded). Data were collected through online surveys conducted by GfK Knowledge Networks. The company recruited the nationally representative panel of
individuals using random-digit dialing and addressed-based sampling to make sure that non-landline households were also included in the sampling frame, then conducted the data collection using a probability-based online panel. The company provides computers and internet access to households without them and includes small incentives to encourage participation. Latitude and longitude coordinates were provided for each respondent based on their home address, which we used to determine respondents’ county of residence.

To produce an overall measure of “support” for renewable energy policy, we created a summated rating scale from three survey questions asking for respondents’ attitudes on a variety of policy issues related to renewable energy. Briefly, these three items were: ‘How much do you support or oppose the following policies?’ a) Fund more research into renewable energy sources, such as solar and wind power; b) Require electric utilities to produce at least 20% of their electricity from wind, solar, or other renewable energy sources, even if it costs the average household an extra $100 a year; and c) Provide tax rebates for people who purchase energy-efficient vehicles or solar panels. The scale produced from these three items had high reliability (Cronbach’s alpha = 0.81), suggesting an acceptable internal consistency for measuring individuals’ overall level of support for policies encouraging the growth and use of renewable energy. Further details of this and other survey-based measures are provided in Table 1.

3.2 Primary independent variables: extractive industry activities

To measure the influence of extractive industry activities on individuals’ level of support for renewable energy policy, we focus on two measures of “extractive industry
### Table 1: Variable measurements, sources, and descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Question(s)/measurement</th>
<th>Source</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome variable</strong></td>
<td></td>
<td>CCAM</td>
<td>Range: 0-9, M: 5.85, SD: 2.35</td>
</tr>
<tr>
<td>Support for renewable energy policy</td>
<td>Summated rating scale (Cronbach's alpha=0.81) derived from three items: ‘How much do you support or oppose the following policies?’ a) Fund more research into renewable energy sources, such as solar and wind power; b) Require electric utilities to produce at least 20% of their electricity from wind, solar, or other renewable energy sources, even if it costs the average household an extra $100 a year; and c) Provide tax rebates for people who purchase energy-efficient vehicles or solar panels.</td>
<td>CCAM</td>
<td>Range: 0-9, M: 5.85, SD: 2.35</td>
</tr>
<tr>
<td>Sex</td>
<td>1=Male, 0=Female</td>
<td>CCAM</td>
<td>Male: 50.11%</td>
</tr>
<tr>
<td>Age</td>
<td>What is your age?</td>
<td>CCAM</td>
<td>M: 49.74, SD: 16.49 (Min=18, Max=97)</td>
</tr>
<tr>
<td>Race</td>
<td>1=Non-white, 0=White</td>
<td>CCAM</td>
<td>Non-white: 22.90%, White=77.10%</td>
</tr>
<tr>
<td>Education</td>
<td>High school or less</td>
<td>CCAM</td>
<td>High school or less: 37.58%</td>
</tr>
<tr>
<td></td>
<td>0=High school or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>1=Some college</td>
<td>CCAM</td>
<td>Some college: 29.65%</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>2=Bachelor's degree or higher</td>
<td>CCAM</td>
<td>Bachelor's or higher: 32.78%</td>
</tr>
<tr>
<td>Political ideology</td>
<td>In general, do you think of yourself as…1=Very liberal, 2=Somewhat liberal, 3=Moderate/middle of the road, 4=Somewhat conservative, 5=Very conservative</td>
<td>CCAM</td>
<td>M: 3.17, SD: 1.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Demographic characteristics**

Table Continues
Belief in anthropogenic global warming (AGW)

Assuming global warming is happening, do you think it is…1=Caused mostly by humans, 0=Not happening and/or not caused by humans

CCAM  Belief in AGW: 50.58%

County-level variables, including industry variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Code</th>
<th>Description</th>
<th>USDA ERS</th>
<th>Within metro county: 85.60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro county</td>
<td>1=Metro, 0=Nonmetro</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural gas production, 2008-2011</td>
<td>1=Natural gas production reported in county for any year from 2008-2011, 0=No production reported</td>
<td>USDA ERS</td>
<td>Within gas-producing county: 29.06%</td>
<td></td>
</tr>
<tr>
<td>Oil production, 2008-2011</td>
<td>1=Oil production reported in county for any year from 2008-2011, 0=No production reported</td>
<td>USDA ERS</td>
<td>Within oil-producing county: 30.31%</td>
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<tr>
<td>Natural gas production in 2000</td>
<td>1=Natural gas production reported in county for 2000, 0=No gas production reported for 2000</td>
<td>USDA ERS</td>
<td>Within gas-producing county in 2000: 27.94%</td>
<td></td>
</tr>
<tr>
<td>Oil production in 2000</td>
<td>1=Oil production reported in county for 2000, 0=No oil production reported for 2000</td>
<td>USDA ERS</td>
<td>Within oil-producing county in 2000: 28.59%</td>
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</tr>
<tr>
<td>2004 classification as mining-dependent county</td>
<td>1=County meets ERS 2004 definition of &quot;mining dependent&quot;, 0=County does not meet ERS definition of &quot;mining dependent&quot;</td>
<td>USDA ERS</td>
<td>Within 2004 mining-dependent county: 0.90%</td>
<td></td>
</tr>
<tr>
<td>2015 classification as mining-dependent county</td>
<td>1=County meets ERS 2015 definition of &quot;mining dependent&quot;, 0=County does not meet ERS definition of &quot;mining dependent&quot;</td>
<td>USDA ERS</td>
<td>Within 2015 mining-dependent county: 3.17%</td>
<td></td>
</tr>
</tbody>
</table>

¹ Mining industry "accounted for annual average of 15% or more of total county earnings during 1998-2000".

² Mining industry "accounted for annual average of 13% or more of total county earnings or 8% or more of total county employment from the years 2010-2012".

activity’. First, we examine the influence of county-level oil and gas production. Second, we examine the influence of county-level economic dependency on the mining sector.
To identify active oil and gas production in counties, we use data from the US Department of Agriculture Economic Research Service (USDA ERS, 2015, 2014) on county-level oil and gas production (Low et al., 2014). This dataset includes oil and gas production up to the year 2011. We examine oil and gas production separately. We grouped the oil and gas production data into the four years relevant to the survey data collection time period (which began in fall 2008) and created binary variables indicating production accordingly. Counties in which oil or gas production was reported for any of the years from 2008 to 2011 received a “1”, while counties in which no oil or gas production occurred during these years received a “0.” To capture any effect of this variable that may have been in place before the ‘boom’ in oil and gas production in the late-2000s, we also included a binary variable indicating whether oil or gas production was reported in the year 2000 (the earliest year available).

According to the ERS data, there were 980 gas-producing counties and 1005 oil-producing counties in the US with production present any year from 2008-2011 (excluding Alaska and Hawaii). In terms of coverage of major energy counties, our dataset includes fifty-six of the top one hundred gas-producing counties and forty-seven of the top one hundred oil-producing counties. As shown in Table 1, about 30% of our respondents lived in a county that produced natural gas in 2008-2011, and about 30% lived in county producing oil for those years.

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13 Boudet et al. (2016) use a similar binary measure for oil and gas production. We explored various categorical variable configurations for oil and gas production to capture any effects based on level of production. However, the effect was in the same direction as the dichotomous variable, and so for simplicity (and to keep the overall number of variables in the model to a minimum) we use the binary variable in our models.
To indicate county-level economic dependency on the mining sector, we use the county typology code for “mining dependency” created by the USDA ERS (2015, 2004). We considered two versions of this classification system, both the 2004 and 2015 versions. The ERS defines mining as “including metal; coal; oil and gas; stone; sand and gravel; clay, ceramic, and refractory minerals; chemical and fertilizer minerals; and miscellaneous nonmetallic minerals, such as gem stones, diatomaceous earth, peat, and talc.” The 2004 classification of “mining dependent” counties was based on that county relying on the mining sector for an annual average of 15 percent or more of total county earnings during 1998-2000. In the 2015 edition, the ERS defined a county as ‘mining dependent’ if the mining industry accounted for “an annual average of thirteen percent or more of total county earnings or eight percent or more of total county employment from the years 2010-2012.” We included both measures as independent variables, though we analyzed their influence in separate models to avoid overfitting due to multicollinearity.

3.3 Additional independent variables

Table 1 outlines variable measurements and descriptive statistics for all variables. Individual-level demographic variables were derived from the CCAM dataset described above. We include gender, age, race, and education as demographic control variables. Age, education, and income have been identified as relatively stable predictors of environmental concern (Jones and Dunlap, 1992; Van Liere and Dunlap, 1980), while the effect of gender has received mixed and inconsistent support, though females generally exhibit higher levels of concern, especially in terms of health and safety risks of environmental problems (Davidson and Freudenburg, 1996; Dougherty et al., 2003; Xiao
and McCright, 2012). Additionally, because political views have been shown to be important for predicting public views on a variety of environmental and energy issues (see literature review above) we include political ideology, measured by asking respondents to place themselves on a scale from “Very conservative” to “Very liberal.”

Because we predict that support for renewable energy policy is at least partly a factor of individuals’ belief in anthropogenic climate change, we also include a predictor variable from the CCAM survey that indicates whether the respondent believes that climate change is at least partly caused by humans, or not.

Rural/urban differences have been demonstrated in some studies of public views on environmental issues (Freudenburg, 1991; Huddart-Kennedy et al., 2009), and so we include whether the county is urban or rural, using the ERS two-category classification system for “metro” or “non-metro” county.\(^\text{14}\)

Last, we control for time by including a categorical variable into the model for each year of the survey, from 2008 to 2015.

4. Methods

To examine the relationship of extractive industry activities and public attitudes toward renewable energy policy, we use the Stata SE software package (version 14) to employ a multilevel modeling strategy, also called hierarchical linear modeling or mixed-effects modeling. In mixed-effects modeling, data are nested according to hierarchical

\(^{14}\) We also tested more refined measures of rurality from the Economic Research Service – both the 12-level scale “Urban Influence Code” as well as the 9-level “Rural-Urban Continuum Code.” Neither showed a relationship with the dependent variable (extremely small coefficients and did not meet the threshold for statistical significance). Thus, we stuck with the simple binary measure of “metro” and “non-metro” county.
structures, such as county, state, and region. Since we are interested not only in the effect of individual-level variables, such as demographic characteristics and belief in anthropogenic climate change, but also county-level characteristics, this approach is appropriate given that we are hypothesizing that both our outcome and our predictor variable may be spatially autocorrelated.

Furthermore, it is very possible that while some county-level variation in public attitudes is captured in the energy variables, other determinants of variation may not be captured. Public attitudes may also vary at larger scales, such as by states or region (Howe et al. 2015). Using a hierarchical modeling strategy helps accommodate missing drivers of public attitudes because it allows for both fixed and random effects at different spatial scales. In our study, we nest our data by county, state, and US Census region, and account for random effects at each level. Since we have both individual and county-level data, we also examine fixed-effects of these factors on the dependent variable.

We first estimate an empty multilevel linear regression model to examine geographic variation at the individual, county and state level (Model 1). We originally tested variation by Census regions, but the variance by regions proved very low, so we left this out of the final models. We then add individual-level variables and the survey-year time variable to examine the fixed effects of these controls (Model 2). Last, we added the extractive industry variables in two separate models, one each for the earlier and later energy variables (Models 3 and 4).\footnote{We examined the gas production, oil production, and mining dependency variables for multicollinearity. However, our postestimation tests indicated that multicollinearity was not a problem, with the Variance Inflation Factor (VIF) for all independent variables}
5. Results and Discussion

5.1 Results

Table 2 presents results from the multilevel linear regression models predicting public attitudes on renewable energy policy. The results from the multilevel models are separated into two groups. The top group reports the fixed-effects coefficients, and the bottom group reports the variances from the random-effects variables and model characteristics.

Overall, respondents were relatively supportive of renewable energy policy, with a mean score of support at 5.85 on a 0-9 scale. Our findings for the individual-level variables (Model 2) indicate that individuals who have at least some college (0.270*** or a bachelor’s degree ($B=0.350***$) and individuals who believe that climate change is at least partly caused by humans ($B=1.379***$) are more supportive of renewable energy policies. Conversely, being male ($B=-0.164***$) and identifying as politically conservative ($B=-0.607$)** are both related to lower levels of support for renewable energy policy. While the results indicate that age has a statistically significant relationship with policy attitudes, the effect size is negligible.

Additionally, the results for the survey year variables indicate that, on average, survey participants in all survey years after the initial wave in 2008 were less supportive of renewable energy policy. The effect is the strongest in survey waves occurring during 2012, 2013, and 2014, with the strongest relationship between survey year and the dependent variable occurring in 2013. The coefficient for the 2013 variable, for example, registering at below 5, and the Tolerance for all independent variables registering at greater than 0.1.
suggests that respondents in the 2013 survey waves on average scored a point lower on the dependent variable scale ($B=-0.997***$).

In terms of the relationship between industry activities and support for renewable energy policies, we find some evidence suggesting that individuals residing in a county with extractive industry activities are on average less supportive of such policies. The strength of the relationship depends on the extractive industry measure used, as well as the time period. Looking first at the earlier extractive industry activity measures (Model 3), we find respondents who live in a county that was economically dependent on the mining sector as of 1998-2000 were on average a half a point lower on the dependent variable scale than other respondents ($B=-0.597**$). Looking at the coefficients for natural gas and oil production in the year 2000, neither variable met the threshold for statistical significance in their relationship with the dependent variable (though the natural gas production variable came close to this threshold at $p<0.071$).

The extractive industry variables for the later time period (Model 4) also yielded mixed results. County economic dependence on mining (2010-2012) was again negatively related to respondents’ level of support for renewable energy policy, though the effect was diminished from the previous model ($B=-0.250*$). Individuals living in counties that reported natural gas production at some point between 2008 and 2011 were less likely to support renewable energy policy ($B=-0.140*$) than individuals who didn’t live in counties with natural gas. The coefficient for oil production in this time period was not statistically significant.

Lastly, individuals living in metro counties and non-metro counties do not appear to be significantly different in terms of their support for renewable energy policy.
Overall, the indicators of model fit suggest that both individual, micro-level factors as well as county-level extractive industry activities help to explain individual attitudes toward renewable energy policy nationwide, reducing the overall variance from the null model at both the county and the state level. Notably, the coefficients for the statistically significant extractive industry variables are comparable in terms of effect size with several of the significant socio-demographic variables, such as gender and education. Also notable is that the measure indicating residence in a mining dependent county (1998-2000) has roughly the same level of influence on the dependent variable as political ideology. This suggests the importance of considering community-level experiences with extractive industries in analyses of public opinion on the environment, and provides some explanation for the geographic variance found by Howe et al. (2015). More broadly, the importance of county-level extractive activities speaks to the importance of considering spatially relevant variables in statistical modeling, rather than only relying on individual-level predictors.

5.2 Discussion

Looking across the results, we note that both political ideology and belief in anthropogenic global warming maintain a consistently strong relationship with the support for renewable energy policy. In terms of political ideology, for every point increase in the five-point liberal-conservative scale, individuals were 0.6 points lower in support for renewable energy policy. These findings are consistent with studies finding a relationship between liberal political ideology and public support for renewable energy policy and technologies (Carlisle et al., 2015; Goldfarb et al., 2016; Hess et al., 2016).
This is perhaps partly explained by the neoliberal leaning of the conservative political platform to reject proposals that can be interpreted as government ‘intervention’ in the free market (Carlisle et al., 2015; Klick and Smith, 2010), such as tax credits or renewable energy mandates placed on electricity producers. Our results also demonstrate that individuals who are convinced that humans are influencing the climate are on average about 1.4 points higher on the scale of support for renewable energy policies than other respondents. These results are consistent with research showing that various environmental attitudes and beliefs are important drivers of the public’s energy preferences (Ansolabehere and Konisky, 2009; DeCiccio, 2015; Larsen and Krannich, 2016).

Considering some of the socio-demographic variables, both gender and education stand out as being related to public views on renewable energy policy, with males expressing less support than females, and those with more education expressing higher support than those with less education, all else being equal. The research on gender and various environmental attitudes has yielded somewhat mixed results, though females generally exhibit higher levels of environmental concern (Xiao and McCright, 2012). A variety of explanations have been put forth to explain this (see reviews by Davidson and Freudenburg, 1996 and Xiao and McCright, 2012). In terms of energy preferences, the findings have been relatively consistent, with researchers finding that women are less supportive of energy technologies perceived as risky, such as hydraulic fracturing or nuclear energy, than are men (Boudet et al., 2014, 2016; Clarke et al., 2016), and more supportive of renewable energy (Olson-Hazboun et al., 2017, 2016; Larson and Krannich, 2016). It is also possible that the overrepresentation of males in extractive industries
might lead men to be more concerned that policies encouraging renewable energy development could diminish their livelihoods. This is known as the ‘economic salience’ hypothesis about gendered environmental attitudes, whereby men are more concerned about economic stability than women because they are more integrated into the workforce; however, this idea has not received much support in empirical studies (see Xiao and McCright, 2012).

Education has been shown in various studies to be a relatively stable predictor of public attitudes on various environmental issues, with higher education levels typically corresponding to greater levels of environmental concern (Diamantopoulous et al., 2003; Dunlap et al., 2001; Jones and Dunlap, 1992; Xiao and Dunlap, 2007). However, the results have been more mixed for energy preferences, with some studies showing higher education being related to support for fossil-fuels related technologies such as ‘fracking’ (Boudet et al., 2016, 2014), other studies reporting no association (Clarke et al., 2016; Larson and Krannich, 2016), and yet other studies showing higher education being related to support for non-fossil fuels technologies such as renewable energy (Olson-Hazboun et al., 2016). Thus, the relationship between educational attainment and public energy preferences remain unclear. Here, we find that respondents with higher levels of education are more supportive of renewable energy policies than those with less. This is true both for individuals with only some college as well as those who have attained a bachelors degree – both are more supportive than individuals who have no college experience.

Looking to the variable indicating how survey timing may influence public views on renewable energy policy, the results indicate that respondents were more supportive of
renewable energy policy if they took the survey in 2008 than any other year. This may be related to the effect of the Great Recession of the late 2000s, which had not fully taken effect when the 2008 survey was fielded in the fall of that year. Some research has suggested that declining public concern about environmental issues such as climate change is related to economic insecurity exacerbated by the recession, among other factors (Brulle et al. 2012; Carmichael and Brulle, 2016; Scruggs and Benegal, 2012). In terms of public support for renewable energy policies, it is logical that a more economically insecure public would be less supportive of polices encouraging new energy sources perceived as being more expensive to consumers (Carlisle et al., 2015; Klick and Smith, 2010). However, a recent study calls this relationship into question; Mildenberger and Leiserowitz (forthcoming) use individual panel opinion data from 2008-2011 and found that neither individual nor local economic conditions were related to declines in those individuals’ support for climate policy action. Instead, the authors find evidence suggesting that changes in public belief in anthropogenic climate change and support for policy action were more heavily influenced by changing cues from political elites – especially the rise of the Tea Party – than by economics.

Considering the negative influence of extractive industry activities in respondents’ counties on their level of support for renewable energy policy, we propose two possible mechanisms explaining these results. First, it is not surprising that both the indicators for mining dependency (which includes coal mining) and for natural gas production are significant in the models, while oil production is not. Both coal and natural gas are used in the production of electricity, while oil is used primarily in transportation (the use of oil-fired power plants has been phased out in the United States
over the last few decades). Thus, it makes sense that individuals in communities seeing economic benefits from natural gas and coal mining may feel threatened by new sources of electricity perceived as being in direct competition with these two existing sources. This effect may be especially prominent in mining-dependent communities, especially coal mining communities, which may be especially feeling the economic effects of automation and the transition to natural gas. Furthermore, communities that have seen coal plants and mines being shut down over the decade may quickly connect coal’s demise with the climate mitigation policies and increasing regulations on coal-fired power plants emphasized over the two terms of the Obama administration. Obama’s Clean Power Plan had the dual goals of regulating carbon pollution from coal burning as well as incentivizing renewable energy sources, and it is likely that these policies are perceived as being directly related to (or responsible for) economic hardships experienced in coal communities.

Another possible explanation draws on the concept of community identity. Scholars have argued that identity can form at a collective level, coalescing around phenomena or shared experiences such as local culture, social norms, landscape features, and predominant occupations or industries (Bell and York, 2010; Carroll, 1989; Kreye et al., 2017; Puddifoot, 1996; Reeve et al., 2013). Collective identity influences how communities respond to threats, such as natural hazards or new environmental regulations, and how members form opinions and understandings of issues (Bell and York, 2010; Kreye et al., 2017; Messner et al., 2015). For example, Kreye et al. (2017) highlight the relevance of community identity in understanding how Florida cattlemen view and respond to new governmental policies to protect panthers. Several scholars have
Table 2: Multilevel model results predicting support for renewable energy policies

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>M2</th>
<th>M3</th>
<th>M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.853***</td>
<td>7.400***</td>
<td>7.445***</td>
<td>7.431***</td>
</tr>
<tr>
<td><strong>Individual Factors (level 1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (1: male, 0: female)</td>
<td>-0.164***</td>
<td>-0.163***</td>
<td>-0.163***</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.003**</td>
<td>0.003**</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Race (Non-white)</td>
<td>-0.049</td>
<td>-0.045</td>
<td>-0.045</td>
<td></td>
</tr>
<tr>
<td>Education (ref. group=H.S. or less)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>0.270***</td>
<td>0.265***</td>
<td>0.267***</td>
<td></td>
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<tr>
<td>Bachelors degree</td>
<td>0.350***</td>
<td>0.348**</td>
<td>0.346***</td>
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</tr>
<tr>
<td>Political ideology (conservative)</td>
<td>-0.607***</td>
<td>-0.606***</td>
<td>-0.605***</td>
<td></td>
</tr>
<tr>
<td>Belief in anthropogenic global warming</td>
<td>1.379***</td>
<td>1.378***</td>
<td>1.380***</td>
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<tr>
<td><strong>Survey year (2008 is ref.)</strong></td>
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<tr>
<td>2010</td>
<td>-0.350***</td>
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<td>2011</td>
<td>-0.454***</td>
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<tr>
<td>2012</td>
<td>-0.794**</td>
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<td>2015</td>
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<td>-0.537***</td>
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<td><strong>County Factors (level 2)</strong></td>
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<td>Metro county</td>
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<td>Active gas production (2000)</td>
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<td>Active oil production (2000)</td>
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<td>Mining dependent (1998-2000)</td>
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<td>Active gas production (2008-2011)</td>
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<tr>
<td>Active oil production (2008-2011)</td>
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<td>0.071</td>
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<tr>
<td>Mining dependent (2010-2012)</td>
<td></td>
<td></td>
<td>-0.250*</td>
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</table>

Table Continues
argued that a “community economic identity” forms when a locale is so dominated by one industry that it shapes local beliefs, norms, and culture (Bell and York, 2010; Freudenburg and Davidson, 2007; Freudenburg and Gramling, 1994; Gramling and Freudenburg, 1992). For example, Bell and York (2010) examine community economic identity in Appalachia, where they find that local identity is built around the history, culture, and economic reliance upon coal mining, and that the coal industry itself plays a role in fostering identity adherence and loyalty to coal mining.

In terms of our results, we suggest that the relationship between residence in a county with extractive activities and lower average levels of support for renewable energy policy may be partly explained by an aspect of the local experience with extractive industries that amounts to more than economic reliance. Indeed, collective identity built around local experience with extractive industries likely plays a role in shaping individuals’ views of energy policy and of renewable energy. Local identity itself
may be felt to be at stake when residents are faced with the disappearance of deep-rooted and familiar economic activities, such as coal mining, and when presented with the possibility of new and possibly incongruent replacements, such as renewable energy.

6. Conclusions and Policy Implications

This study builds on the literature examining public responses to renewable energy as well as research on generalized public energy preferences. Previous research in this area has been primarily conducted at the community level or through comparison across several communities. This research presents a broader look at how spatial or locally relevant characteristics may influence public views of renewable energy policies. We find a relationship between extractive activities, including dependence on the mining sector and natural gas production, and lowered support for policies that encourage the use of renewable energy. Ultimately, these results provide more generalizable evidence suggesting place-based factors and experiences – not just individual-level characteristics – are important in shaping public opinion.

Some limitations to this research are worth pointing out. First, for simplicity, we used a binary independent variable indicating the presence or absence of oil and natural gas production. While we found a relationship showing individuals living in a county that has oil or gas production and were less likely to be supportive of renewable energy policies, this is a relatively coarse measure of oil and gas production. Thus, future analyses could extend this work by examining whether attitudinal thresholds exist at various oil and natural gas production levels. Additionally, this work considers only production levels for oil and gas, not development activities. Since drilling activity
(which can be measured as the number of oil ‘spuds,’ or initial drill pads, that have been established) is not the same as production activity, it could be interesting to include an independent variable that indicates drilling activity in a model of public support for renewable energy policy. Last, because we used the ERS measure of economic dependence on the mining sector, the relationship between residence in mining dependent counties and support for renewables policy is not as clear as it could be because this variable includes fossil fuels and non-fossil fuels mining activities.

Our results suggest that the economy-versus-environment debate is a component of public views on renewable energy, especially amongst individuals in locales seeing economic benefits from extractive industries. Those individuals and communities possibly feel that renewable energy represents a threat to the fossil fuels-based electricity production that has fueled their local economies. This tension was especially prominent in the fall 2016 presidential campaigns, with debates between Hillary Clinton and Donald Trump frequently focusing on the topic of energy and with each candidate differing on how to best meet energy demands while also boosting the economy and increasing job growth. During President Obama’s two terms in office, renewable energy development was emphasized while coal-fired power plants came under increasing regulation and with the Environmental Protection Agency beginning to regulate carbon dioxide as pollution. These policy changes likely contributed to the perception of renewable energy as a threat to local economies of which extractive industries are a part.

For policymakers, this research indicates that finding ways to emphasize the economic benefits of renewable energy could help build public support for policies encouraging its growth. Indeed, other researchers have suggested that policies that use a
‘carrot’ approach and promote the economic growth potential of green industries are likely to be the most successful, rather than polices using a ‘stick’ approach, such as a carbon tax (Brown and Hess, 2016; Meckling et al., 2015; Tvinnereim and Ivarsflaten, 2016). This may be especially true amongst constituents in areas that economically rely on fossil fuels industries. Furthermore, these results indicate the importance of aid and retraining programs in the communities where fossil fuels employment, such as in coal mining, have dramatically declined or disappeared altogether.

This research also indicates that individual-level factors remain important in understanding public views on energy. For example, in our study both political ideology and belief in anthropogenic climate change were strongly related to the level of support individuals show for renewable energy policies. This indicates that energy preferences are related to both environmental beliefs as well as political views, as suggested by other research (Ansolabehere and Konisky, 2009; Boudet et al., 2016; Cacciatore et al., 2012; Clarke et al., 2016; DeCiccio, 2015; Delshad and Raymond, 2013; Goldfarb et al., 2016; Larson and Krannich, 2016; Mukherjee and Rahman, 2016). While there is some evidence suggesting that factors like environmental attitudes and political views are less important in shaping public views toward renewable energy when those individuals have some level of experience with a renewable energy facility (Olson-Hazboun et al., 2017, 2016), overall our national-level analysis here suggests that these factors are indeed important. Indeed, energy policy is embedded into national and global dialogues about climate change (Barry et al., 2008; Goodman, 2016; Pralle and Boscarino, 2011; Stephens et al., 2009), yet climate change has been increasingly politically charged and divisive in places like the United States (Brulle et al., 2012). Thus, renewable energy
policies may be more likely to be championed as bi-partisan issues if connected to rationales beyond simply the imperative to mitigate climate change. Framings that would likely help promote renewable energy technology and policies across partisan groups include economic development, domestic energy security, electricity portfolio diversification, and stable pricing for consumers, among others. Additionally, while political polarization is high on the issue of climate change, the non-climate environmental benefits of renewable energy, such as promotion of better air quality, are much less divisive and could garner support across individuals with differing political views (Goldfarb et al., 2016).

Overall, this research provides clues not only as to what types of individuals may be especially disapproving of renewable energy policies, but also where these individuals or communities may be concentrated and what place-based factors may be important in shaping public views. Social science research must continue to examine the underlying mechanisms driving political polarization over climate change mitigation strategies, such as the transition to low-carbon sources of electricity. Our research here suggests that local reliance on fossil fuels-based economies is a piece of the puzzle, and that addressing concerns regarding the decline of such industries will be critical to the passage of legislation to accelerate the transition to a low carbon economy.

Acknowledgments
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Appendix A: Survey wave details, “Climate change in the American Mind”

<table>
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</tr>
<tr>
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<td>Dec 24-Jan 3</td>
<td>1001</td>
<td>+/- 3 points</td>
</tr>
<tr>
<td>June 2010</td>
<td>May 14-June 1</td>
<td>1024</td>
<td>+/- 3 points</td>
</tr>
<tr>
<td>May 2011</td>
<td>Apr 23-May 12</td>
<td>1010</td>
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</tr>
<tr>
<td>November 2011</td>
<td>Oct 20-Nov 16</td>
<td>1000</td>
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</tr>
<tr>
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<td>Mar 12-Mar 30</td>
<td>1008</td>
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<tr>
<td>September 2012</td>
<td>Aug 31-Sept 12</td>
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<td>Sept 30-Oct 19</td>
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CHAPTER IV

DOUBLE BENEFIT OR DOUBLE-EDGED SWORD? LOCAL DISCOURSES ON RENEWABLE ENERGY IN RURAL UTAH \(^{16} \, 17\)

ABSTRACT: The development of renewable energy has emerged as one of the predominant policy strategies for tackling the reduction of greenhouse gas emissions related to global climate change. However, little attention has been paid to the relationship between public support for renewable energy and public views on environmental issues such as climate change, especially in rural areas where most renewable energy installations are built. Additionally, little is known about how rural communities dependent on energy extraction industries will respond to renewable energy development. The present study examines local discourses on renewable energy and environmental beliefs through analysis of sixty-one interviews with sixty-eight individuals living in rural Utah. Three rural areas are examined to explore contextual differences by extractive industry: one with several large-scale renewable energy facilities, one where coal mining and power production are predominant, and one with significant oil and gas development. While a relatively high level of support for renewable energy existed across all three contexts, there were notable variations in how respondents of the three places discussed the pros and cons of renewable energy, with the individuals living in the coal-dependent study site especially likely to feel that renewable energy posed a threat to their livelihood. Several master narratives emerged across study sites, including the neoliberal view of a ‘level playing field’ for all energy sources,

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concern about renewable energy’s reliability, hesitancy toward renewable energy’s ‘liberal persona’, and discussion about its economic development potential. Skepticism toward anthropogenic climate change was pervasive, and both concern and dismissiveness about air quality were relevant to how respondents discussed renewable energy. Overall, this research indicates that 1) discursively linking renewable energy development to carbon mitigation would not be salient and could be inflammatory in the study areas, and 2) policy options to address economic challenges faced by energy resource-dependent communities must be an integral part of the clean energy transition.

*Key words: Renewable energy, climate change, public opinion, discourse, rural communities*

**Introduction**

Studies show that more than enough resources exist to power the world with renewable energy (Delucchi and Jacobson 2011; Jacobson and Delucchi 2011). However, the deployment of renewable energy is faced with political and social obstacles. Continued analysis of the social barriers to renewable energy development is crucial for laying a smoother path for the clean energy transition. While the majority of research has focused on technical, financial, and policy barriers to renewable energy deployment (Sovacool 2014), less research has been conducted on the social dimensions influencing renewable energy development, yet public opinion is highly pertinent. Research on public responses to renewable energy has found widespread generalized public support (Leiserowitz et al. 2016), yet contentious localized debates arise when renewable energy facilities are built or proposed in a specific community (Bell, Gray, and Haggett 2013,
Citizen opposition has been observed in a many different contexts in response to a variety of types of renewable energy facilities (e.g. Moore and Hackett 2016; Phadke 2010; Swofford and Slattery 2010). Citizen groups have the capacity to influence decision-making at the state and national policy level (Matisoff 2008) and to cause delays in renewable energy development at the local level through lobbying of local officials, lawsuits over permitting, and other appeals (Ogilvie and Rootes 2015).

Research has uncovered several insights as to why citizen opposition may arise, much of it focusing on aesthetic impacts. Utility-scale renewable energy systems have a very large footprint, represent a new industrial feature on the landscape, and are highly visible, posing threats to citizens’ place attachment, place meanings, and place-based identities (Devine-Wright 2011, 2009; Jacquet and Stedman 2013). However, renewable energy also faces additional political and economic obstacles, especially in rural areas where most large-scale renewable energy facilities are constructed. First, economic vulnerabilities associated with the transition away from fossil fuels may cause rural, resource-dependent communities to feel especially threatened by renewable energy. Second, the increasing political polarization over climate change and other environmental issues, and the rising power of climate change denial movements in the United States and worldwide (Jacques and Knox 2016; McCright, Dunlap, and Xiao 2014; McCright, Xiao, and Dunlap 2014) may mean that renewable energy receives less public support if it continues to be framed in terms of carbon-mitigation. Last, because the growth of renewable energy in the United States is currently driven by tax incentives, state renewable energy mandates, and other governmental interventions (Gan et al. 2007; Komor 2004; Menz 2005), renewable energy may become an increasingly politicized
issue itself. This could be further energized by the hegemonic status of neoliberal discourses in American politics, perpetuating the belief that the free market, not the government, will provide the greatest good for the greatest number (Harvey 2007).

This paper explores public views on renewable energy in three types of rural, energy-dependent locales in Utah using qualitative analysis of local discourse. The term “discourse” refers to “a particular way of talking and thinking” (Hajer 1995: 13) that represents how people give meaning to and respond to different issues. Discourses can also be thought of as a social construction or “shared way of apprehending the world” (Dryzek 1997: 8), and are communicated through ritualized language structures, catch phrases, and metaphors. They are passed on as storylines or narratives that become so entrenched in a society as to become almost invisible or ‘common sense’. Analysis of discourse can reveal the underlying values, taken-for-granted assumptions, associations, and beliefs of not only individuals but also larger social groups. Discourse analysis has often been used to examine environmental debates (e.g. Hajer 1995; Hajer and Versteeg 2005). Different social, occupational, or geographic groups – such as environmental activists, the business community, or rural energy-dependent communities – may utilize unique discourses to engage with particular environmental topics. Some discourses achieve hegemonic status in society, pervading across various social groups (Gramsci 1971).

I focus on energy and climate discourses in rural areas for the following reasons. First, the vast majority of utility-scale renewable energy facilities are built in rural locations. Rural areas have available land, cheaper land, and significantly lower population density, translating into lessened interface with potential opposition from the
public. Rural communities may be uniquely positioned to benefit from the increases in
tax revenue and employment brought by large-scale renewable energy development. However, it’s possible that individuals in rural communities in the West may be especially suspicious of renewable energy because of the perception that it is a federal
government initiative. Rural western communities have directly experienced the effects
of federal environmental regulations on their livelihoods and ways of life and therefore
often adhere to anti-federalist viewpoints (Krannich and Smith 1998; McCarthy 2002;
Petrzelka and Marquart-Pyatt 2012). Last, many communities in the rural American West rely on local economic structures built around the extraction of fossil fuels, and residents of these areas may perceive renewable energy as a threat to both the local economy and their cultural identity.

I explore discourses about renewable energy across three different rural Utah study sites, each with a different energy production context: one where several large-scale renewable energy facilities have been constructed, one where coal mining and power production are predominant, and one with significant oil and gas development. Three questions driving this research are: 1) what master narratives are prevalent about renewable energy across different rural contexts? 2) how do discourses about renewable energy vary between energy-production contexts? 3) to what extent are perceptions of renewable energy related to environmental beliefs, including beliefs about anthropogenic climate change? Findings are based on analysis of sixty-one semi-structured interviews with sixty-eight individuals representing a variety of local sectors.

The energy communities of rural Utah provide a rich laboratory to explore these questions. Utah itself is rich with fossil fuel resources and ranks 10th in the country for
natural gas production, 11th for oil production, and 14th for coal production (Utah Governor’s Office of Energy Development 2017). Significant renewable energy resources have been developed in Utah as well; the state is the 3rd largest producer of geothermal energy in the United States and has seen significant increases in both solar photovoltaic energy and utility-scale wind power installations in the last 5-7 years.

**Literature Review: Public Attitudes Toward Renewable Energy**

Research on public attitudes toward renewable energy has found relatively widespread support amongst the general public (Greenberg 2009; Klick and Smith 2010; Leiserowitz et al. 2016; Nisbet and Myers 2007; Stoutenborough 2015; Truelove 2012). However, public support for renewable energy in the abstract has been shown to vary geographically (Howe et al. 2015) and is often complicated at the local level by opposition to proposals for nearby construction of renewable energy facilities (Bell, Gray, and Haggett 2013, 2005). There are many reasons a community may oppose the nearby development of a utility-scale wind or solar energy facility. Renewable energy systems are highly visible, cover large areas of land, and may pose threats to citizens’ local place attachment, place meanings, and place-based identities (Devine-Wright 2011, 2009; Jacquet and Stedman 2013). Much of the research examining local opposition to renewable energy development has found evidence suggesting opposition commonly arises from aesthetic and place-based concerns (Devine-Wright 2011; Olson-Hazboun, Krannich, and Robertson 2016; Phadke 2011), concern that the local community does not have a voice in how or where such systems are developed (Bohn and Lant 2009; Haggett 2011; Leitch 2010; Pasqualetti 2011), and anger about the distribution of both the
benefits and the burdens of large-scale renewable systems (Garcia et al. 2016; Haggerty, Haggerty, and Rasker 2014; Ottinger 2013).

Individuals’ opinions about renewable energy are also influenced by more abstract forces, such as environmental beliefs, political views, and local economic identity (i.e. Bell and York 2010). Each of these three factors is reviewed in depth below. Additionally, the influence of religious faith is also addressed, given that the three study sites are located in rural Utah, where the majority of individuals belong the Church of Jesus Christ of Latter Day Saints.

**Concern About Climate Change and the Environment**

Renewable energy is increasingly framed by the media, energy professionals, governmental agencies, and activists as an environmental issue and as a vital component of climate change mitigation (Barry, Ellis, and Robinson 2008; Pralle and Boscarino 2011; Stephens, Rand, and Melnick 2009). Yet, little attention has been paid to whether and how individuals’ climate change beliefs and broader environmental views are related to attitudes toward renewable energy. In general, environmental issues in the United States have grown increasingly politically polarized over the last several decades (Brulle, Carmichael, and Jenkins 2012; McCright and Dunlap 2011; McCright, Dunlap, and Xiao 2014). While protection of the environment used to be a relatively bi-partisan issue in the early and mid-1900s, the latter decades of the twentieth century saw a significant widening of opinion on environmental protection based on political party lines and the proverbial ‘economy versus environment’ debate.
This is especially true with regard to the public’s view on anthropogenic climate change (Dunlap and McCright 2008; Guber 2012; Marquart-Pyatt et al. 2014; McCright and Dunlap 2011). The research has shown that political ideology and political party are among the strongest predictors of whether or not individuals are concerned about the human influence on the climate, and that polarization is only increasing over time (McCright, Dunlap, and Xiao 2014; McCright, Xiao, and Dunlap 2014). Even the influence of having a higher education (Hamilton 2011) and a higher level of scientific literacy (Kahan 2012) are both moderated by political party affiliation. Due in part to the success of climate change ‘disinformation campaigns’ created by a well-funded climate denial counter-movement (Brulle 2014), a significant portion of the American public is skeptical or indifferent toward climate science and possible mitigation strategies (Leiserowitz et al. 2016).

It is unclear the extent to which views about climate change and other environmental issues play into individuals’ attitudes toward renewable energy. Some evidence suggests that environmental views, including belief in anthropogenic climate change, have little bearing on opposition or support for renewable energy (Ansolabehere and Konisky 2012), especially in rural areas that are politically conservative and/or that have some type of experience with renewable energy development (Brannstrom, Jepson, and Persons 2011; Jepson, Brannstrom, and Persons 2012; Olson-Hazboun, Krannich, and Robertson 2016). On the other hand, rejection of renewable energy and renewable energy policy is explicitly connected to denial of climate change in some cases (Jacques and Knox 2016). Ansolabehere and Konisky (2014) find that while most Americans do weigh environmental issues when deciding on energy preferences, they tend to do so at
the local level rather than in the abstract. That is, individuals tend to weigh local health
and pollution problems more heavily than issues perceived as being more distant, such as
anthropogenic climate change.

Clearly, research to understand how such messaging has been received and
responded to in rural areas, where renewable energy facilities are most commonly built,
is needed to contextualize how and why different publics may respond differently to
clean energy policies and technologies.

**Political Ideology and Support for Free-market Capitalism**

Concerns or opposition about renewable energy in the abstract often appear to be
tied to individuals’ political leanings. Political ideology and political party affiliation are
strongly related to public opinion about energy in general (Boudet et al. 2016, Boudet et
al. 2014; Cacciatore, Scheufele, and Shaw 2012; Clarke et al. 2016, Delshad and
Raymond 2013; Goldfarb, Buessing, and Kriner 2016; Larson and Krannich 2016;
Mukherjee and Rahman 2016). Political conservatives often support fossil fuels over
other energy sources because of concerns about job losses, support for industries reliant
on cheap fossil fuels, and support for free-market ideology. Conversely, political liberals
seem to oppose the development of fossil fuels due to environmental concerns, including
concerns about global climate change (McCright and Dunlap 2011).

The partisan divide also appears in the case of renewable energy, with individuals
who identify as Democrats or politically liberal being generally more supportive of
renewable energy (Carlisle et al. 2015; Goldfarb, Buessing, and Kriner 2016; Hess, Mai,
and Brown 2016). However, other researchers have found that political ideology is a less
strong predictor of renewable energy attitudes than other factors such as local landscape context and beliefs about the economic facets of renewable energy (Klick and Smith 2010; Olson-Hazboun, Krannich, and Robertson 2016). Notably, a divide over policies supporting emerging cleaner energy technologies has widened between political leaders over the last decade. For example, pointing to current levels of polarization amongst party leaders over the Production Tax Credit (the PTC, a policy encouraging development of wind energy) Goldfarb and colleagues (2016) note that this has not always been the case. While the PTC was a bipartisan issue in the 1990s, a recent vote to renew it for a five-year period arose in the Senate during 2015. Forty-four Democrats voted in favor with only one opposed, but only three Republicans were in favor with fifty opposed.

The extent to which individuals adhere to a free-market ideology may offer a more complete explanation for the political divide on renewable energy than simple political party divisions. Free-market ideology, or neoliberal ideology, refers to support for a free-market economic system that is unhampered by governmental intervention and regulation (Block and Summers 2014; Harvey 2007; Heath and Gifford 2006). Underlying free-market ideology is the assumption that the market, not the government, will provide the greatest good for society because it is able to self-regulate against social or environmental ills (i.e., the “invisible hand,” Smith 1776). Thus, individuals supporting a free-market system typically support the deregulation of business and tend to be less concerned about the effect of the economy on the environment (Jackson et al. 2013; Longo and Baker 2014). Researchers have shown that individuals who adhere to neoliberal ideology are less likely to believe in climate change or to support climate
change mitigation efforts, such as the development of carbon-free energy sources (Heath and Gifford 2006; Lewandowsky and Oberaurer 2013).

Because fossil fuels continue to enjoy dominance in the United States’ energy economy (Evans and Phelan 2016; Ladd 2017), renewable energy development in the United States is reliant on federal policy interventions to foster growth. These interventions include tax incentives, research grants, and state-level mandates requiring renewable energy use by electric utilities (Gan et al. 2007; Komor 2004; Menz 2005). However, for individuals who embrace a neoliberal worldview, such interventions are viewed as unsavory and unnecessary manipulations of the free-market system, which works best when left alone. In this case, policies supporting renewable energy research and development may be viewed as a government ‘giveaway’, privileging one industry while wrongfully penalizing another (Carlisle et al. 2015, Chassot, Hampl, and Wustenhagen 2014; Klick and Smith 2010).

**Rural Energy Dependence, Economic Vulnerability, and Local Economic Identity**

Economic reliance upon the fossil fuels sector may also be an important driver of perceptions about renewable energy. There are several reasons this might be so. First of all, several studies have demonstrated the effect of employment in the fossil fuels industry is related to energy and climate policy attitudes at both the individual and collective levels (e.g. Boudet et al. 2016; Mukherjee and Rahman 2016; Tvinnereim and Ivarsflaten 2016). One study found that how members of Congress vote on climate policy appears to depend on the carbon intensity of their districts (Cragg et al. 2012). At the level of local governments, Zahran et al. (2008) found that whether or not officials
develop climate mitigation strategies depended on how prominently fossil fuels factored into the local economy.

Residents of rural communities dependent on energy extraction activities may be more supportive of fossil fuels than the public at large, and may feel particularly threatened by the societal shift toward clean energy. Even if individuals themselves are not employed by the local extractive industry, it would be reasonable to expect that they would be more supportive of the industry propping up the local economy and providing family-wage jobs for their friends and neighbors (Freudenburg and Davidson 2007). There is some evidence for this idea at both a national level and the local level. In a nationally representative study of the United States, Boudet et al. (2016) find that individuals living in counties with higher employment in the natural resources and mining sector, and individuals living in a shale play area were more likely to be supportive of hydraulic fracturing, or ‘fracking’. In another study, individuals who lived closer to the Keystone XL Pipeline Expansion were found to be more supportive of that project (Gravelle and Lachapelle 2015). Mukherjee and Rahman (2016) found that residents of fossil fuels-rich states appear to be more supportive of extraction activities such as offshore drilling. Several other studies have shown that individuals living in areas undergoing intense natural gas development were more likely to view fracking positively, often for the economic development it was expected to bring (Kriesky et al. 2013; Jacquet 2012; Rabe and Borick 2011; Stedman et al. 2012; Theodori 2009).

At a local level, several studies have highlighted how local leaders and individuals in energy-dependent communities are often very supportive of continued extractive activities, even though they regularly experience negative impacts from this
type of industry, including ‘boom and bust’ cycles of job and population growth and loss, long-term poverty, and impacts on environmental and public health (Ceresola and Crowe 2015; Freudenburg 1992). Ladd (2014) argues that there is an unspoken agreement between the energy industry and extractive communities whereby the communities trust the energy industry to provide employment and other benefits and in return accept the risks. Extractive communities are often economically vulnerable, and thus allegiance to existing or proposed fossil fuels development is based on hopes for economic development (Silva and Crowe 2015). In a study of county commissioners in rural Illinois, Silva and Crowe (2015) articulate this dynamic: "Leaders perceive unconventional shale development as a potential way to overcome the economic vulnerabilities of their community and accentuate the economic strengths. By economic vulnerability, I refer to characteristics of a community that may hinder future economic growth or wellbeing" (p. 313).

Local economic vulnerability can stem from factors such as geographic isolation from larger population centers, lack of access to transportation routes for export of goods, population loss, ‘brain drain,’ and an unskilled labor force due to lack of access to education and training opportunities. Additionally, natural resource communities can become ‘overadapted’ to particular types of employment, making it difficult to envision or implement changes as larger economic and production systems shift around them (Gramling and Freudenburg 1992). Overall, these types of structural economic vulnerabilities translate into continuing support for extractive industries.

Support for the energy industry may also be a product of local identity, which can form around certain extractive activities such as coal mining or logging (Bell and York
2010; Ceresola and Crowe 2015; Dampier et al. 2014; Evans and Phelan 2016; Silva and Crowe 2015). For example, Ceresola and Crowe (2015) found in their study of individuals in the New Albany shale that “…proponents use their histories within a town and experience with extractive industry to frame shale development positively…proponents consider themselves tied into their communities in ways that make the only logical decision to be supportive of shale development” (p. 81). Evans and Phelan (2016) propose "…coal mining has provided material wellbeing and led to particular habitual, institutional, and discursive formations in the region that have formed 'mining' identities of individuals and communities” (p. 332). Bell and York (2010) found this to be true in coal communities within Appalachia, where strong ‘community economic identity’ was built around historic economic reliance on and cultural associations related to the coal industry. However, they also found that that the coal industry itself was a manipulative force underlying this identity, insidiously engaging in the construction of a pro-coal ideology in these Appalachian towns by capitalizing on existing economic vulnerabilities, cultural ideas about masculinity, and other social norms. Local identities built around the history and culture of extractive industries could influence how individuals respond to renewable energy development. Local extractive identities may also shape individuals’ larger worldviews, which could be incongruent with the idea of the clean energy transition. Indeed, as Brasier et al. (2013) state “[i]t is unclear the extent to which histories of extraction in particular localities might affect the development of worldviews related to natural resource extraction and economic imperatives” (p. 12).
Though energy dependence has been shown to be related to support for extractive industries, it is unclear whether or not it is related to individuals’ views on renewable energy. To date, I have found only two studies that specifically analyze how extractive industry activities influence individuals’ attitudes toward renewable energy. In one, Goldfarb, Buessing, and Kriner (2016) found that individuals living closer to coal-fired power plants were more supportive of policies encouraging the growth of renewable energy than individuals living farther away, which the author attributes to heightened concern about pollution from these plants. In another, Olson-Hazboun, Howe, and Leiserowitz (Unpublished Manuscript) used nationally representative survey data and found that individuals living in counties that were either dependent on the mining sector or where oil or natural gas were produced were less likely to support renewable energy policies than individuals who did not reside in counties with these activities. Clearly, more research is needed in this area. On one hand, individuals in these places may be particularly supportive of fossil fuels while feeling threatened by the clean energy transition. On the other hand, economically vulnerable rural communities are positioned to benefit from renewable energy development through construction jobs, lease payments to landowners, and increased tax revenue. In the present study, I hypothesize that individuals in places where extractive industry activities are occurring will be less supportive of renewable energy. The present research provides a unique opportunity to examine how perceptions of and discourses about renewable energy may vary across different energy contexts, including places that are and are not based on fossil fuels extraction.
Environmental Beliefs in Utah: The Influence of Religion

Past research has indicated that individuals belonging to Judeo-Christian religions tend have lower concern for the environment, though this varies by denomination as well as what measures of environmental concern are utilized (Hand and Crowe 2012; Klinberg, McKeever, and Rothenbach 1998; Peterson and Liu 2008; Truelove and Joireman 2009). Since the three study sites chosen for this research are located in rural Utah, the role of religion is important to consider because, in some ways, Utah represents a unique social setting due to the dominance of the Church of Jesus Christ of Latter Day Saints (LDS, or Mormonism). Seventy percent of Utah’s population is Mormon, compared to one percent in the U.S. as a whole; Mormonism underlies a distinct regional culture in Utah and southern Idaho (where about 25% of the population is Mormon) and informs thought and action in many spheres of life (Toney, Keller, and Hunter 2003). For example, Mormons are almost twice as likely as other U.S. citizens to identify as politically conservative, and 75% of Mormons prefer small government over bigger government, compared to about half in the general public (Pew Research Center 2012).

Though Mormon environmental beliefs are understudied, some research has found Mormon individuals have very low concern for environmental issues compared to individuals belonging to other major religions (Hand and Van Liere 1984; Peterson and Liu 2008) and compared to non-Mormon individuals (Brehm and Eisenhauer 2006). Any research studying public opinion on environmental issues in Utah should consider the influence of religion when interpreting results and implications, because if religious beliefs are linked to lower environmental concern, they may be an important factor explaining individuals’ environmental policy attitudes. Because some evidence suggests
that renewable energy attitudes are less tied to environmental beliefs than other factors (Brannstrom et al. 2011; Jepson et al. 2012; Olson-Hazboun, Krannich, and Robertson 2016; Olson-Hazboun, Krannich, and Robertson 2017), it is possible that religious identities and beliefs are not of major consequence in regard to the issues addressed in the present study. Since information on religion was not incorporated into the data collection process or analytic approach, the extend to which this may or may not be the case cannot be addressed. Nevertheless, the unique religious context of Utah does at minimum suggest the need for caution in attempting to generalize the findings reported here to other settings.

**Data and Methods**

Analysis of discourse provides insight into “regular patterns in the variability of accounts” including “repeatedly occurring descriptions, explanations, and arguments, in different participants’ talk” (Talja 1999: 466). Essentially, the objective of discourse analysis is to examine, through language, the underlying beliefs, assumptions, and values of individuals – in this case relating to energy and environment – and to understand how these might be unique to certain social groups. It is believed that there are not an infinite number of societal discourses on any given topic. Instead, discourses are repeatable, recognizable entities that may exist at different scales, including discourses that are society-wide phenomena and discourses prominent within different communities. The purpose of this research is to identify what discourses are articulated at individual and collective levels to describe renewable energy, to examine how this is connected to
environmental beliefs, and to analyze how those discourses may vary between different contexts.

To conduct discourse analysis, scholars set out to collect texts, then systematically analyze them to identify discourse “regularities” (Hajer and Versteeg 2005). In this research, the ‘texts’ or data used are transcriptions from sixty-one semi-structured interviews with sixty-eight individuals across three rural Utah study sites. I utilize an inductive approach to data collection through semi-structured interviewing. The semi-structured model of interviewing allows for open-ended responses yet also provides some consistency and structure across interviews in terms of what questions are asked. In semi-structured interviewing, the researcher prepares open-ended question stems and collects participants’ free, unscripted responses. Each participant is asked the same question in the same order so that each item can be analyzed separately and to enhance confidence in the reliability of the process (Morse 2012: 195).

Description of Study Sites

Three rural study sites in Utah were chosen to represent different energy contexts – Beaver County, Emery County, and Uintah County. Because coal, oil and gas, and renewable energy are significant energy players in different parts of Utah, each study site was selected to represent one of these three energy production activities. Each study site encompasses more than one town or small city, as residents often travel between local-area towns to purchase groceries, commute to work, or attend meetings. While study sites are labeled by county names, the sampling procedure does not necessarily fully represent whole counties because in each site I focus on the communities within the county that
Table 1. Study Site Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Site 1: Beaver County</th>
<th>Site 2: Emery County</th>
<th>Site 3: Uintah County</th>
<th>State of Utah</th>
</tr>
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<tbody>
<tr>
<td>Dominant Energy Activity</td>
<td>Renewables</td>
<td>Coal</td>
<td>Oil and Gas</td>
<td>-</td>
</tr>
<tr>
<td>ERS Mining Dependent County (1974 and 2015)*</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>County Population: 2015</td>
<td>6,461</td>
<td>10,728</td>
<td>35,721</td>
<td>2,903,379</td>
</tr>
<tr>
<td>Population Density (persons per square mile): 2015</td>
<td>2.5</td>
<td>2.4</td>
<td>8.0</td>
<td>35.3</td>
</tr>
<tr>
<td>Median Household Income: 2015</td>
<td>$50,282</td>
<td>$49,787</td>
<td>$66,815</td>
<td>$60,727</td>
</tr>
<tr>
<td>Per Capita Income: 2015</td>
<td>$21,405</td>
<td>$19,717</td>
<td>$24,720</td>
<td>$24,686</td>
</tr>
<tr>
<td>Unemployment Rate: 2015</td>
<td>3.8%</td>
<td>5.7%</td>
<td>5.1%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Bachelor's Degree or higher: 2015</td>
<td>20.0%</td>
<td>12.6%</td>
<td>15.9%</td>
<td>31.1%</td>
</tr>
<tr>
<td>Poverty Status for Population Age 18-64: 2015</td>
<td>10.1%</td>
<td>10.4%</td>
<td>9.4%</td>
<td>6.5%</td>
</tr>
</tbody>
</table>


Geographically cluster around the energy activity. Select socioeconomic and demographic characteristics for each study site are reported in Table 1.

Beaver County:

Beaver County is the renewable energy study site and is located in western Utah. The local area hosts five different renewable energy production facilities, including a utility-scale wind farm, a utility-scale solar farm, two geothermal energy facilities, a
small municipal hydroelectric energy plant, and an experimental methane plant that converts gases from livestock manure to electricity. While the county saw a significant increase in employment during the construction phases of both the solar and wind farms (occurring over the last seven years), those jobs ended once construction was complete and only a couple dozen jobs remain to run both energy facilities. The main sources of employment in the county are currently in the government sector (especially the school district) and at a major corporate livestock operation that moved into the area over fifteen years ago.

The major towns in Beaver County (Beaver and Milford) are within 30 miles of each other, and Beaver, the county seat, is about 200 miles from Salt Lake City, the closest major metropolitan area. The county is bisected by a major railway, and a federal interstate highway passes through one far edge of its borders. The county population in 2015 was estimated at 6,461 and its population density is about 2.5 individuals per mile, making it a rural and sparsely populated place (ACS 2015). As of 2015, the county’s unemployment rate was less than the state average by two percentage points, and the poverty rate was higher than the state average by four percentage points.

*Emery County*

Emery County is also located in southeastern Utah. Coal mining has been present in the area since the late 1800s and has played an increasingly large role in the local economy throughout the 1900s in terms of providing jobs to local residents. In the 1970s, several large coal-fired power plants were built in the area, providing further employment opportunities. Coal mining has demonstrated a ‘boom and bust’ cycle in the area over the
decades, and in the last ten years it has seen a significant decline in terms of numbers of mines shutting down and subsequent job losses. Conversely, the coal-fired power plants have provided relatively stable employment, though one was recently shut down. The Economic Research Service of the US Department of Agriculture classifies Emery County as a “mining dependent” county, which it defines as a county in which the mining industry accounted for “an annual average of thirteen percent or more of total county earnings or eight percent or more of total county employment from the years 2010-2012” (ERS 2015a).

Emery County is one of the more expansive counties in Utah, and its major towns are about an hour apart. The county has several noteworthy outdoor recreation and natural protected areas. I focused geographically on one quadrant of the county where the communities most dependent on jobs in the coal mines and at the power plants were located. The county seat, Castle Dale, is located within this quadrant and is approximately 150 miles from Salt Lake City, the nearest major metropolitan area. The county’s population density is similar to Beaver County, making it a remote, rural, and sparsely populated area as well. A major interstate bisects the county, but is located relatively far from the communities under study. In 2015, the county population was estimated at 10,728 and the unemployment rate was on par with the state average, though the poverty rate was much higher than the state average at 10.4% (ACS 2015).

Uintah County

Uintah County, located in eastern Utah, is a hotbed for oil and gas extraction. Like Emery County, over the last few decades Uintah County has experienced the boom
and bust cycle characteristic of economies reliant on energy extraction. Most recently, the area experienced the energy boom of the late 2000s seen around the country and saw annual oil production double from 2001 to 2011 and annual natural gas production triple in the same time period (ERS 2016). Over the last five years or so, residents of the area have felt the economic decline related to significantly decreased energy development activity related to depressed oil and gas prices. Uintah County is also classified as a “mining dependent county” (ERS 2015a). The area is also well known for several natural sites and outdoor recreation areas, which draw tourists from around the country and contribute to the local economy through the service industry. Uintah County is further from major transportation corridors than the other two study sites and only has a two-lane state route bisecting it and no major interstate. The communities of focus cluster in the northern half of the county and are all 150-170 miles from Salt Lake City.

As of 2015, the population of Uintah County was estimated at 35,721 and the population density was eight people per square mile (ACS 2015), making it the largest and most densely populated county of the three this study, though it is still by all means a rural and remote county. The median household income in 2015 was higher than the state average at $66,815, most likely due to the prevalence of high-paying energy jobs. Unemployment was slightly lower than the state average at 5.1% and the poverty rate was 9.4%, three percent higher than the state average.

Sampling and Interview Process

Much of the qualitative research on perceptions of energy development in communities uses a key informant approach, in which ‘informants’ are operationalized as
local leaders, most often public officials and other leaders in the local business or nonprofit sectors (Anderson and Theodori 2009; Ceresola and Crowe 2015). Local leaders can both reflect and influence residents’ perceptions on issues like energy development. Additionally, local leaders are able to facilitate or block various developments in their communities through decision-making about permitting, zoning, and business tax regulations. However, some studies have detailed important differences between area residents’ and local leaders’ views on such topics, with leaders expressing more enthusiasm for energy development based on economic rationale and local residents exhibiting more concern (Crowe et al. 2015; Silva and Crowe 2015).

With this in mind, I chose a sampling strategy that included respondents representing a variety of local sectors or local “social fields” (Wilkinson 1991). This strategy allowed me to obtain an overall picture of place-specific discourses toward renewable energy and the environment that was more representative than solely sampling leaders in government, for example. I targeted six local sectors in particular: government, business, education, agriculture, religion, and energy. Included in the sample were individuals holding positions in county and city governments (both elected and non-elected positions), school districts, and business-focused organizations such as chambers of commerce and offices of economic development. Several local business owners were also sampled. In addition, individuals who were engaged in local agriculture, religion, and the local energy industry were sampled. Agriculture is prominent in each of the three

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18 While it’s possible that variability may exist in individuals’ perspectives across different local sectors, we did not focus on this aspect for two reasons: 1) our research questions target variability across different local energy contexts, and 2) not enough data exists to properly assess variability across local sectors.
study sites (though it should be noted that none of the three study sites was designed as “farming-dependent” by the ERS, and I was told most farmers in these places work other jobs seasonally to supplement low farming incomes). Farmers and ranchers often hold large tracts of land, which can be leased to energy companies for a variety of energy extractive uses, including renewable energy development.

Religious leaders, such as pastors and priests as well as church officials, were also sampled. Religious leaders may develop a unique perspective on energy development in their communities, based on observations about fluctuations in church attendance and requests for help as well as the spiritual or emotional status of their members. Furthermore, religious leaders are conduits for faith-based stances relating to the environment, which influence individuals’ environmental beliefs through perspectives about humans’ role in climate change, the right of humans to modify and utilize the natural environment, and the human responsibility to be stewards of creation (e.g. Hayhoe and Farley 2009; Olson-Hazboun, Krannich, and Robertson 2017; Woodrum and Wolkomir 1997; Wardekker, Petersen, and van der Sluijs 2009).

Last, representatives in the energy sector were sampled. This included mostly employees of various energy companies, but also individuals involved in the regulatory side of energy extraction (such as public lands managers) and electricity production (such as a municipal utility manager). Further details on each respondent are detailed in Appendix A.

Sampling was conducted by compiling a list of individuals based on information publicly available on the Internet. Individuals were phoned or emailed with a request for an in-person interview, were provided with a Letter of Information (if emailed –
otherwise, this was provided at the start of each interview), and were told that they would be offered a $25 gift certificate for participating. Contact with each individual was attempted up to three times; once an individual had not responded after three attempts, communication was ceased. In many cases, individuals recommended others who they thought would want to participate and either passed on my contact details or provide direct contact information.

About one-fourth of all interviews in each county were conducted over the phone, either because the respondent had to cancel or could not meet at the desired time, or because the respondent was contacted after the research trip to each study site (details in Appendix A). In a few cases, respondents brought along other leaders to the interview that they thought would have valuable insights; thus, some interviews were conducted with more than one individual at a time. On several occasions, a respondent represented more than one sector – for example, a local priest who was also a farmer, or a county official who was also a business owner. Respondents were also encouraged to answer each question through both the lens of their own opinions as well as what they felt was the general attitude of residents in their area; they were asked to clearly state which lens they were using to answer the question.

The majority of interviews were conducted in-person at the respondent’s choice of location. Research trips were made to each of the study sites in the fall of 2016. It is worth pointing out that this timing coincided with the presidential debates between

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19 The interviews in Beaver County were conducted from September 18-25, the interviews in Emery County were conducted from October 2-8, and interviews in Uintah County were conducted from October 16-23. Several additional interviews were conducted by phone after these dates. All interviews were complete by mid-January 2017.
Secretary Hillary Clinton and President Donald Trump. This study should therefore be understood within this particular political ‘moment’ in history, because heightened media coverage on the presidential debates and election were likely to have had an influence on how respondents thought about the issues covered in the research interviews, especially since a common point of contention between Clinton and Trump was how the US should be producing its energy. This political context may have sharpened the nature of the pro-conventional energy orientations in many rural areas across the country, and possibly created increased agitation over possible effects from the clean energy transition championed by Clinton. Though there is no way to truly assess how the timing of this research with the 2016 presidential debates and election may have affected research outcomes, it is important to consider this political context when interpreting findings.

In all, sixty-eight individuals were interviewed during sixty-one interview sessions. With two exceptions, interviews were audio-recorded. Interviews lasted between thirty and ninety minutes. 2 provides a brief profile of respondents across study sites, including gender, method of interview, and sector represented. Men were over-represented in the sample, with fifty-six male respondents and thirteen female respondents. Pseudonyms are used to protect participants’ privacy.

The interview process involved one researcher guiding participants through an interview protocol consisting of seventeen open-ended questions. The researcher used follow-up questioning and probes that did not appear in the protocol to elicit further response or clarification from the participants. Both the questionnaire and the follow-up questions varied slightly across study sites since the energy context of each varied.
Table 2. Respondent profile

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Site 1: Beaver County</th>
<th>Site 2: Emery County</th>
<th>Site 3: Uintah County</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total respondents</td>
<td>23</td>
<td>22</td>
<td>23</td>
<td>68</td>
</tr>
<tr>
<td>Total interviews</td>
<td>19</td>
<td>19</td>
<td>22</td>
<td>61</td>
</tr>
<tr>
<td>Males</td>
<td>19</td>
<td>17</td>
<td>19</td>
<td>55</td>
</tr>
<tr>
<td>Females</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>In-person interview</td>
<td>19</td>
<td>17</td>
<td>16</td>
<td>52</td>
</tr>
<tr>
<td>Phone interview</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Sectors Represented</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>County &amp; City Government</td>
<td>7</td>
<td>11</td>
<td>11</td>
<td>29</td>
</tr>
<tr>
<td>Business &amp; Economic Development</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Religion</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Energy Development</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td><em>Participants representing 2 sectors</em></td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>17</td>
</tr>
</tbody>
</table>

*In several cases, individuals were able to speak as representatives of two sectors (for example, if an individual was a county commissioner and also operated a ranch, they could speak as a representative of local government as well as local agriculture).

Please see Appendix B for the interview schedule and Appendix C for the official Letter of Information provided either as a hardcopy or read verbally to each participant prior to the interview.

**Method of Analysis**

Each interview was fully transcribed word-for-word and spot-checked against the audio recordings for accuracy. One respondent did not wish to be recorded, and one audio file was corrupted after the interview session was complete – in both cases, thorough
notes were taken and were used as the basis for analysis. Transcriptions and these two sets of notes were uploaded into Nvivo 11 software. Conducting analysis through the digital environment of Nvivo provides a more efficient and thorough way to easily compile representative discourse on certain topics, examine compiled codes to identify larger societal discourses at work, and link discourses together to identify discursive membership categories. Discursive membership categories could be delineated by place or by individual characteristics, such as occupational identity or socioeconomic status.

Interviews were analyzed using an open-coding process in which each transcript was read at least once to identify major and minor discursive themes (Strauss and Corbin 1998). More refined codes were then derived based on the research questions and through additional readings of the transcripts, paying special attention to discourse patterns or regularities individuals used to describe their views about renewable energy and the environment. A focused coding of transcripts was then conducted within the Nvivo environment. This method of coding allowed the data to be sorted into meaningful categories (Lofland et al. 2006), but allowed themes and codes to emerge iteratively. Finally, passages from the codes that were the most relevant to the research questions were read again within the context of the entire interview to be sure their meaning was clear. Representative quotes were identified to illustrate discursive themes.

**Findings**

The majority of individuals across study sites were either outright supportive of renewable energy or had mixed views; just twelve of sixty-eight respondents used only negative language to describe renewable energy. Notable variation existed across study
sites, with the vast majority of residents in Beaver County (the renewable energy study site) expressing positive views about renewable energy, residents of Emery County (the coal study site) being the most skeptical, and residents in Uintah County (the oil and gas study site) having the most ambivalence (see Table 3). Several factors impeded respondents’ support for renewable energy, including the perception that federal incentives wrongfully manipulate the free market, concern that renewable energy isn’t reliable (yet), perceiving that renewable energy is a ‘liberal’ project, and being curious about the economic development renewable energy could bring to struggling communities. Significant climate change skepticism spanned all three contexts, and overall, the environmental benefits of renewable energy were not relevant components of individuals’ discourse. The main factor underlying positive language about renewable energy was the economic contribution it could provide.

Detailed findings are presented below and are arranged by discursive themes according to each research question.

What Master Narratives Are Prevalent About Renewable Energy Across Different Rural Contexts?

While I found variation across the study sites with regard to how individuals viewed and talked about renewable energy, I will begin by discussing the discursive themes that appeared across all three places. I posit that these narratives are representative of broader societal discourses.
Support for free-market capitalism and renewable energy’s ‘unfair advantage’

Across contexts, individuals I spoke with expressed strong support for free-market capitalism, especially reduced government influence in the market and reduced regulations for natural resource companies. This related to renewable energy because respondents expressed concern, and in many cases anger, over the federal tax incentives and grants currently offered to renewable energy companies. Peter, a government official in Beaver County who is in favor of renewable energy, stated:

“I think it should be left to private business, that's going to be a caveat that you catch me on, because I would like to see more renewable energy to be located [here] but I think that they should stand on their own two feet. If it's not feasible then our government should stay out of it and go back to the hydrocarbons.”

Individuals across contexts felt that federal incentives and state renewable energy mandates were unfairly prioritizing one energy source over the other and that this was an undesirable manipulation of the free-market system. Liam, a public official in Emery County, argued that all enterprises should to operate on a ‘level playing field’:

“I’m very much against government being involved in making decisions on what industry should win and what industry should lose…I don’t think that anyone should get subsidies, I think that they should throw out the tax code myself…you know they always talk about wanting to level the playing field, well there you go, I mean that’s going to level the playing field.”

Alex, a religious leader in Uintah County who is also supportive of renewable energy felt that the issue was not only that renewable energy was being incentivized, but also that fossil fuels were being dis-incentivized:

“I don’t think you’re going to find anybody that’s against using renewable energy. I think the question is why is there a push on or against energy of fossil fuels and yet subsidies are being given towards renewable energy. And if renewables are so great and renewables are going to work, we’re all for that. But why are we being punished for that and they are being rewarded?”
Table 3. Profile of respondents’ views on renewable energy and anthropogenic climate change

<table>
<thead>
<tr>
<th></th>
<th>Attitude toward renewable energy</th>
<th>Belief in anthropogenic global warming</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mostly positive</td>
<td>Mostly negative</td>
</tr>
<tr>
<td>Beaver County</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Renewable energy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Emery County</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Coal)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Uintah County</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Oil and Gas)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

A few individuals expressed they were not against the government incentives. However, most of these individuals had some sort of personal experience with renewable energy – either they were directly involved in renewable energy development or they had recently put solar on their homes and received the homeowner tax incentives. For example, Joe, a renewable energy project developer in Beaver County, stated:

“[T]here’s a lot of people that are opposed to subsidies, but the fact of the matter is, in many places in the United States right now, with or without subsidies, wind power is cheaper than oil, and solar is just about there. It’s amazing how fast the cost just dropped…and it’s still going down. So, if it wasn’t for the subsidies, people like to yell and scream and complain, but it’s a basic economic principle. You know, in economic theory, if you subsidize something, the price curve will go down and we will adapt to it. So I mean it’s, it worked.”

By and large, the respondents across sectors and across study sites were in favor of ‘leveling the playing field’ for energy markets, which for them meant no ‘unfair’ incentives provided for renewable energy companies.
Concern about the feasibility of renewables as a major player in the electricity system

Another narrative about renewable energy that spanned study sites was worry about the reliability of renewable energy, particularly the ability of renewably generated electricity to meet base load requirements. The term ‘base load’ refers to the minimum amount of electricity needed to accommodate normal societal needs; it fluctuates throughout the day, peaking in the evening hours and dipping in the middle of the night. Respondents as a whole seemed quite familiar with this concept, and many expressed concern that because renewable energy sources such as solar and wind were variable, adding them to the grid in large amounts would cause the grid itself to become unstable.

Randy, a government official in Emery County who also works at the coal plant, highlighted this concern:

“They’re saying let’s go renewable energy, solar panels, wind mills, they are very inefficient. Solar panels only work in the sunlight. The sun goes down, a cloud comes up, you have no power. So, you people with your cell phones and everyone else who wants power only during the day, where you gonna get your power at night? It’s not fair. You gotta have base load, which is a coal-fired power plant or a gas power plant. And you wanna shut them down? But these power plants have got to stay in operation or not only do we suffer, every environmentalist in this area suffers.”

Overall, respondents across study sites were supportive of increasing the amount of renewable energy in the United States but were worried about its ability to provide constant energy for the nation. Erica, a county employee in Uintah County, spoke to this:

“Renewable energy is great I just don't know if it will be able to sustain everybody you know long term like natural gas and the oil can.” Most respondents preferred to speak of renewable energy as a ‘supplementary’ energy source – that is, they did not believe it should replace the use of fossil fuels. Ben, a county official Emery County articulated
this: “I don’t even like the term alternative sources, they’re not alternative because you can’t have an alternative that doesn’t produce power when the sun goes down and the wind doesn’t blow. They’re supplementary.” Becky, a government official in Beaver County, also saw renewable energy as a supplement, not a replacement: [I]t’s stupid not to use [renewable energy]. The only thing that I hesitate about the renewable part at all is that even though we’re doing that, you need to see both sides of the coin. You shouldn’t be limiting another source just because that doesn’t suit your purpose so to speak.”

Respondents as a whole were especially concerned about renewable energy increasing the incidence of ‘brown outs’ or energy shortages. Words like “unreliable,” “intermittent,” “off and on,” “unproven,” “limited,” “fluctuates,” “buffer power,” and “supplementary power” came up frequently when discussing renewable energy, and overall a sense of distrust in the technology pervaded the discourse particularly about wind and solar. Tina, an educational leader in Emery County, mentioned that she felt that those pushing renewable energy were unaware of this aspect of it:

“[I]f they shut down all the power plants, I think it would have a major affect on keeping enough power in communities. I think that they haven’t taken that into account. In their effort to be green… Um, I think when they have to sacrifice and not have, you know, have power outages at some times, that might change the… and I hope it doesn’t have to come to that, but I really feel like they’re not that well educated on…I don’t think they know of the ramifications of it.”

It’s notable that even in Beaver County, where the vast majority of respondents were very supportive of renewable energy development, many individuals still expressed skepticism about the ability of wind and solar to be major contributing players in the power grid. Rob, who used to be a teacher in Beaver County, spoke to why this perception of renewable energy is pervasive:
“I think number one, it’s intermittent. The sun doesn’t shine twenty-four/seven, the wind doesn’t blow twenty-four/seven. You can burn coal twenty-four/seven and it seems comfortable, it seems consistent; it’s something we can wrap our brain around and not even have to think about. You get up at two in the morning and turn the light on in the bathroom – it’s coming on. Renewable energy, people still think ‘I have to live like a hermit in the woods and only have power for three hours a day,’ or you know it still kind of has that persona.”

The ‘persona’ of renewable energy – that it will require a return to a less modern and less convenient way of life – was a common component of respondents’ discourse about renewable energy. Furthermore, this was connected to the view that renewable energy was a liberal project being perpetuated by a stance that was decidedly ‘environmentalist’ or ‘hippie.’

‘Us’ versus ‘them’: Renewable energy as a liberal project

An ‘us’ versus ‘them’ element pervaded discourse about renewable energy across study sites. For some respondents, this was simply the feeling that renewable energy was a liberal project or an agenda of the Democratic party. Forest, a business owner in Beaver County, stated this succinctly: “Democrats… they like clean energy. They pump a lot of money into getting clean energy. Republicans are oil based.”

For other respondents, the divide was more about lifestyle, local culture, and the local economy. Mary, a business owner in Emery County who was generally supportive of renewable energy, still felt that it could draw an undesirable crowd and have a negative impact on the local economy: “You bring in renewable energy, you bring in the tree huggers, you bring in [Democrats], they shut down the coal mines and we’re done.”

Much of the discourse about renewable energy that arose in interviews was related to the way that respondents perceived political liberals and the Democratic party.
itself as being a threat to the local economy. This was particularly salient in both Emery County and Uintah County, the two study sites that were dependent on fossil fuels energy extraction, but was also present in Beaver County. Chris, a government official in Uintah County, described this concern that Democrats would hurt the economy in cyclical terms:

“[It] was the Democrats, and frankly it’s still the Democrats that are pushing green energy, renewable energy, versus oil, gas, coal. I remember when President Carter was elected, before he took office. The oil companies in this area and gas companies were very concerned about, you know, where we were going with the development of domestic fuels and domestic resources. And you know before we had, you know the Bushes…it was good. But when the Democrats took over, the change, the administration was certainly a change in philosophy as to what we should be doing as to developing energy.”

Todd, an educational leader in Beaver County did not personally subscribe to this outlook, but he described how he believed that if local residents have doubts about renewable energy, it’s because it’s perceived as being part of a liberal agenda: “You know, I think deep down people think it’s probably not a bad thing. But, by George, if Obama says to do it, it must be bad. That’s the kinda my perception.”

Much of the language overall that respondents used to describe renewable energy was political in nature, and this element appeared to be related to decreased support for renewable energy technologies.

Double benefit or double-edge sword? Renewable energy's economic development potential

Almost every individual referred to a challenged local economy. This is not surprising given that all three study sites were rural areas with limited economic opportunities. Most often, respondents attributed this to the lack of economic diversity,
lack of jobs, and the rurality and geographic isolation of each place from major population centers, though population decline, lack of access to major routes for commodity transport, lack of a skilled or diversified workforce, insufficient or declining tax revenue, and the proportional amount of public lands versus private lands (limiting resource extraction activities) were also brought up. At the time of the interviews, two of the three study sites (Emery and Uintah Counties) were experiencing significant economic declines related to downturns in the coal, oil, and gas markets.

This is pertinent to the discussion on renewable energy because in all three study sites, the majority of respondents expressed a desire for a more diversified local economy. Harold, an elected official in Uintah County, described the problem they were experiencing as being due to “an all or nothing economy” in which the strategy is just to “hang on” when times are tough. Most of the public officials I spoke to were actively working on bringing in new types of businesses. When asked if they thought renewable energy development could help diversify the local economy, respondents were somewhat skeptical about how many jobs renewable energy might bring in. Jay, a elected official in Emery County, described his doubt: “Solar and wind are pretty close to the same in impact. They produce very few jobs. So even if we bring [a solar or wind energy facility] in, the ten people that lose their jobs at the power plant, only one of them is probably gonna get hired. Because they only need one person to maintain it. So they’re very low on jobs.”

Despite the doubt, respondents’ views were balanced with a sense of desperation and the feeling that anything would help. As Chris, a local government employee in Uintah County, explained:
[I]f a company wanted to come in and do a renewable energy project, I think we would, you know, open our arms to them. I don’t think people would be upset…it would be, you know, a double benefit of it for us, to have both kinds of energy being developed.”

Respondents in Beaver County spoke of the economic benefits of renewable energy most frequently and in-depth, which makes sense given that they have local experience with both large-scale wind and solar energy development. Respondents spoke most often of the economic ‘bump’ their area received during the construction phases of both wind farms as well as the solar farm that was developed in the last few years. About a third of all respondents seemed to know that the renewable energy facilities had also significantly increased the tax revenue for the county. An employee in Beaver County explained the extent of the tax base increase brought by renewable energy:

“Twelve thousand acres [of wind turbines] is now producing 3.1 million dollars in taxes. Solar, we’re anticipating similar. It’s less acreage. Eighteen hundred dollars predevelopment, four million post development. Per year. This is the impact it has on Beaver County. All renewable energy assets account for approximately sixty-five percent of our assessed evaluation. Over half…[I]t’s somewhat of a two-edged sword and it sounds great, it sounds like a ton of money and everything, but it’s all depreciable property. And so it depreciates every year and so what happens is we’ve put in safeguards to help us guard against this. But when you start basing your budgets off the five million dollars’ worth of taxes you’re getting, then that’s going down every year, your government system is made to where you make up that money somewhere else.”

However, while most Beaver County respondents acknowledged that the renewable energy installations had provided a significant economic benefit, they also said there was a ‘double-edged sword’ element to renewable energy in that it was ‘boom and bust’ and not permanent. Tim, a religious leader in Beaver County, spoke to this:

“Beaver County was hurting for employment prior to both the windmills and the solar panels. With them coming in, that helped a great deal, you know, for that. My worry is: two years from now, a year from now, what's going to happen? I feel like we might be going back to where we were, again. But, I mean, the solar
it's a temporary fix.”

Karla, who manages a local business in Beaver County, spoke of how booming business during the construction phases has almost completely dropped off: “Well, [renewable energy], it’s got the economy a lot here. Technically business here was booming, the hotel was packed, the diner was packed. I mean, we literally had two servers on every shift because it was so busy. And now, it’s dead.”

Corbin, a farmer in Beaver County, expressed doubt about long-term employment provisions:

“Well, both [the solar and wind facilities] created some jobs, but they’re not the kind of long-term jobs that really strengthen the community. It was kind of a fly by night, hit and miss deal. You know we had lots of workers in the area…it was so crowded with all these individuals there working on the project…I don’t see any long-term employment benefits from the project.”

Overall, while respondents in all three study sites voiced skepticism about how much economic benefit renewable energy could truly bring, especially in terms of creating employment or replacing jobs lost in the energy industry, respondents as a whole were relatively open to any sort of economic development, including renewable energy. However, this might speak more to the structural economic challenges present in each place than it does to attitudes toward renewable energy.

How Do Discourses About Renewable Energy Vary Between Energy-Production Contexts?

As Table 3 indicates, respondents in Beaver County overall had more positive views of renewable energy than respondents in either of the two other study sites. They spoke of the economic benefits, including construction jobs, some permanent
maintenance jobs, and the increased tax revenue. The very concept of renewable energy seems to have percolated further into the lives and discourse of Beaver County residents. About a fourth of the residents interviewed in Beaver County had installed solar panels on their own roofs because it made ‘economic sense’ (though one individual, the school superintendent, mentioned he also wanted to reduce his environmental impact). Several farmers had installed (or were planning to install) solar panels to defray the costs of pumping water for irrigation. One farmer mentioned that this process would save him $3000-$5000 per month. Furthermore, several farmers are receiving lease payments from the utility-scale solar energy facility on land that they considered otherwise ‘useless.’

With the exception of the angst over the federal subsidies and lack of long-term employment opportunities, much of the language individuals in Beaver County used to describe renewable energy hinged on ‘common sense’ or ‘practical’ values. That is, the idea that the resource exists, is free, and all one must do is ‘harvest’ the energy. One farmer told me: “The earth is, is producing that. We should harvest that. As a farmer, we try to harvest everything we grow. Everything we produce. With the earth, I think we should do the same thing.” Another farmer mentioned that it just made sense to install solar because: “our home farms is 1100 acres fence line. We can only farm 880 acres of that 1100 acres with center pivots. So we have a lot of corners and ground that’s just…has no use. So solar fits in very well in those spots.” This practical-values way of viewing the use of renewable energy, plus the significant amount of personal experience respondents as a whole had with renewable energy in Beaver County, appeared to balance the negative influence of other factors (federal incentives and the liberal ‘persona’).
The most prominent difference in local discourse about renewable energy between Beaver County and Emery and Uintah Counties was the tendency of respondents in the latter two places to speak of renewable energy as threatening the local fossil fuels-based economy. This was especially prominent in Emery County and helps explain why Emery County respondents had the most negative views of renewable energy (see Table 3). Respondents indicated a sense that adding renewable energy facilities to the local area was a sort of ‘zero sum game’ in that fossil fuels (coal) would be taken away as renewables were added. Noah, an educational leader in Emery County put it this way: “I’d like to see more renewable energy, even right here in Emery County. But at the same time… I don’t think that shutting down coal leases and, you know, creating havoc in small communities is the way to do it.”

Speaking of a recent initiative to put solar panels on a museum, Randy, an elected official in Emery County, recounted a story that further illustrates this perception:

“I went to the [city council] and said, you know we want to do this, let's put solar panels on the museum. I think it would be great. We've got a southern exposure, we’re the highest building there, let's put solar panels on there, it would help out a lot. The mayor…he said absolutely, positively not. You will not put solar panels on anything, solar panels take food out of the mouths of the miners.”

Tina, an educational leader in Emery County, referred to a statement made by presidential candidate Hillary Clinton in the fall of 2016 – a statement remembered by several respondents in Emery County:

“Yeah, now and Hillary Clinton made a statement about coal miners needing to shut down, and then she retaliated or came back and tried to cover it by saying ‘no, you misunderstood me, I don’t want to have miners out of jobs, but you know, that’s too far gone past words for that. So yeah, it’s frightening. I think that the… the feeling here is that if a Democratic president came in, we would be toast. That would be the end of us.”
Thomas, who works in education and is a religious leader in Emery County, referred to this fear toward renewable energy as a cultural challenge indicating that the local people, especially energy workers, feel “resentment toward renewable energy” and that he thinks “there would be some cultural opposition if something like [renewable energy] were proposed for the area.” He explained “I think it’s natural, because they’re seeing that kind of industry take away from the coal industry.”

What seemed to go hand in hand with this sense of threat was the feeling that coal itself was both a target of the government and was misunderstood by the public at large. Trevor, an elected official in Emery County, spoke to this: “It seems like all of the sudden this last 5 years that… it’s almost like… if someone stubs their toe, it’s the fault of coal. I mean that’s how we… at least that’s how we… I think that’s kind of how we perceive it in our county.” Stephanie, a government official in Emery County, reflected the belief of many respondents that the reason for this was because coal was the ‘easiest target’:

“[T]hey’re going after one industry, the coal-fired industry [but] to go after one industry and say you’re causing all this problem is a farce… If you want the climate to clean up and to change, you better get rid of everybody off the earth.”

Interviewer: So why do you think they’re going after coal?

“Because it’s the easy one.”

Interviewer: Why is it the easy one?

“It’s the catch word because it’s dirty. Because how are they going to shut people down with their cars?

The sense that renewable energy was a threat to the local economy was present, though not as prominent in Uintah County, where oil and gas extraction was dominant. It’s possible that this is because both renewable energy and coal are used in the
generation of electricity, whereas oil and natural gas have a wider array of energy uses, such as transportation, heating, and in goods such as plastics. However, there were still some respondents in this place who saw a direct threat from renewable energy, such as Harold, an elected official: “Sure, wouldn’t it be lovely if we had clean energy sources that actually worked? I think that that would be great. But of course it would kill our economy.”

Overall, the discourse about renewable energy in Uintah County was more ambivalent, with respondents showing the most mixed views of any of the three study sites (see Table 3). Anitra, a business owner and city elected official in Uintah County describes how the local communities must balance the economic benefit of renewable energy with the feeling that fossil fuels are under attack:

“[W]e'd be open to [renewable energy] if you know if it's gonna create jobs … you've got people really torn cause they are fossil fuels people and that's what they've been their whole lives, and their parents and their grandparents. So it's hard to make that mind shift … because to us out here we feel like the federal government has just shoved the renewables down everybody's throat. And we're fighting. We're fighting for fossil fuels, you know, we feel like they're becoming really attacked … the more they're doing with renewables and to me really shunning the fossil fuels is putting down it people's minds that if they want to they really could shut this down.”

The variations in discourse between the three study sites seemed to be tied to the energy-production context of each location. In Beaver County, where renewable energy is a part of everyday life, residents had mostly favorable views, and their own personal experience with renewable energy balanced the components they found undesirable (such as government subsidies). In Emery County, where coal had been experiencing a significant decline for years, renewable energy was viewed as not only a threat to the local economy but also a cultural imposition. In Uintah County, respondents indicated
mixed views or ambivalence, with many supporting the idea of renewable energy for the economic development it might bring, and others still feeling that renewable energy would not be beneficial.

To What Extent Are Perceptions of Renewable Energy Related to Environmental Beliefs?

Three themes arose in this research that illustrate how environmental beliefs figure into narratives about renewable energy in rural Utah. First, a notable and pervasive climate skepticism spanned discourse across study sites. Second, the topic of air quality and pollution was connected to discourse about renewable energy, but in divergent ways. Last, respondents pointed out that renewable energy comes with its own environmental costs. Overall, environmental concern was not a driving factor underlying respondents’ views about renewable energy. Acknowledgement about the environmental benefits of non-fossil fuels energy sources was most prominent in Beaver County.

Pervasive climate skepticism

Table 3 indicates that the vast majority of respondents interviewed do not believe that humans are causing the Earth to warm. Respondents were asked specifically for their views about climate change, and were asked to consider how this, for them, connected to renewable energy. Several respondents, mostly public officials, chose to remain neutral on this subject and several indicated they did not know whether or not humans were influencing the global climate. Only four of sixty-eight individuals indicated that they did
believe that anthropogenic climate change was occurring. Several quotes illustrate climate skepticism or outright denial across study sites:

“I mean I’m not denying this, I mean the polar ice caps are receding, we’re seeing the effects on our farm of global warming. But I don’t think it’s man caused, I do not think it’s because of excess CO2. I think that’s bogus.” (Corbin, a farmer in Beaver County)

“I would say by and large, the local view of the community with regards to climate change is that it’s a big pile of garbage.” (Liam, an elected official in Emery County)

“You look at the earth’s history and you will see that climate has changed, it’s variability, the climate has changed through the centuries. So, I don’t know that people will say that there’s, you know, that climate doesn’t change. But I don’t know that our people would subscribe to the belief that fossil fuels is the culprit.” (Eugene, an elected official and farmer in Uintah County)

This pervasive climate change skepticism across study sites is indicative of the larger climate denial discourse in the United States. It also suggests that attempts by activists, politicians, and developers to gain support for renewable energy by using a climate change rationale will not resonate. As Jeff, a county employee in Beaver County, put it: “I would say that the bulk of the community doesn’t believe in it. They don’t support the national narrative on global warming. And therefore they do not look at the renewable energy development as necessary to minimize the impact of global warming.”

Divergent discourses on air quality

Respondents were not asked directly about their views on air quality and pollution as they related to energy production, yet many respondents brought this up. A major difference between Beaver County and Emery and Uintah Counties was the discourse itself around air quality. Respondents in Beaver County were much more likely to talk
about the pollution from fossil fuels than were individuals in either of the other two places. Tony, an elected official in Beaver County pointed out the environmental benefits of renewable energy as he saw them:

“[With renewable energy] you’re not burning nothing so there’s nothing going into the air. It’s not polluting the air at all. There’s nothing on the solar panels that can contaminate the ground or even if there’s nothing that can leak out of them. So it’s a lot cleaner all the way around. And the [coal-fired] power plants are nice and they produce a lot, but there’s some of them that are putting out some pretty nasty toxins and contaminant in the air.”

In Emery County, respondents as a whole felt like coal has been unfairly blamed for air quality issues and that cars were the real polluters. Individuals felt that their local air was pristine and not at all affected by the two coal-fired coal plants in their county. They felt allegations that their coal-burning power plants were polluting the air were especially ludicrous coming from the Salt Lake Valley, the state’s largest metro area and which suffers from wintertime inversions that trap harmful pollutions for weeks on end. Louis, an elected official in Emery County, explains how it’s hard to understand why their coal plants are being blamed for air quality issues:

“We might have fog, but smog, we just don’t have it here…you talk about the environmental impact of all this coal stuff, it doesn’t hit us here. So we’re having a hard time grasping and understanding those concepts that the nation wants us, environmental controls, it doesn’t affect us here. I’ve never known anybody at the power plant that had any health issue that I think of… I drive into Utah Valley and I see the inversions there in the wintertime. My mother still lives there, her family lives there, and so I think there is something to do with the emissions coming out of their vehicles.”

Even respondents in Emery County who admitted that the coal-fired power plants were releasing some pollutants downplayed this aspect while focusing on either how much cleaner coal plants are now than they used to be, or on how little they were polluting compared to coal plants in other places (other parts of the United States, or coal
plants in China). Words like “clean,” “efficient,” “technologically advanced,” “sophisticated,” and “blue skies,” peppered their language to describe their views on coal-generated electricity. John, an elected official and local business owner, pointed out that there was no visible pollution from their coal plants: “You saw the steam or the water vapor that was coming out of smokestacks, there's hardly any pollution that actually comes out of our power plant.” Jay, another public official, echoed the same sentiment:

“[T]he power plants right now are running at a 99.5 percent efficiency. So, actually what you see come out of the power plants is steam. It’s not actually particulates. Um, so … they’re actually quite efficient. So that’s what I, my fear is when it comes to the federal government, they don’t try to create a level playing field. They just pick one enemy, and then they attack, and they attack, and they attack, and they attack.”

In Uintah County, a major wintertime inversion causing air quality issues has received national attention over the last couple of years, and some scientists link this to oil and gas development occurring there. Yet, respondents as a whole expressed skepticism about the inversion being a problem or being linked to extractive industries. They spoke positively about how much the energy industry has done to be cleaner and to be a ‘good neighbor.’ They also focused on how much ‘cleaner’ natural gas was compared to coal. Bruce, a elected official stated:

“I don’t see any need to move away from a fuel that is as clean as natural gas is, we just need to make sure that we, do things that are environmentally efficient, as much as possible moving forward. And we stand behind clean, efficient, natural gas. It is the cleanest, natural gas, it is the cleanest fossil fuel, right? We have a lot, we have volumes of it.”

Taken together, the sentiments that the energy industry is already plenty ‘clean’ in both Emery and Uintah County suggest that the framing of renewable energy as a strategy to mitigate air pollution would not be a very salient frame in these places.
However, in Beaver County, which currently has no economic reliance on fossil fuels, individuals were more willing to speak about air quality issues from the burning of fossil fuels. For some, air quality was a reason to support renewable energy development.

*The environmental costs of renewable energy*

A lesser theme that emerged with regard to the environment was reference to the negative environmental impacts that installations like solar and wind can bring. Several respondents in Beaver County recounted how shocked they were at the amount of waste generated from packing materials enclosing the photovoltaic panels for the utility-scale solar farm. Becky, a public official in Beaver County, pointed out this aspect:

“[W]ith these solar things, look at all the waste. I mean, so there’s, it’s a double-edged sword. I don’t care what you’re talking about, green energy is not one hundred percent green energy. Because you have so much waste and there are so many other things that go into that that it can’t be all win/win and no loss to that.”

Another negative environmental aspect that respondents pointed out had to do with the materials required to produce renewable energy technologies, which come with their own environmental costs. Liam, a public official in Emery County, spoke to this:

“[A]nother thing that I don’t think people think about that much, is what’s required to make solar panels. Is some of the most, you know, polluting and anti-environmental material that they put into those things. What happens when they break down, what are you gonna do with ‘em? You’re gonna chuck, you’re gonna chuck them in a landfill, and all those nasty stuff is gonna leach into the ground.”

Some respondents also focused on the landscape impacts of renewable energy, though in Beaver County only one individual seem particularly perturbed by the presence of renewable energy, a farmer who felt that the solar farms were encroaching on
productive agricultural lands. A handful of respondents mentioned the impacts on wildlife, especially their concern that wind turbines killed birds.

In all, the environment was not a prominent component of local discourse about renewable energy in any of the study sites, except in the sense that many respondents used environmentally skeptical language to express their views on energy in general.

**Discussion and Conclusions**

This study examines the perceptions of renewable energy held by sixty-eight representatives of six different local sectors across three different study sites in Utah. Each study site is characterized by a different energy production context – renewable energy, coal, and oil and gas – and has been substantially impacted by energy-related activities. My research questions focused on how discourse about renewable energy varied in each study site, what master narratives existed across all three places, and how environmental beliefs may factor in. Overall, analysis of interview transcriptions and notes revealed that the majority of respondents were positive about renewable energy, but support for free-market capitalism, the ‘liberal persona’ of clean energy, concern about technological reliability, and environmental skepticism attenuated support.

Concern about climate change did not factor into the way that the vast majority respondents rationalized their views about renewable energy; rather, mention of climate change served to fuel language describing renewable energy as a liberal political project, particularly under the Obama administration. Pervasive climate skepticism dominated discourse in all three study sites, with only four of sixty-eight individuals stating that they believed human-induced climate change was occurring. Several respondents articulately
explained that carbon mitigation was not relevant to local views about renewable energy. In some cases, skepticism of climate change was tied with distrust in the federal government, in scientists, and in the environmental movement, and was connected to negativity toward renewable energy. This is in keeping with the findings of Jacques and Knox (2016) who found that rejection of renewable energy was closely tied to climate denial discourse on social media. The potential for renewable energy to become increasingly politically polarized is a threat to the clean energy movement. This becomes an even greater possibility when renewable energy development is tied to discourse about climate change mitigation, especially since many respondents expressed their feeling that their local economies were suffering in large part due to restrictions on the energy industry motivated by what they felt was an ideological and political battle against climate change.

Past research indicates that connection or proximity to extractive industries in and of itself can boost support for fossil fuels (e.g. Boudet et al. 2016; Gravelle and Lachapelle 2015; Mukherjee and Rahman 2016). Based on this, I hypothesized that the two study sites dependent on the extraction of fossil fuels would have more negative or skeptical views toward renewable energy. Overall, I found this to be true, with residents of Beaver County (the renewable energy study site) exhibiting more positive views about renewable energy than either Emery County (a coal-dependent area) or Uintah County (where oil and natural gas production is dominant). Notably, many of the respondents in Emery County, and some in Uintah County, saw renewable energy as a direct threat to their local economy as well as their cultural identity. This is consistent with the research on local economic identity (Bell and York 2010; Evans and Phelan 2016; Silva and
Crowe 2015), which has highlighted how individuals and communities can form identities based on a locally dominant extractive industry.

These findings are also consistent with research showing that individuals living within or closer to places dependent on extractive industries tend to exhibit more support for those industries, though this research has not specifically examined the ramifications of this fossil fuels allegiance for public opinion toward renewable energy. A nationally representative study by Olson-Hazboun, Howe, and Leiserowitz (Unpublished Manuscript) in the previous chapter shows that individuals living in counties with extractive activities are less likely to support renewable energy policy than individuals living elsewhere – however, that study only measures policy attitudes, which could be indicative more of political views than attitudes toward clean energy technology itself. Goldfarb, Buessing, and Kriner (2016), also using nationally representative data, found that individuals who lived closer to coal-fired power plants were more likely to support the Production Tax Credit, a policy supporting wind energy development, than individuals who lived further away. This study, too, measures policy attitudes and thus does not necessarily capture individuals’ attitudes toward renewable energy itself. Additionally, the study by Goldfarb and colleagues doesn’t capture variation that may exist between individuals who live in coal-dependent communities and those who do not. Thus, the present findings further insight into the ways that local economic and cultural dependence on extractive industries factor into perceptions about renewable energy – namely, that clean energy technologies are more likely to be seen as a threat in these types of places.
The finding that respondents in Emery County and Uintah County feel their communities were being ‘abused,’ ‘punished,’ or ‘targeted’ by the federal government and by environmentalists deserves more attention. Though not covered in the findings section of this manuscript, the interviews in Emery County (the coal study site) in particular revealed that individuals in the area were dealing with issues of depression, self-worth, distrust, and feelings of being shunned, ignored, or forgotten by their federal government, state government, and fellow US citizens. This speaks to the importance of an emerging concept in the energy transitions literature – that of ‘just transitions’ (Evans and Phelan 2016). The ‘just transitions’ concept is being pioneered by the Canadian Labour Congress (CLC), which argues that, in the transition toward sustainability, "the costs of environmental change will be shared fairly” (Canadian Labour Congress 2000: 3). The ‘just transitions’ concept considers communities marginalized by reliance on the fossil fuels sectors, and argues that “Failure to engage marginalized communities and others who might be vulnerable and hostile to change raises the risk they might unite with hazardous industry and corporate interests” (Evans and Phelan 2016: 333). The insights here are many. One, even though renewable energy may offer an economic boost to isolated rural communities, it may still be rejected as a scapegoat for the loss of local economic stability. Two, the rising tide of the cleaner energy economy must float those most marginalized by the old system. Three, the project of neoliberalism and corporate deregulation will continue to gain supporters in marginalized energy communities unless these communities are engaged by the clean energy movement and provided with acceptable alternatives.
While respondents in Uintah County expressed similar fear of renewable energy as threatening their fossil fuels-based economy, there was overall a much higher level of ambivalence. That is, respondents’ views seemed less settled, with many expressing truly mixed views about renewable energy. This is likely due to several factors. One, renewably generated electricity is in less direct competition with oil and gas production because the later two have uses other than electricity generation. Two, respondents understood that the decline in oil and gas production was related to global energy price fluctuations, so there was less of a tendency to blame the federal government for the local economic decline. Last, respondents in Uintah County did not feel specifically as ‘punished’ or ‘attacked’ by federal environmental regulations as those in Emery County. Many respondents felt that permitting for new oil or gas well had been significantly restricted under the Obama administration, but the overall feeling of being ‘targeted’ was not as acute as it was in Emery County, where new EPA standards for coal-fired power plants were seen as wrongfully targeting one energy industry over the other.

In my interviews, respondents connected the topic of renewable energy to several politically charged issues, including skepticism over climate change but also including the use of taxpayer money to ‘prioritize’ one energy source over another through tax incentives and the perception that renewable energy was a liberal project. When coupled with the relatively high level of support for renewable energy in these rural areas, these issues indicate that public perception of renewable energy stands at a crossroads. Several discursive frames of renewable energy are competing for dominance, especially in rural areas where economic development is sorely needed but where conservative ideology and ties to fossil fuels industry can cast renewable energy as an enemy.
Strong counter-frames are needed to counteract these forces (Aklin and Urpelainen 2013). Fossil fuels enjoy practical, discursive, and institutional hegemonic status across society but especially in energy-dependent communities and regions (Evans and Phelan 2016). Thus, it is imperative that politicians, activists, and developers seeking to foster the clean energy transition find and employ counter-hegemonic discourses that are ‘disruptive’ to the hegemony of fossil fuels. My findings revealed that the most pervasive positive frame about renewable energy in rural Utah is the economic benefit it can bring to struggling areas. Even though (justifiable) skepticism exists about how many long-term jobs renewable energy can truly provide, residents in Beaver County appreciated the economic boost brought by the construction period for the solar and the wind energy facilities, as well as the drastic increase in county tax revenue. Rob, a former teacher in Beaver County, poignantly spoke to the importance of using salient frames:

“[W]hen you talk about renewable energy in Utah, you don’t talk about tons of CO2 that you save, or saving the earth or anything like that. You talk economy. And whenever you talk about saving pollution or anything like that, you get kicked out of the room or laughed at or whatever. But you talk about creating jobs, creating revenue, creating a tax base for the schools. Dollars and stamps, people listen.

Renewable energy should not by any means be marketed to rural communities as a panacea to economic woes or a replacement for traditional energy jobs. While it has helped rural communities such as Beaver County to generate more tax revenue and employment, most jobs associated with renewable energy development last a relatively short while. However, Beaver County’s experience with renewable energy has largely been a positive one, and it’s notable that discourse there was as a whole considerably more positive there than in either of the fossil fuels-based study sites. It’s possible that as
more rural areas experience renewable energy development, positive narratives about renewable energy will spread out further into various corners of U.S. society and attenuate existing and future political polarization. However, a key piece of this puzzle will include figuring out how to engage and include communities marginalized by dependence on fossil fuels – communities that right now, as evidenced from this research, are feeling ‘attacked’ and ‘punished’ by their own government. Future public support for renewable energy – especially in rural areas where most renewable energy installations are built – may well depend on it.
References


McCright, Aaron M., Chenyeng Xiao and Riley E. Dunlap. 2014. “Political Polarization on Support for Government Spending on Environmental Protection in the USA, 1974-2012.” *Social Science Research* 48:251-60.


Appendix A: Respondent pseudonyms, background, and views on renewable energy and anthropogenic global warming.

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<th>Name</th>
<th>Sector(s) representing</th>
<th>Sex</th>
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*Respondent didn't want to be recorded, so notes were taken instead.

**Audio file was corrupted before analysis, so notes from interview were used instead.
Appendix B: Interview Schedule

VIEWS ON ENERGY AND ENVIRONMENT IN UTAH COMMUNITIES

Interview Preamble: My name is Shawn Olson, and I’m a graduate student at Utah State University studying how people in Utah communities view various issues related to energy and the environment. Thank you so much for volunteering to be part of our research. Before we begin, I want to briefly describe the study, and then go over some guidelines for you in terms of how this interview will proceed.

This purpose of this research is to understand the opinions and beliefs that residents of Utah hold about various issues relating to energy and the environment. Specifically, we are interested in individual and community reactions about different types of energy production, as well as various environmental issues and policies.

The rules of conduct for research at Utah State University require us to provide you with documentation about the study, including contact information, procedures, and the confidentiality of your participation. I have documentation here for you [HAND THEM THE LETTER OF INFORMATION]. I’d like to ask you follow along as I go over it, and please let me know if you have any questions at any point.

The procedures of this study involve me interviewing you for about one hour. There are about twenty questions in the interview. With your permission, I will be recording the conversation using this recording pen (show them the pen). This recording will be kept on a password-protected computer, and no one but the researchers will have access to the recordings or the notes I take during this interview. Your participation will be kept anonymous and confidential. Is it OK if I begin recording this interview? [IF YES, TURN PEN ON].

We believe there is minimal risk or discomfort involved in your participating in this research. However, if you experience any problem and want to end the interview early, there is no negative consequence for you. Your participation is completely voluntary, and you may choose at any time to end the interview. If there are particular questions that you don’t want to answer, we can either skip those questions or end the interview entirely.

As stated in the recruitment advertisement, we will be providing you with a $25 gift certificate to a local grocery store upon completion of this interview.

If you agree to the terms of this research, we can proceed. [GET VERBAL OK]

QUESTIONS

1. Please describe your life in this community and in Utah:
   a) How long have you lived here?
   b) What sorts of changes have you noticed over your time here?
2. Please describe your role here in this community.
   a. How long have you been in this role?
   b. Do you represent or have any other leadership role within any community organizations?

3. Can you describe the local economy in this community?
   a. What are the major business contributors to the local economy?
   b. What percentage of jobs do you think come from the energy industry?
   c. How do you think the energy industry has affected the local economy?

4. How do you feel the local community views the local energy industry?
   a. Are people generally supportive?
   b. Is the community generally supportive or unsupportive?
   c. Have any complaints arisen? If so, what are they?

5. How have recent changes in the local energy industry affected the community and the local economy?
   a. Has a similar dynamic ever happened in the past?
   b. Are these changes different than past changes you’ve seen in the local energy industry?
   c. What’s the overall feeling in the community about these changes?

6. Are there new industries the local community might look to strengthen its economy?

7. [This question was asked in the renewable energy county]: How has the (renewable) energy infrastructure – the solar, wind, and geothermal – affected the community in general?
   a. Has it been mostly good or mostly bad?
   b. Are there any specific problems you see with this industry?
   c. Has renewable energy development affected you or your friends or family personally?

8. In general, do you think the United States should be developing MORE renewable energy like solar and wind? Why or why not?

9. What about here in this place? Has there been any talk of developing (MORE) sources of renewable energy here in the future?
   a. If so, how do you think the community would respond?
   b. Are you personally supportive?
   c. Is your organization involved at all? If so, how?
10. How would you feel if renewable energy came to this community?
   a. Would it be a good or bad thing?
   b. What about wind energy?
   c. What about solar energy?
   d. Do you think there would be any different community effects from renewable energy than from traditional fossil fuels energy extraction?

11. Do you think government should be involved in renewable energy development, or should it just be left to private business? Briefly explain.
   a) If “yes,” what levels of government should be involved?
   b) If “yes,” how might government be involved? (subsidies, tax breaks, requirements for renewables to be used in power generation, etc.)
   c) How do you feel about renewable energy development policies, such as requiring utilities to produce a certain percentage of their power from renewable energy?

12. What do you think are the main reasons for developing renewable energy over other types of energy, such as fossil fuels?
   a. Energy independence, job creation, or community development important? Why?
   b. Environmental reasons (e.g., climate change)?

13. Has there been any talk in this community about climate change or global warming?
   a. Has there been talk about preparing for any possible future changes in the weather or the natural environment?
   b. Do you feel that people agree about climate change in this community?

14. Have you personally noticed any signs of the climate changing here in this area?

15. Do you see climate change as a manmade phenomenon, or something caused by natural changes in the environment?

16. Do you think energy is a political issue? What about climate change? If yes, then why do you think it is this way?

17. Thank you - is there anything else you would like to add to this interview? Is there something important about your opinions on energy development or climate change that we forgot to ask?

   END OF INTERVIEW
APPENDIX C: Letter of Information

LETTER OF INFORMATION
Utah Residents and Communities: Views on Energy and Environment

Research on Utah Residents’ Views on Energy Production and the Environment. Shawn Olson, a doctoral student in the Department of Sociology, Social Work, and Anthropology at Utah State University (USU) wants to learn about how Utah residents form their opinions concerning energy and the environment. Ms. Olson will conduct interviews under the direction of Dr. Richard Krannich in the same department.

You have been asked to take part in this research because you represent a group of Utah citizens who have important thoughts about energy and the environment, and we want such thoughts to be better understood by scientists and policy makers. This work is funded by Office of Research and Graduate Studies at Utah State University.

We Seek Your Participation in this Research. You are invited to participate in an interview. The interview will be conducted either face-to-face, on the telephone, or perhaps using a mixture of both.

The interview questions will include topics such as your views on different types of energy production activities, as well as your beliefs about environmental issues, including whether you feel the climate is changing or not. There are no “right” or “wrong” answers in the interview; the interview is only intended to help us understand the views of Utah citizens and their communities at large.

The interview is expected about 60 minutes to complete. We want the process to be enjoyable and interesting for you. Ms. Olson will take notes during the interview, and with your permission she will also record the interview. The purpose of recording is to make sure the notes are correct.

Your Anonymity, Confidentiality, and Privacy will be Protected. We will strive to protect your anonymity, confidentiality, and privacy. For example, no one outside of the research team will know you participated. The analysis of all interview results will occur without the use of any names.

Any participant lists or information attributable to individuals will be kept under lock and key at USU as per state and federal regulations. These records will be destroyed by December 31, 2017, when the research ends. Please know that you do not have to answer any interview question that causes you discomfort. And you are free to withdraw from the interview at any time. There will be no penalty or negative judgment from the research team if this happens.
Potential Personal Risks and Benefits to You. We do not see any significant personal risks that might result from your participation in this research. As noted above, we will strive to ensure that your rights are respected and that you are comfortable throughout the process. Also know, however, that we do not see any special personal benefits coming to you from your participation, either.

You will be eligible for a gift certificate (see below) as compensation for your time.

A benefit that might occur to you would be a sense of satisfaction that you are contributing to science. The research results will be used to help improve design and implementation of public information programs and policy initiatives; you may be proud to know that your voice is heard in this process.

Research Explained to You. Before the interview begins, Ms. Olson will explain the research to you and answer your initial questions. If you have more questions or concerns, you may contact Ms. Olson or Dr. Krannich at any time. See the last page of this letter for their contact details.

Extra Costs to You. Beyond your time getting to and from an interview location, and your time participating in the interview, we do not envision any extra participation costs for you. You may agree to meet Ms. Olson at any public location of your choosing, but please know that the costs of getting there and back would be borne by you. We will do all we can to make the interview as convenient for you as possible. We can also conduct the interview by telephone.

Compensation for You. You will be offered a $25 gift certificate to a local grocery store for participating in the interview. You will receive this money in the form of a gift certificate handed to you after the interview has been conducted.

Your Participation is Voluntary and You Can Withdraw without Consequence. Your participation in this research is voluntary. As noted above, you may elect to withdraw at any time during the interview without negative consequences. If you decide to withdraw prior to the interview, however, please notify a research team member quickly so that you can be replaced. Your $25 gift certificate, however, would be forfeited if your interview never takes place. It is also possible that your scheduled interview may be canceled due to unforeseen events, such as sudden illness of the interviewer or the like. In this case the interview could be canceled without your consent, but the team would strive to contact you again quickly so you can reschedule the interview. If the interview cannot be rescheduled, the $25 gift card must be forfeited.

IRB Approval Statement. The Institutional Review Board (IRB) oversees the protection of human subjects involved in research conducted by USU. The USU IRB has approved this research study. If you have any questions or concerns about your rights, or if you
have suffered as a result of this research process, you may contact a member of the research team for assistance. If you want to contact someone other than a member of the research team, however, you may contact the USU IRB Administrator at (435) 797-0567 or email irb@usu.edu

Investigator Statement

“I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered.”

Signature of Researcher(s):

_____________________________  ________________________________
Shawn K. Olson               Dr. Richard Krannich
Doctoral Student & Project Leader  Professor and Project Co-Leader
(Telephone: 360-305-6408)         (Telephone: 360-305-6408)
(email: shawn.k.olson@usu.edu)   (email: richard.krannich@usu.edu)
Introduction

Understanding the dynamics and factors underlying public support for or opposition to renewable energy is critical to the clean energy transition. Existing studies on renewable energy public opinion have tended to focus on community-based factors such as local geography and place meanings, processes for effective community engagement, and strategies for enhancing support through tangible community benefits. Less effort has been directed to understanding the influence of other variables (hypothesized and found here as important), including political views, environmental beliefs, and local economic activities. Energy policymaking, including for renewable energy, has become increasingly politically polarized in recent decades (Bayulgen and Ladewig 2016; Goldfarb, Buessing, and Kriner 2016), as have Americans’ views on climate change and other environmental issues (Brulle, Carmichael, and Jenkins 2012; McCright and Dunlap 2011; McCright, Dunlap, and Xiao 2014; McCright, Xiao, and Dunlap 2014). Polarization amongst political leaders and the public alike stymies forward progress on renewable energy development. Further research is needed to understand what factors are involved in public and political opposition to cleaner energy technologies.

Furthermore, while renewable energy is continually framed by the media, activists, and policymakers as an environmental and climate change mitigation imperative (Barry, Ellis, and Robinson 2008; Pralle and Boscarino 2011; Stephens, Rand,
and Melnick 2009), additional analysis is needed to understand the potential pitfalls of emphasizing especially the carbon mitigation frame of renewable energy over other frames that may be more salient with certain sectors of the population. This is especially true in rural communities, where the majority of large-scale renewable energy facilities are built, where the majority of residents may adhere to a conservative political ideology, and some of which are economically reliant upon the extraction of fossil fuels.

The overarching goal of my dissertation research was to examine the importance of several understudied factors in renewable energy public opinion – environmental beliefs, political ideologies, and local economic activities. I took a mixed-methods approach to this project and combined quantitative analyses of two separate survey datasets at different geographic scales (community and nation) with qualitative interview data in order to examine public opinion on renewable energy from different vantage points. Overall, my findings indicate that while environmental beliefs (especially the belief that humans are causing the climate to change) are related to public support for renewable energy, this relationship is nuanced at the local or community level. Certain local circumstances – including both experience with renewable energy development and reliance on fossil fuels industries – may outshine the importance of environmental beliefs in shaping individuals’ views toward renewable energy. In addition, I found political ideology to be important at the national level but more nuanced at the local level. Attitudes underlying political viewpoints, such as opposition to governmental regulation of environmental issues and support for a free-market economy, appear to play a very large role in shaping support or opposition toward renewable energy. Last, I found that local economic reliance on extractive industries and related cultural identities motivate
opposition toward renewables. Taken together, these findings suggest the need for continued study of the factors shaping public opinion around clean energy policy and, for those engaged in policymaking, careful consideration about how renewable energy is framed and presented to the public.

Below, I briefly review the approach and contributions of each project. I then conclude by describing several areas for future research.

**Review Of Chapter II**

In this paper, I analyze the perspectives of community residents of five communities in the Intermountain West experiencing utility-scale wind energy development. The goal of this research was to examine the factors related to individuals’ attitudes toward renewable energy, both in the abstract and in direct response to a local renewable energy facility. The research questions addressed in this study were 1) In what ways and to what extent are renewable energy attitudes, environmental beliefs, including climate change beliefs, and attitudes toward other energy sources inter-correlated? 2) How well do general environmental beliefs and climate change beliefs explain renewable energy attitudes, compared with landscape aesthetics, economic expectations, community engagement, and proximity? To answer these questions, I used quantitative data from a 2014 drop-off/pick-up survey conducted in five communities in Utah, Idaho, and Wyoming. I employed a variety of quantitative statistical tests, including correlational analysis, factor analysis, and multiple regression modeling. I examined the relationship between environmental beliefs (general environmental beliefs as measured by the New Environmental Paradigm Scale, as well as climate change beliefs) and support for
renewable energy. I also analyzed the influence of political ideology and other individual characteristics, as well as several local contextual factors, such as physical proximity, visibility of wind turbines, and whether or not residents believed that renewable energy development is economically beneficial for the community.

My findings indicate that several local level factors were more important than either environmental beliefs or political ideology in predicting renewable energy attitudes, at least for these five communities that have local experience with renewable energy development. Individuals’ beliefs about aesthetic impacts of renewable energy facilities and the belief that renewable energy brings economic benefits were especially important, as was how frequently residents saw the wind turbines each day. Several individual characteristics helped predict renewable energy attitudes, including gender and level of education, though neither climate change beliefs nor general environmental beliefs did. This suggests that local experience with renewable energy outweighs preexisting beliefs and underscores the importance of creating positive community experiences. I also found considerable variation from community to community, indicating that communities in the same region experiencing the same type of renewable energy development (utility scale wind energy) may have greatly differing experiences.

Last, I found that the way that individuals think about renewable energy in these communities is distinct from how they think about other energy sources, meaning that the criteria individuals use to judge energy sources like fossil fuels or nuclear may not be relevant for understanding how the public responds to renewable energy.

The main insights drawn from this paper are 1) environmental beliefs are less relevant than we might believe in terms of predicting public response to renewable
energy, at least in communities where renewable energy facilities are being built; 2) the type of experience (positive or negative) that a community has with the development of a particular renewable energy facility may outshine in importance the influence of individuals’ preexisting political or environmental beliefs; and 3) renewable energy comprises a distinct attitudinal dimension for individuals in our study sites – that is, individuals do not think about renewable energy in the same way that they think about other energy sources, such as nuclear energy and fossil fuels resources.

This work advances the energy social science on public opinion by demonstrating that environmental beliefs are not always the best indicator or explanatory variable for determining how and why the public might respond to renewable energy. While some studies have shown environmental beliefs to be relevant (Jacquet and Stedman 2013; Larson and Krannich 2016; Mulvaney, Woodson, and Prokopy 2013), others have clearly indicated that environmental attitudes are not a strong factor influencing how communities and individuals perceive and respond to renewable energy – conversely, individuals living near renewable energy facilities have been shown to both be supportive of renewables and openly express environmental skepticism (Jepson, Brannstrom, and Persons 2012). Decades of research in environmental sociology and broader environmental social science has analyzed causal factors in individuals’ environmental beliefs, behaviors, and policy attitudes. This body of work presumes an underlying assumption that pro-environmental behavior and policy support can be motivated through understanding and attempting to influence individuals’ environmental beliefs, whether through the provision of information, use of the emotional affect, or other means. However, the present study indicates that environmental beliefs are not relevant in
individuals’ stances toward renewable energy, at least in the context of communities in the Rocky Mountain region of the U.S. that have experienced renewable energy development. This insight should motivate scholars to continue to examine the importance of environmental beliefs in other contexts and reinforces Wolsink’s (2007) argument that the environmental framing for renewable energy “is not in line with the frame that is applicable from a local perspective” (p. 2695).

This work should motivate continued research by scholars, policymakers, activists, and developers alike to examine which frames are most effective in generating public support for renewable energy. While renewable energy continues to be framed in the media and by political leaders and activists so often as a climate change imperative, our findings here indicate that this may be a dangerous pursuit in some geographic and political contexts. In short, renewable energy is likely to be further politicized if it continues to be ‘environmentalized,’ and the consequence of politicization would be stalled or halted policy support. Research in environmental sociology has suggested that the decline in public support for climate action since 2008 has been largely motivated by the rise of far right leaning political leaders, whom the public look to in forming their own opinions about environmental issues (Brulle, Carmichael, and Jenkins 2012; Carmichael and Brulle, 2016; Mildenberger and Leiserowitz – Forthcoming). If renewable energy itself becomes further painted as a ‘green’ or ‘liberal’ project, it will not only not resonate in many politically conservative communities, but will also become politically divisive at the level of state and national politics. This will be especially true in political climates of states like Utah, where political leaders have expressed outright
skepticism about anthropogenic climate change and outright disagreement with climate policy action.

**Review Of Chapter III**

In this paper, I examine the relationship between local extractive industry activities and public support for renewable energy policies using a nationally representative survey dataset. The research is focused on two main questions: 1) Does local presence of extractive industry activities influence public opinion about renewable energy policy? 2) What other factors help predict public support for renewable energy policy? Unlike the last chapter, this chapter explores public opinion toward *policies* supporting the development of renewable energy.

Using multi-level modeling at the individual, county, and state levels, I examined several independent variables I hypothesized as related to individuals’ views toward renewable energy policies, including the presence of local extractive industry activities. Specifically, I analyze the influence of living in a county that is a producer of oil, a producer of natural gas, and that is economically dependent on the mining sector (as classified by USDA Economic Research Service). I also examine several variables representing individuals’ views, including political ideology and belief in anthropogenic global warming, as well as socio-demographic characteristics.

This project contributes to the social science knowledge on public energy preferences by demonstrating that place-based, county-level factors can influence individuals’ energy preferences. More specifically, I show that local experience with extractive industry activities can decrease public support for renewable energy policies.
Community-level economic factors are important in understanding public opinion, but they are understudied. While sociologists and policy scholars have shown that extractive industry activities influence public opinion on fossil fuels energy and policy (e.g. Boudet et al. 2016; Freudenburg and Davidson 2007; Mukherjee and Rahman 2016), only one other study has examined the relationship with public opinion on renewable energy (Goldfarb, Buessing, and Kriner 2016). Notable in my study is the finding that the extractive industry activity variables have a similar level of influence as several individual-level characteristics, such as gender and political ideology, on individuals’ level of support for policies promoting renewable energy.

In contrast to the previous paper, I found in this study that climate change was a very influential factor in predicting public opinion on renewable energy policy. There may be several reasons for these disparate findings. First, the dependent variables for both studies are different – in the community study, the outcome variable of interest was opinion about renewable energy, including both general attitudes and views toward a specific local facility; in the national study, the outcome variable is opinion about renewable energy policies. It may be that climate change beliefs are less important for predicting attitudes toward renewable energy than they are for predicting support for renewable energy policy actions. Second, the previous study focused on communities that had experience with renewable energy development, whereas the national dataset in this paper does not distinguish between individuals who do and do not have personal experience with renewable energy. It is possible that experience with renewable energy development might attenuate the effect of climate change beliefs if such a variable were included at the national level. The finding of this and the previous paper indicate that it
would be appropriate to emphasize different frames for renewable energy and renewables policy when addressing different social and cultural groups around the country. It also suggests that environmental sociologists should not assume the omnipotent importance of individuals’ environmental beliefs in predicting pro-environmental attitudes and behaviors, but that these are instead nuanced and dependent on certain local circumstances and experiences.

This work lends scholarly insights by demonstrating not only socio-demographic variation in support for renewables policy, but also geographic variation. Though the role of geography and place in sociological research on environmental attitudes has become more emphasized over the last decade or so than in previous decades (e.g. Brehm, Eisenhauer and Stedman 2013; Hamilton, Colocousis, and Duncan 2010; Stedman 2003), much of the sociological knowledge on public environmental opinion continues to rely on the ‘social bases’ of environmental concern (e.g. Dunlap et al. 2000; Jones and Dunlap 1992) – namely, the role of socio-demographic and social structural characteristics, at the expense of place-based variables. Place-based factors – which can include individuals’ interpretations of place, place-based local culture, and other place-related characteristics – too often is left out of sociological analyses of public environmental views. In my research here, I use multilevel modeling to highlight geographic variation and to examine the role of local economic characteristics. The findings will hopefully motivate other researchers to continue to incorporate place-based variables in even large-scale studies on public environmental opinion.
Reflections on Survey Research

Two of the three research projects comprising this dissertation utilize very different datasets compiled through survey administration. The dataset for Chapter II was created through administration of a community-level, drop-off pick up survey in which the researchers had face-to-face contact with community residents, eliciting a sort of social exchange (Trentleman et al. 2016). Chapter III uses a nationally representative dataset collected by a market research company (GfK) using an online panel of individuals recruited via both random digit dialing and address-based sampling techniques. Each survey method has its merits and drawbacks, and each is appropriate given a different research scenario, including target population, research questions, and scale. The community survey used in Chapter II targeted five communities in the Intermountain West that had recent experience with large-scale renewable energy development (all wind energy). Specifically, we wanted to understand how community members perceived the nearby wind energy facilities, what their experiences with the wind energy developers had been, and how much variation existed across various communities. In this case, a drop-off/pick-up (DOPU) survey was an appropriate and effective mode of administration because 1) DOPU typically generates much higher response rates than mail or telephone survey modes (Dillman et al. 2009; Jackson-Smith et al. 2016), and 2) the target population resided within relatively small communities, making door-to-door data collection a realistic option within a relatively short time frame (ten to fourteen days per community).

By contrast, the nationally representative dataset analyzed in Chapter III provided an opportunity to analyze a much larger-scale target population (the whole United States)
for variation at different geographic sub-scales (county and state). Indeed, the main research question for this project (how county-level factors, such as county-level oil and gas production, may influence public opinion on renewable energy policy) requires a much larger sampling frame than the community study described above. Whereas the community study asked questions about variation in public response to renewable energy facilities within different communities experiencing such development, the national study examined variation within US counties based on extractive industry presence at the county level.

More and more, social researchers are turning to online panels for survey data collection (Tortora 2009), and several types of online surveys abound (Callegaro and Disogra 2008), including pre-recruited probability panels and volunteer opt-in panels of web users (e.g., Chapter III of this dissertation uses nationally representative data collected via online probability-based sample). Online panels present their own challenges and set of considerations in terms of estimating response rates, and as Callegaro and Disogra argue, “the term response rate [italics in original] is limited, inconsistently defined, and often abused when reporting metrics for online panels” (2008: 1025). Researchers using online methods must be careful to employ measures to both circumvent coverage error and to report appropriate metrics that help gauge potential nonresponse bias (such as recruitment rate, profile rate, and completion rate, outlined by Callegaro and Disogra 2008).

Given the challenges of 21st century survey research detailed by Dillman (2016) and others (Brick and Williams 2013; Dillman, Smyth, and Christian 2014), survey researchers must continue to be attentive to their particular research scenario and take
into account that “different situations call for different approaches to data collection” because “different modes and combinations of modes are best suited for particular situations” (Dillman 2016, p. 166). This dissertation research underscores this point by using two separate survey datasets to analyze two separate sets of research questions. Going forward, researchers must continue to weigh the positives of online survey research with the concerns and challenges of this ever-popular method.

**Review Of Chapter IV**

In the final paper, I used qualitative analysis to provide richer insight into the findings from the previous two quantitative studies. The community study in Chapter II indicates that environmental beliefs are not very relevant for understanding individuals’ views on renewable energy, at least in communities where renewable energy development is occurring. The national study in Chapter III indicates that climate change beliefs *are* important predictors of support for renewable energy policy, as is residence in a county with extractive industry activities. These findings deserve further examination beyond the insights revealed by quantitative analysis to understand both why environmental beliefs may be important in some contexts but not in others and how experience with extractive industries may shape individuals’ views about renewables.

In this paper, I explore discourses about renewable energy across three different rural Utah study sites by analyzing transcripts from sixty-one semi-structured interviews. Each study site was animated by a different economic context, and all three were significantly affected by energy production: one had several large-scale renewable energy facilities, one was dominated by a legacy of coal mining and coal-fired electricity
production, and one was a site of significant oil and gas development. The research questions that drove this project were: 1) what master narratives are prevalent about renewable energy across different rural contexts? 2) how do discourses about renewable energy vary between energy-production contexts? 3) to what extent are perceptions of renewable energy related to environmental beliefs, including beliefs about anthropogenic climate change?

This analysis revealed three main findings. First, environmental concern was not a significant frame individuals used when expressing support for renewable energy development, and in fact my environmental questions often incited antagonism and tension; instead, the economic potential of renewable energy to reinvigorate rural economies was predominant. Second, individuals who lived in communities that were economically dependent on coal, oil, and natural gas were much more likely to express skepticism or outright negativity about renewable energy, and much of this sentiment appeared to have been driven by both fears about renewable energy pushing out existing extractive industries as well as via cultural boundaries around what renewable energy represents. Third, political views played a very large role in individuals’ discourse about renewable energy, specifically the feeling that renewable energy itself was part of a liberal or progressive political agenda and the concern that renewable energy had an unfair market advantage due to existing governmental incentives and policies.

The main contribution of this paper is to provide rich insight into how residents of rural communities view renewable energy, given three different energy-economic contexts. This work shows that negativity toward renewable energy may be in large part driven by legitimate fears that renewable energy would exacerbate existing structural
vulnerabilities in rural communities dependent on fossil fuels extraction. This insight lends another dimension to the “addiction” dynamic rural sociologists have argued is characteristic of natural resource-dependent communities (Freudenburg 1992). That is, that communities’ economic “addiction” to resource-based industries may not only render them continuously vulnerable to the boom and bust cycle of resource extraction but may also preclude pursuit and acceptance of other economic options.

This work also contributes to the sociological literature on public energy preferences by demonstrating some of the cultural obstacles that might be inherent in developing renewable energy in rural communities. It also demonstrates that some of these cultural obstacles may be overcome through positive community experiences; indeed, individuals in my study site with several large-scale solar and wind facilities had an overwhelmingly positive view of renewable energy, despite holding conservative political views that otherwise might motivate them to view renewable energy and policies supporting it as undesirable.

This research also contributes to a growing body of work examining the influence of neoliberal ideology on public attitudes toward environmental issues and energy policy (e.g. Malin et al. 2017; Malin 2015; Longo and Baker 2014). My research demonstrates that widespread adoption of neoliberal views combined with general, historic anti-federalism (characteristic of many rural Western U.S. communities – see Krannich and Smith 1998; McCarthy 2002) translates into anti-renewable energy stances in the context of my study sites. However, it suggests as well that an important part of individuals’ and communities’ support for neoliberalism and the unfettered free market is their own experience of being marginalized. Especially in the two extractive communities where I
conducted interviews, participants clearly expressed their view that government environmental regulations on the energy industry were to blame for their local area’s economic decline, rather than developments in technology and automation or global shifts in energy prices. As I discuss in the last section below, this insight indicates an essential area of future research for energy social scientists – how to engage communities already marginalized by the current energy regime in such a way as to empower them in the clean energy transition. One challenge of this will be engaging with neoliberal views motivating anti-regulatory or anti-environmental policy stances, often widespread in political conservative regions of the country. However, my dissertation research as a whole indicates the potential for generating support for renewable energy in such places through the use of different discursive frames for renewables, including but not limited to economic development and energy security. This change in how we frame renewable energy development, however, will need to be paired with efforts to directly and address the very real needs of declining energy communities especially.

**Future Research**

Public attention to energy and climate change reached a new height of tension and politicization during the fall 2016 presidential campaign cycle. Democratic candidate Hillary Clinton promised to foster a clean energy transition by continuing to phase out coal and bring renewables online, while Republican candidate and now president Donald Trump promised to reinvigorate the coal industry and remove regulatory obstacles for all fossil fuels development. In the first month of Donald Trump’s presidency, congressional Republicans have made efforts to roll back a variety of environmental regulations,
including change climate mitigation, and cut the efficacy and extent of the Environmental Protection Agency itself. It remains to be seen what effect the Trump administration and a Republican-controlled Congress will have on the pace of renewable energy development. The effect of President Trump’s pro-fossil fuels rhetoric on public attitudes toward renewable energy is also unknown. Continued scholarly study of the factors shaping public energy preferences is essential and should inform the approach of policymakers, developers, and others in presenting both utility-scale and smaller scale renewable energy projects and policies to the public.

The findings from this dissertation research suggest several areas for future research. In an important 2014 article in *Energy Research and Social Science*, Sovacool suggests that an important area energy social scientists should continue to focus on is the “types of politics [that] can make the numerous energy and climate policies we discuss achievable” (p. 21). The findings from my analysis of the national data from the ‘Climate Change in the American Mind’ survey indicate that political ideology is currently an important variable in predicting public support for renewable energy policies nationwide, but it’s unclear to what extent political ideology plays a role in public opinion on renewable energy technologies themselves. At the local level, public opposition has been shown to frequently halt or stall renewable energy developments, though this is usually due to specific objections raised around local landscape alteration and aesthetic impacts brought by a particular proposed facility. What is unclear is the extent to which ideological opposition to renewable energy may result in public opposition to specific facilities or local and state policies. There is a notable lack of research in this area. While the findings from my qualitative analysis of renewable energy discourse in three rural
communities suggests that individuals’ political standpoints do motivate oppositional stances toward renewable energy, the results are specific to the places I studied and are not generalizable. It would be particularly interesting to track how renewable energy public opinion might have changed before and after the 2016 Presidential election cycle and within the first few months of the Trump administration.

Scholars also need to continue to examine the influence that local or personal experience with renewable energy development has on public support, and the ability of that experience to attenuate the influence of individuals’ preexisting beliefs. For example, while the results of my national survey analysis revealed that both political ideology and beliefs about climate change were important for predicting individuals’ support for renewable energy policy, my community analysis found that local, contextual variables were much more important and in fact completely mediated the effect of politics and climate beliefs. Thus, it would be extremely useful to conduct a national analysis using respondents’ personal experience with renewable energy as a hypothetically moderating variable (such as physical proximity to utility-scale renewable energy facilities, or personal experience with smaller-scale renewable technologies, such as rooftop solar). It is possible that personal experience with renewable energy mediates the effect of other factors (like climate change beliefs or political views).

Considering the findings of my qualitative research, one last area of research that is vital to the clean energy transition and the larger project of sustainability is research that emphasizes pathways toward a socially just energy transition. My interviews with individuals living rural communities economically dependent on the fossil fuels industry revealed the real and present fear that the clean energy transition would leave them
behind. These communities are already marginalized by the current system of energy production and suffer due to the boom and bust cycles inherent in energy extraction, as well as from the environmental and health costs of these activities. The concept of ‘just transitions’ asks how leaders of the clean energy transition can better incorporate fossil fuels communities being left behind so that "the costs of environmental change will be shared fairly" (Canadian Labour Congress 2000: 3). Energy social scientists must take this question seriously, probing the true reality of the often-touted solution to replace fossil fuels jobs with renewable energy jobs. Except for an initial construction period, renewable energy facilities require relatively few full-time workers to operate and maintain. Additionally, while manufacturing jobs for renewable energy equipment holds much promising, such manufacturing plants are likely to be located in more populated areas with better access to transportation routes and labor. Scholars from rural sociology, community development, environmental justice, energy social science, and economics must work together to articulate what a ‘just transition’ would look like, and how this can be achieved. In an age of anti-environmental rhetoric and extreme polarization over scientific facts like climate change, finding workable solutions that benefit the most stakeholders – especially those already marginalized – while moving the clean energy transition forward will be of utmost importance.
References


APPENDICES
Appendix A: Permission letter for Chapter II from co-author

March 1, 2017

Peter Robertson
Juneau, Alaska
petergrobertson@gmail.com

Dear Peter,

I am in the process of preparing my dissertation in Department of Sociology, Social Work, and Anthropology at Utah State University. I hope to complete my degree program in Spring 2017.

I am requesting your permission to include the paper we wrote together, called “Public Views On Renewable Energy In The Rocky Mountain Region Of The United States: Distinct Attitudes, Exposure, And Other Predictors Of Wind Energy,” which has been published in Energy Research and Social Science. I will include your name in the citations and will also footnote the title of this chapter so that your name is attributed as a co-author. Please advise me of any changes you require.

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I hope you will be able to reply immediately.

Thank you for your cooperation,

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Appendix C: Permission letter for Chapter III from co-author

April 12, 2017

Dr. Anthony Leiserowitz
Yale Program on Climate Change Communication (YPCCC)
anthony.leiserowitz@yale.edu

Dear Dr. Leiserowitz,

I am in the process of preparing my dissertation in Department of Sociology, Social Work, and Anthropology at Utah State University. I plan to complete my degree program in Spring 2017.

I am requesting your permission to include the paper we have co-authored together, called “The Influence of Extractive Industry Activities on Public Support for Renewable Energy Policy.” This paper constitutes chapter three of my dissertation. I will include your name in a footnote at the beginning of this chapter so that you are attributed as a co-author. Please advise me of any changes you require.

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[Signature]
CURRICULUM VITA

Shawn K. Olson-Hazboun

(March 2017)

EDUCATION
Doctor of Philosophy, Sociology (Expected: May 2017)
Presidential Doctoral Research Fellow
Utah State University – Logan, UT

Master of Science, Environmental Studies (2013)
University of Colorado – Boulder, CO
Thesis: Power Politics: The Political Ecology of Wind Farm Opposition in Wyoming

Bachelor of Arts – Environmental Studies & Social Movements (2003)
The Evergreen State College – Olympia, WA

RESEARCH & TEACHING INTERESTS
Environmental sociology, community, political sociology, research methods, energy & climate change

PUBLICATIONS

REFEREED JOURNAL ARTICLES


REFEREED CHAPTERS
Olson-Hazboun, S.K. and Peter Howe. “Public Opinion on Climate Change in the United States: Trends, Factors, and Implications for Rural America.” Forthcoming in


ARTICLES UNDER REVIEW


NON-REFEREED PUBLICATIONS


GRANTS & FELLOWSHIPS

- Presidential Doctoral Research Fellowship, Utah State University: 2013-2017. $20,000/year plus tuition waiver.

TEACHING EXPERIENCE

TEACHING AWARDS
Graduate Instructor of the Year, Department of Sociology, Social Work, and Anthropology, Utah State University. 2016.

SOCIOLOGY COURSES TAUGHT (Instructor of Record)
- SOC 1010: Introduction to Sociology, Utah State University. Summer 2016
- SOC 4010: Contemporary Sociological Theory, Utah State University. Spring 2016
- SOC 1020: Social Problems, Utah State University. Spring 2015

OTHER COURSES TAUGHT (Instructor of Record)
- WRTG 1150: Freshman Writing & Rhetoric, University of Colorado. 2011-2013 (2 sections each semester)
- Mining the Four Corners (8-semester credits). University of Colorado – Boulder. 2013.
  o Topics: Energy policy, communities and energy extraction, environmental justice
- Wild Rockies Summer Semester (15 semester-credits). Wild Rockies Field Institute, University of Montana. 2012 & 2013
  o Topics: environmental geography of the Northern Rockies, community-based conservation, and traditional ecological knowledge
- Alaska Wrangell Mountains Field Semester (12 semester-credits). Wildlands Studies Program, California State University. 2010 & 2011
  o Topics: natural resource policy, park management, alpine ecology

SELECT GUEST LECTURES
- SOC 3610 (Rural Soc.): “Energy Development & Rural Communities.” USU, 2014
PRESENTATIONS

INVITED TALKS


CONFERENCE PRESENTATIONS


RESEARCH ASSISTANTSHIPS
“Deconstructing the Multidimensionality of Public Perspectives on the Environment and Natural Resources.” Principal Investigator: Dr. Rick Krannich. Utah Agricultural Experiment Station Project #UTA01219. Utah State University. July 2015 - present.


SERVICE
DEPARTMENTAL SERVICE
• President, Sociology Graduate Student Association, Utah State University Sociology Program. 2014 – 2016
• Fundraising Co-Vice President, Sociology Graduate Student Association, Utah State University Sociology Program. 2013 – 2014.
• Student Representative, Environmental Studies Program, United Gov. of Graduate Students. University of Colorado. 2011 – 2012.

PROFESSIONAL & COMMUNITY SERVICE
• Elected Student Representative to Council, International Association for Society and Natural Resources. 2016-2017
• Sub-committee Chair, Professional Development, Student Affairs Committee, International Association for Society and Natural Resources. 2013 – 2015
• Manuscript Reviewer: International Environmental Agreements and Wiley Interdisciplinary Reviews (WIREs): Climate Change, Journal of Social & Political Psychology
• Co-Director, Forum on Science, Ethics, & Policy, University of Colorado. 2013-2014
• Founding Member, Int’l Collective on Environment, Culture, & Politics (ICECaPs), University of Colorado. 2012-2013
• Board Member, Washington Wilderness Coalition. Seattle, WA. 2008-2009
• Steering Committee Member, Nooksack Wild & Scenic River Protection Group. Bellingham, WA. 2008-2009

PROFESSIONAL MEMBERSHIPS
• International Association for Society and National Resources
• American Sociological Association
  o Environment and Technology Section
  o Section on Teaching and Learning
• Rural Sociological Society