“THE SAUDI ARABIA OF WIND”:

ENERGY IDENTITIES AND CONFLICT IN

A HISTORIC OIL TOWN

By

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Abstract: While the number of installed wind turbines across the United States continues to grow, little research, especially qualitative research, has been conducted on the perceptions of those living near these installations. With a noted lack of theoretical consistency in this area of the environmental sociology literature, there is a need for detailed qualitative work. An intrinsic case study of Woodward, Oklahoma was conducted to help address these deficiencies. As a town economically based on petroleum production since the beginning of the twentieth century, the recent introduction of wind turbines and the city government’s claim to being “The Wind Energy Capitol of Oklahoma” have the potential to cause conflict. However, the overall perceptions of residents to wind power installations in Woodward appear neutral to positive. The most commonly cited benefits of wind power were economic, with development being seen as a boost to local businesses, adding local jobs, and increasing revenue for schools. While most respondents noted negative consequences, like traffic delays due to industrial trucking, most respondents also stated that the benefits far outweighed the “hiccups.” Others noted positive effects were environmental, such as improvement in local air quality, and community oriented benefits, such as the ability of wind development to give the town hope for a better future. Overall, both unquestioning support and opposition to wind power development in Woodward is rare. Most respondents qualified their stance toward the development. Additionally, respondents seem to have little issue with (or even knowledge of) the city government claiming that Woodward was a “wind town.” They explained the culture of their town as being an “energy city” or a “what works” city. In this way, wind energy was not in conflict with the area’s existing identities. Theoretically, evidence supports the use of sense of place or Social Representations Theory over the classily used Not In My Backyard (NIMBY) approach to explaining resident perceptions. Several instances were recorded that seem imposable under the simple NIMBY model, but are easily understood under a sense of place or SRT framework.

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CHAPTER I

INTRODUCTION

Even before Oklahoma was a state, the riches heralded by the discovery of oil had oozed into the collective mind of those in the Territory. The once small town of Woodward in the northwest reaches of the Territory played host to rumors of a massive pool of oil just waiting to bestow its black prize on any wildcatter willing to strike first. While rumors of gushers to be started in 1901, the first well was sunk in 1903 near the home of Temple Houston (son of the famed Sam Huston) in the center of modern day Woodward. The failure of that well to produce any oil did little to quell the excitement that the area was ripe for a bumper crop of derricks. Through the teens, twenties, and thirties, the residents of Woodward county encouraged exploration and even invested their own time and money toward ensuring a gusher in their area. It wouldn't be until 1956 that a well would actually produce that valuable black ooze, but the identity of Woodward as an oil town was solidified when the turn of the twentieth century brought with it rumors of wealth to be (James 1984).

When the turn of the youngest century brought with it the specter of catastrophic

climate change and a call to end the use of fossil fuels, this staunchly conservative area of the United States resisted, deflected, and denied any calls for change. Modeling data from a Yale university study, and a subsequent expose by CNN, revealed that Woodward County contained the highest concentration of climate denying people the nation (Howe et al. 2015, Sutter 2015). So, one would expect that when wind power companies knocked on the area's collective door and asked to erect clean, green, climate change fighting wind turbines across the land that county residents would have slammed that door *en masse*. It may come as a surprise, then, to learn that support for renewable energy in this Woodward is especially high. "We're proud of the fact that we are the hub of the wind energy," one resident proudly proclaimed in an interview. When another was asked how they felt about the area's wind power, they answered that they've "heard it called the Saudi Arabia of wind" with an equally proud chuckle. In an area tied to a more than one-hundred-year petroleum identity, why has wind development over the past ten years been welcomed as opposed to resisted? How can this apparent contradiction in energy identities be explained sociologically?

As the push for greater use of renewable energy technologies has grown over recent years, wind energy has emerged as a leading provider of clean energy in the United States (Volkwein et al. 2015). Wind energy has demonstrated the ability to provide energy without creating carbon dioxide emissions, contaminating local air and water, causing radiation containment issues, or using large amounts of water for energy production (Brittan 2002; Schiermeier et al. 2008). Despite frequent local resistance to the implementation of the technology, public support for wind energy in the United States remains remarkably high (Swofford and Slattery, 2010).

Recently, the perceptions of those living near wind energy projects have become the topic of research and debate. While the NIMBY argument has been used historically to explain negative perceptions of wind energy facilities, there has been a recent call in the literature to examine theoretical frameworks that explain these perceptions more complexly (Devine-Wright 2005; van der Horst 2007). The two frameworks that have been the most theoretically supported are sense of place and Social Representations Theory (SRT) (Devine-Wright and Howes 2010; Batel and Devine-Wright 2014).

Despite this call for more complex ways of considering the opinions of those living near wind farms, little research has been done on how histories of previous energy methods interact with and effect the perceptions of residents in areas where wind energy is relatively new. This leaves unanswered questions about how flexible existing identities and ideologies are to the introduction of wind energy. Furthermore, while research into wind energy perceptions in Europe have been studied relatively extensively, perceptions research in the United States has been considerably sparser. The socio-cultural effects of wind energy introduction in Oklahoma have been researched either extremely sparingly or not at all. This absence is especially notable as large parts of the state are situated in a class 4 wind area; having the highest sustained wind speeds and being the most lucrative for wind development (Oklahoma Department of Commerce 2015).

With these facts in mind, an intrinsic case study was undertaken of the perceptions of wind energy in the Northwest Oklahoma city of Woodward. Historically, the city has been supported in large part economically by petroleum exploration and production with the first oil well being drilled 1903 (James 1984). One hundred years later, in 2003, the first wind farm in the state began operation near the city. In the

following years, two more farms have been added in the county, as well as numerous others in neighboring jurisdictions (Kansas Energy Information Network 2015).

Given the historically close ties that the city and its residents have with the fossil fuel industry, examination of how the relatively new introduction of wind energy has been perceived may help to expand the wind energy perception/energy transition literature in many ways. Adding to the interest is the fact that the city government of Woodward has self-designated the municipality as the "Wind Energy Capitol of Oklahoma" (Woodward Convention and Visitors Bureau, 2015).

Several questions of interest to the social researcher then emerge:

1. *How are wind farms, a "clean" energy source, perceived in a town so heavily rooted in oil and gas?*
2. *How does the city government's declaration of being a "wind capitol" effect the residents of Woodward?*
3. *Is the introduction of wind farms to the area accompanied by "green" attitudes?*
4. *How has this introduction affected the sense of place that Woodward residents have? Has this change been positive or negative?*
5. *How, if at all, do residents reconcile their town's new identity with their established past?*
6. *Can these reconciliations be explained satisfactorily using the SRT framework that has been recently proposed?*

A grounded theory approach is used due to the relatively young nature of the study of perceptions of wind energy (Bell, Gray, and Haggett 2005), the lack of

validation for theoretical frameworks in the literature (Batel and Devine-Wright 2014), and a lack of research on wind energy perceptions in the United States generally and Oklahoma specifically.

CHAPTER II

REVIEW OF THE LITERATURE

The following sections will review the relevant literature as it relates to the various concepts inherent to this study. The first discussion will review the contributions of the relevant literature to the processes of wind energy generation and its perceptions by people. The current literature surrounding the impact and perceptions of wind energy projects encompasses many fields including environmental sociology, environmental psychology, rural sociology, medicine, ecology, political science, and acoustics. Next, a summary of research methodologies used to date will be presented. In the sociological realm both qualitative and quantitative methods have been used to investigate questions of wind energy impact and perceptions. Next, debates in the current literature will be presented in terms of theoretical and methodological thinking. The final section will detail recommendations from the literature for further research as well as improved research methodologies.

Contributions of the Relevant Literature

The following section reviews contributions by relevant literature. First, a general

overview of the energy generation by way of wind energy will be presented. Then the commonly reported benefits and costs of wind energy will be discussed. These include the impacts of wind energy generations on local economies, the environment, and those living near utility-scale wind turbine installations.

An Overview of Wind Energy Generation

Wind turbines are used to harvest wind energy by converting wind's mechanical energy into electrical energy by way of a generation turbine. The mechanical force of wind currents drive the blade system which turns a drive shaft connected to a gear box. The gear box powers a generator located inside the turbine's nacelle, or housing, which sits atop a large, typically tubular, tower. Electricity generated in the nacelle is then transmitted via transmission lines down the tower, across land to a transformer station, and then on to the electrical grid for transmission to end users (American Wind Energy Association 2013). While wind turbines can take on many shapes and sizes, the typical design utilized in utility scale wind farms incorporate three large blades attached to a tubular tower upwards of 100 meters tall. Wind energy projects often place tracts of turbines together to form one wind energy "farm" or "park" (American Wind Energy Association 2013).

The siting of a wind energy farm is typically on private land. That said, wind farms almost always require an approval and permitting process by an authorized governmental authority. The operation of wind farms is typically discussed in two phases; construction and maintenance. During the construction phase, turbine components are actively shipped to the wind farm cite for construction and are erected.

Access roads, maintenance facilities, personnel housing units, and other infrastructure are also constructed during this phase. The construction phase may last for a few months to a few years. During the maintenance phase, the focus of work is on keeping the turbines in working condition, conducting inspections, and making repairs as needed. The maintenance phase typically lasts for the entirety of the wind farm's expected 20-30 year life span. The construction phase overall requires more labor and generates more economic revenue in the surrounding area than does the maintenance phase (Slattery, Lantz, and Johnson 2011). Wind farm developers typically contract with utility providers who build the transmission lines from the wind farm to the existing grid (American Wind Energy Association 2013). The construction of these transmission lines may be either above or below private land and therefor the utility company must negotiate with landowners for the necessary easements through their property. Occasionally, this easement is obtained through eminent domain (Vajjhala and Fischbeck 2007).

Compensation to landowners by the wind company for the siting privileges are negotiated before construction begins and varies depending on the country, state, county, and individual project. Payments are usually made per year per turbine and may also include a percentage of revenue based on the amount of energy produced (Jacquet 2012). Normally landowners who give easements for transmission lines are also compensated financially, however these payments may be one-time only (Vajjhala and Fischbeck 2007).

Aspects of Wind Energy Generation Commonly Referenced as Positive

One of the most widely discussed and advertised aspects of wind energy is that it can generate electricity with a miniscule carbon footprint and exceedingly low water usage. Wind energy only produces carbon emissions during the production of turbines at the plant and during the construction phase at the project site. These carbon emissions are typically offset shortly into the life span of the wind farm after produced energy is distributed onto the existing electrical grid (Saidur et al. 2011). Wind energy generation also uses only an estimated 0.001 gallons of water per kilowatt hour of energy generated. This compares to an estimated 0.25 gallons per kilowatt hour for natural gas and 0.49 gallons per kilowatt hour for coal (Saidur et al. 2011). Swofford and Slattery (2010) noted that because these environmental benefits appear to be significant, the public is often strongly in support of their deployment. There are also economic benefits to be generated by the installation of wind energy projects. A large proportion of wind farms are located on private lands and wind power companies pay royalties to landowners based on the amount of power generated (American Wind Energy Association 2013). Wind power development can also stimulate economic growth within municipalities near where the farm is sited. Local municipalities (<100 miles from the wind farm) experience increases in economic activity in their hospitality and service industries as an increase in construction and maintenance jobs are created. One example from Texas found that communities could expect $0.52 million dollars per MW of installed capacity over twenty years (Slattery, Lantz, and Johnson 2011).

Aspects of Wind Energy Generation Commonly Referenced as Negative

While the majority of potential negative aspects of wind energy are typified in the literature by nuisances, there are also some environmental concerns associated with wind turbine use. Common nuisance complaints include intrusive noises, shadow flickering, and aesthetic impact to the landscape (Saidur, et al. 2011). Intrusive noises from wind turbine operation are typically defined in one of two broad groups: mechanical noise and aerodynamic noise. Mechanical noise results from grinding of gears in the gear box, rotation of the drive shaft, rotation of the nacelle, pitching of the turbine blades, or any other noise resulting from the mechanical movements of the wind turbine itself (Saidur et al. 2011). Aerodynamic noise is caused when the leading edge of the turbine blade interacts with pockets of turbulence that occur naturally in wind flow. These interactions lead to a distinctive "whooshing" sound that is often described by those near wind energy installations. Turbine "self-noise" can also occur when the trailing edge of the turbine blade interacts with a turbulent layer of air caused by the leading edge (Oerlemans, Sijtsma, and Lopez 2007). The time of day can also impact the perceived intrusiveness of aerodynamic turbine noise. Van den Berg (2004) found that those living up to 1-2 kilometers from a wind park may rarely hear intrusive noise during the day, but may complain of being constantly disturbed at night when the ambient noise level is lower. These effects may be diminished through proper siting, better design, and careful operation (Saidur et al. 2011). Shadow flickering is caused by the shadow of the turbine's blades repeatedly passing over a window or other residential structural opening. As turbine blades move into and out of sunlight, the effect through a window can result in a rapid flickering (Saidur et al. 2011).

Individuals near wind farms may also disapprove of the impact on the natural aesthetic of a landscape that wind turbines can have. Typically, the most valuable locations for wind energy generation are located near coastlines, on ridges, or places of higher elevation. Residents in these areas, especially if they were present before construction began, may see the encroachment of wind farms as a destruction of the natural scenery (Jacquet 2012). There has also been noted concern about the effect of wind farms on nearby property values, although there has been no evidence for either a positive or negative effect (Hoen et al., 2011)

Another common concern involves the effect of turbines on wildlife, especially birds and bats (Sovacool 2009; Jacquet 2012). While the spinning turbine blades do pose a danger to wildlife and result in both bird and bat mortality, Sovacool (2009) estimated a mortality rate of 0.3 birds per gigawatt-hour. This compares to an estimated mortality rate of 5 birds per Gigawatt-hour for fossil fuels. In total, an estimated 7,200 avian deaths per year on average in the United States are due to wind turbine plants as opposed to an estimated 14.5 million for fossil fuel operations (Sovacool 2009). Estimates of bird mortality due to turbine strikes are difficult to determine with certainty, however, as the total number can be widely influenced by the season, siting, region, flyway, weather, and age of the installation (Wang and Wang 2015).

Some concern has also been raised about possible health impacts of wind turbines on those living near installations. These concerns mainly take the form of health impacts caused by sleep disruption, a lack of REM sleep caused by noise and aircraft lights flashing, and stress due to noise and shadow flickering (McMurtry 2011). The veracity of these health impact claims is disputed (Ministry of Health and Long-Term Care 2010).

Conclusions of the Relevant Literature

Wind energy, as with any energy development, has a number of consequences when introduced to an area. Those most commonly touted as positive are environmental and economic in nature. The ability of wind power to replace carbon energy sources and limit water usage while generating revenue to local municipalities are oft cited example. The negative consequences to the introduction of wind energy usually focus on the impact to the environment, landscape, and surrounding populous that the development will have. Those near development sites may be concerned with a changing aesthetic to the land, the noise pollution that turbines produce, shadow flickering, and health effects caused by increasing stress and a lack of restful sleep. Concern over avian and bat mortality due to collation with blades or landscape change may also be of concern to residents.

Debates in the Current Literature

There are several debates currently in the literature surrounding wind energy perceptions that have yet to come to a widely accepted conclusion. The majority of these debates revolve around methodological and theoretical aspects of the research. The perceptions of wind energy, stated reasons for support or resistance, and complaints relating to wind energy production have been widely addressed and agreed upon (Saidur et al. 2011, Wang and Wang 2015). However, as Devine-Wright (2005) stated: "Overall, this body of research has largely been conducted without reference to any specific conceptual foundation, leading to a situation where the extant literature is rather incoherent and devoid of a sense of cumulative progress." As such, recent debates in the

literature have revolved around identifying and applying an appropriate theoretical framework that takes into account the complexity of human emotion and action as they relate to the acceptance, rejection, or qualification of wind energy production. The following sections discuss various theoretical and methodological debates within the wind energy perceptions literature.

NIMBY

The largest debate currently in the wind energy literature is over the cause of what is known as the social gap. Bell, Gray, and Haggett (2005) define the social gap as "the gap between the high public support for wind energy expressed in opinion surveys and the low success rate achieved in planning applications for wind power development." In other words, if Americans are widely in favor of wind energy in general, why do many specific projects face resistance from the public? Since utility scale wind energy emerged in the 1970s, the typical explanation of the social gap has been the 'Not In My Backyard' or 'NIMBY' phenomenon; while wind energy is desirable, I don't want it near my home or town. Hubbard (2005) defines the NIMBY response as thoughts and actions "opposing a locally unwanted land use." Burningham (2000) notes that the term 'NIMBY' and references to 'NIMBY behavior" are often used by proponents of a given project as "a succinct way of discrediting project opponents."

More recently, the NIMBY explanation of the social gap has been criticized for its inability to accurately reflect the complex nature of human action and motivation (Devine-Wright 2005; van der Horst 2007; Wolsink 2006). One of the largest criticisms of the NIMBY explanation is that it makes the invalid assumption that all individuals

within a community that employ the NIMBY argument are acting out of self-interest. This assumption fundamentally discredits any qualified objection (Bell, Gray, and Haggett 2005). Van der Horst (2007) developed a model of qualified objection in which he attempts to explain the social gap by offering three possible explanations for opposition to wind energy. Van der Horst notes that people who generally approve of wind energy but oppose local projects may object to the specific project due to perceived environmental or human impacts. Others may generally approve of wind energy but object to the political or bureaucratic process by which the project was approved. Still others may see "green" technologies as a positive thing, but be opposed to wind energy specifically for a variety of reasons. These three types of objections to wind energy (specifically the first two) may help to explain the 'social gap' better than the classic, selfish NIMBY explanation. It is also important to note that supporters of wind energy typically also qualify their support. Qualifications typically take the form of support only if certain regulations or limits are placed on the construction and operation of such wind projects (Bell, Gray, and Haggett 2005).

Lack of a Theoretical Framework

Another debate currently in the wind energy perceptions literature is over the lack of a fundamental, overarching theoretical framework to help examine and direct research on the topic. Devine-Wright's 2005 paper "Beyond NIMBYism: towards an Integrated Framework for Understanding Public Perceptions of Wind energy" seems to begin a trend in the literature of posing the question of what can take NIMBY's place if that classic argument is rejected. Devine-Wright charges that not only does NIMBY offer an

incomplete view of opposition to wind energy, but that it is of little help when trying to contextualize support.

Devine-Wright and Howes (2010) explore sense of place as a possible framework for exploring the sociological implications of wind energy introduction. Altman and Low (1992) define sense of place as social phenomenon, complex in nature, that incorporate the emotional bonds between individuals and groups with familiar locations like neighborhoods or towns. The theory seeks to offer a better framework for explanations of both NIMBY style opposition and general and specific acceptance of changes in a place. Abrupt changes to a place can be upsetting to individuals attached to the place to such a degree that it may be described in terms of grief or loss (Chow and Healey 2008). Stedman (2002) concluded that resident's intentions to protest against what they perceived as a damaging change to a place could be explained by two indicators: the strength of their place attachment and their perceptions of that place as being 'pure' or 'wild'. Devine and Howes (2010) conclude that a general suggestion of the literature is that the introduction of energy generation methods to a place considered to be 'restorative' (natural, wild, or pure), even if that method is 'green', has the greatest potential to highly disturb a resident's sense of place.

Using this definition, Devine-Wright and Howes present a case study of two coastal towns in Northern Wales located near a proposed off-shore wind farm. The first town, Llandudno, was typically described by residents to the researchers as being 'picturesque' with a 'beautiful view of the bay'. The other town, Colwyn Bay, was described by residents as 'run down' and 'forgotten'. They concluded that the residents of Llandudno opposed the project vigorously because the it was seen as ruining the view

of the bay and therefor damaging place attachment to the town. The residents of Colwyn Bay, on the other hand, saw the proposed project in a much more positive light and perceived it as breathing new life into their "rundown" town.

More recently, the use of Social Representations Theory (SRT) has been proposed as a theoretical framework for understanding reactions to energy technologies. Moscovici coined SRT in 1961 and later defined its purpose that "by focusing on the everyday communication and thinking, hopes to determine the link between human psychology and modern social and cultural trends" (Moscovici 1988: 225). SRT rejects the assumption that change can be described as a simply replacing old items and ideas with newer counterparts (Jovchelovitch 1996). Instead, SRT seeks to explain change, and specifically the social interpretations of it, as a complex process that can cause competing ideas to exist in balance within the same town, community, or even individual (Jovchelovitch 2007). In this way, SRT can help to explain the social gap as well as both qualified support and qualified opposition. SRT rejects the NIMBY notion that being for or against a techno-sociological change can be explained in simple terms for simple reasons and instead focuses on the complexities of perception as they exist in individuals and their corresponding groups.

Another key aspect of SRT is the idea that turning the unfamiliar into more understandable terms happens by way of the construction of a social representation. Social representations are born by way of two processes: anchoring and objectification. Anchoring is the linking of new objects or ideas to more familiar ones in order to better understand the unknown. For instance, a person living both near a new wind farm and in an area that prides itself on historic windmills may tether these concepts together in order

to root the new in terms of the area's existing pride in its history. Objectification describes the transformation of the abstract into concrete ideas by way of a metaphor. For instance, the person living in historic windmill country may tell themselves that the new wind turbines are just bigger versions of the windmill they pass on their favorite walking route (Batel and Devine-Wright 2014). In the scope of SRT, these processes describe how people position new stimuli symbolically in social, community, and individual terms.

Extant Recommendations for Future Research

The majority of the recommendations in the extant wind energy perceptions literature discuss the need for selecting and applying theoretical frameworks to research. Broadly speaking, the various perceptions both positive and negative of those living next to wind power installations are largely known. What are not as well understood are the theoretical models that can explain and possibly predict these behaviors. The call for the application of theoretical frameworks is relatively young. Devine-Wright was one of the first to call for a move away from a simple NIMBY model in 2005 for explain perceptions of wind power. Since that time, the two models that have been recommended and applied to research on the subject are sense of place and Social Representations Theory. Devine-Wright and Howes (2010) describe how the application of sense of place can describe the disruption of place attachment and residents' responses to that disruption in a much richer way than selfish NIMBY explanations can. Van der Horst (2007) reiterated the need to move away from the NIMBY model of self-interest. The call for SRT to be explored in terms of wind perceptions was first made in 2014 by Batel and

Devine-Wright. Their 2014 paper also called for the "[analysis of] the communication between expert and lay spheres regarding RET (renewable energy technologies) targets and related public engagement laws, and the impact that the communication between these groups may have on each other and on specific public understandings of and responses to RET."

Beyond theoretical frameworks, there has been a call in the literature for more detailed examination of not only what people feel about wind energy projects, but *why* they feel the way they do. This call for greater and more complex understanding typically takes the form of a call for greater focus on qualitative work. For instance, van der Horst (2007) notes that "there is also clearly a need for more in-depth qualitative research to increase our understanding of the social construction of individual attitudes and to explore the tensions between positive social or environmental attitudes in principle and actual social or environmental behavior in practice." Devine-Wright and Howes (2010) called for use of "more complex analytical tools" to be used in the examination of wind energy perceptions. Jacquet (2012) concluded that "it is clear that a better understanding of resident perceptions of multiple forms of energy development will become critical in the effective planning and siting of these projects."

Lastly, there also appears to be a dearth of qualitative wind perception research focused on the United Sates. A majority of the literature to date focuses on the perceptions of those living in Europe and the United Kingdom. While there are some qualitative studies of wind perceptions of those living in California and Pennsylvania, there has been little to no research done on the highly marketable "class four" wind area that covers the Texas panhandle, western Oklahoma, and southern Kansas. Slattery,

Lantz, and Johnson (2011) looked at the economic effects of wind energy on two central Texas towns, but their research did not include the resident's perceptions of wind energy itself.

Previous Research Methodologies

To date, the majority of research surrounding perceptions of wind energy by the populous have centered on quantitative methodologies (Devine-Wright 2005). Surveys and questionnaires are particularly common research instruments. These instruments have been administered both remotely and by researchers in the presence of participants. Often, the questions employ a Lickert scale to gage the how different aspects of wind energy projects are experienced and perceived by respondents (see Jacquet 2012). Another common quantitative approach is numeric analysis of existing data sets. Quantitative analysis of state and federal economic data (see Slattery, Lantz, and Johnson 2011), existing public opinion surveys (see Devine-Wright 2005), models for disruptive sounds (see Oerlemans, Sijtsma, and Lopez 2007), and meta-analysis of medical case studies (see McMurtry 2011) have all been used to quantitatively assess the impact that wind energy has on a location and its populous.

Of the research that has been qualitative, studies have been conducted that utilize semi-structured interviews (see Devine-Wright and Howes 2010), systematic reviews of governmental approval proceedings (see Rensburg, Kelley, and Jesrich 2015), focus group discussions (see Spiess et al. 2015), case study methodologies (see Slattery, Lantz, and Johnson 2011), and comparative case study methodology (see Ratinen and Lund 2015). Overall, however, these kinds of qualitative research methods are perceived by

some researchers to be underrepresented in the literature about wind perceptions. Devine-Wright (2005) hypothesized that a greater focus on qualitative methods into the future (and a shift away from survey and questionnaire data collection instruments) may make the body of knowledge on wind energy perceptions more cohesive and lead to better development of the field.

CHAPTER III

METHODOLOGY

This study conducted an intrinsic case study that describes the perceptions of wind energy by the residents of Woodward, Oklahoma. Woodward is a 13 square mile city located in the northwest corner of Oklahoma (36.4331° N, 99.3978° W). The estimated population of Woodward in 2014 was 12,963 residents (United States Department of Commerce 2014). The city serves as the county seat of Woodward County whose population is 21,529 (United States Department of Commerce 2014).

Description of the Study Site

Economically, the area is heavily dominated by energy production and agriculture. The petroleum mining industry self-reports that it employed 3097 individuals in the county during 2012 (Oklahoma Energy Resources Board 2104). The wind industry directly supports 68 jobs in Woodward county. It is worth noting that there are a considerable number more turbines in neighboring counties that may provide jobs for Woodward County residents. Additionally, the local vocational college in Woodward graduates 400-500 individuals per year from its wind turbine technician program (Burnett 2015).

Woodward County hosts three utility scale wind farms containing a combined 200 turbines (with one farm straddling the Woodward/Harper County line). The three local wind farms include the Oklahoma Wind Energy Center (68 turbines; 102 MW), the OU Spirit Wind Farm (66 turbines; 101.2 MW), and the Keenan II Wind Farm (66 turbines; 151.2 MW) (Kansas Energy Information Network 2015). Livestock production is large in the area with 66,000 head of cattle and 240,000 head of hogs in the county during 2014. 124,925 acres of cropland are farmed predominantly with wheat (90%) with the remainder consisting of other grains, soybean, canola, and sunflower (United States Department of Agriculture, 2014). In total, the agriculture and mining industries (including oil and gas production) employed 18.5% of the county's population in 2013 (Fig. 1). This number is second only to the education, health care, and social services sector which employs 19.2% of the county's population (United States Department of Commerce 2014).

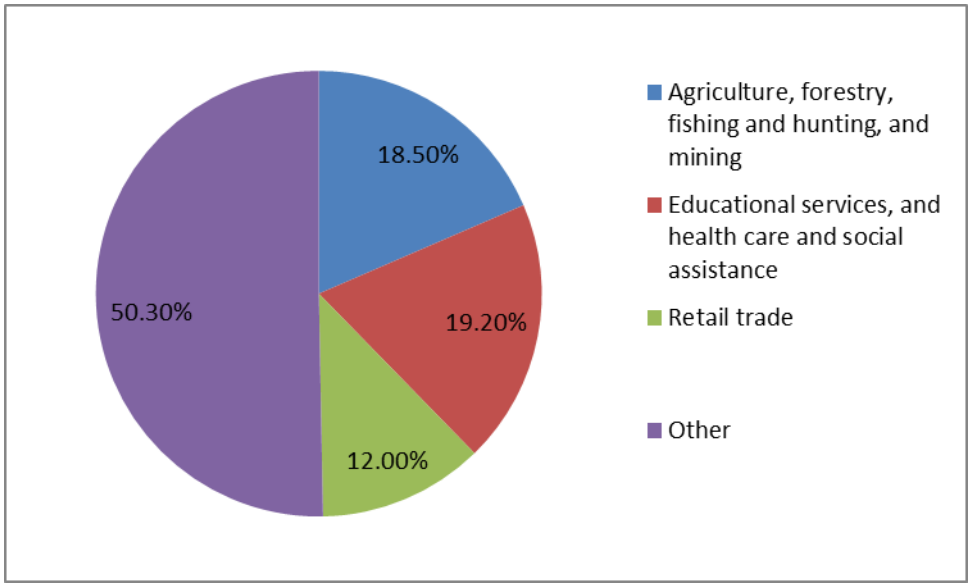

Figure 1: Woodward County economic activity per industry, by percent

Climatologically, the area consists of high sandy plains with an average 17 inches of precipitation annually. The area is susceptible to drought due the low average and high variability of precipitation. Temperatures can range from over 100° F to below 0° F in a given year with an annual mean temperature around 56° F (Arndt 2003). Average overall wind speed for Woodward County is 10.8 mph with calm conditions only 0.6% of the time. (Oklahoma Climatological Survey N.D.).

The Case Study

This case study used multiple lines of evidence to examine the perceptions of Woodward residents toward wind energy in their county. Additionally, resident's perceptions of the municipal government's views on wind energy were examined. More specifically, case study items focused on resident's feelings about government claims of energy identity.

Examination of these lines of evidence is qualitative in nature. The lines of evidence used include semi-structured interview responses, Q methodology, content analysis of popular press and government publications, analysis of found artifacts, ethnographic observations.

The analysis of these lines of evidence were undertaken through a grounded theory methodology. The advantage of grounded theory for this study comes from the ability to produce a rich, qualitative data set where no preexisting theoretical frameworks are available or wildly agreed upon. Grounded theory also gives the flexibility to allow the simultaneous collection of data with its analysis. This quality enables data collection to further shape emerging frameworks and vice versa.

The analysis of data under the grounded theory paradigm proceeds in a rather standard format (see Charmaz 2004). Rich data sources (interviews, ethnographic observations, popular press and government publications, etc.) first undergo a line-by-line coding process for two reasons. The first is to begin shaping the analytic form of the research for later analysis and further data collection. The second is to enable the researcher to look at the data set in a way divorced from any preconceptions they have brought into the research project. Next, a focused coding process takes recurring codes that have become apparent in the line-by-line process and reapplies them to the data set to view the collected data in a new, more broad way. These focused codes can also be incorporated in the data collection process as a way to inform, for instance, new questions for interviews or entire new lines of evidence. The final step in grounded theory coding is a memo writing process that explores the researcher's ideas about the codes that have been enumerated so far. It also serves as an intermediate step between the codes and a first draft of any research paper or publication.

Interviews for this study are semi-structured in nature and were carried out in conjunction with the Oklahoma EPSCoR Social Observatory sampling effort of Woodward. Interview subjects were selected through a snowball sample starting with identified community leaders in Woodward. These leaders included government administrators, public works personnel, local business organization leaders, church leaders, and farmers. While this sampling method may not result in the most representative sample possible, it allowed for a feasible sampling method for penetrating a new community where no research ties had been established. All selected subjects lived or worked within the Woodward County lines. The four open-ended questions related to

this study followed the thirteen question EPSCoR interview slate (see appendix 1 for the EPSCoR interview slate). The questions were as follows:

1. *Are you aware that the city government of Woodward has given the city the moniker of "Wind Energy Capital of Oklahoma?"*
2. *How do you feel about this designation?*
3. *How do you feel the wind power industry affects Woodward?*
4. *Can you see wind turbines from your residence?*

All interviews were tape recorded and transcribed. These transcriptions were then coded using a line by line method in the NVIVO software package. In keeping with grounded theory, the audio recordings and transcripts both were thematically coded during collection in order to direct future research efforts.

The goal of this line of inquiry was to provide a direct method for measuring the perceptions of those both inside and outside the government when it came to wind power. Specifically, these questions collected data directly related to research questions one and two ('How are wind farms, a "clean" energy source, perceived in a town so heavily rooted in oil and gas?' and 'How does the city government's declaration of being a "wind capitol" effect the residents of Woodward?'). While these questions may have also revealed data points on the remaining four research questions, they were not specifically asked about.

Q methodology employs stakeholders to sort a number of opinion statements based on their agreement or disagreement. Q methodology was established in the sociological research by Stephenson in his 1935 article "Correlating Persons Instead of Tests." In brief, Q methodology allows for factor analysis of qualitative data sorted in a

quantitative way while allowing the subjectivity of those doing the sorts to remain intact through analysis (Watts and Stenner 2005; McKeown and Thomas 1988). This allows for the definition of broad discourses that surround an issue.

One of the core strengths of Q methodology is that it can return strong results with a relatively small pool of human respondents (P sample). It is important to note that the important metric in Q methodology is the number of items in each sort and not the number of people making those sorts. This also means that, in certain cases, a single respondent can sort more than one time. (Watts and Steener 2005). In general, a Q sample consists of 40-60 opinion statements about a topic. A Q sample is chosen from a thematically organized communication concourse that can include hundreds of statements taken from interviews, newspaper articles, ethnographic observations, and other sources. The Q sample is then presented to a subject who is given a condition of instruction to sort the objects on to a grid resembling a quasi-normal distribution (Fig. 2). Generally speaking, these grids resemble a Lickert scale ranging from a lower bound up to 0 and continuing to a corresponding upper bound. The grid is designed so that the greatest number of responses must be sorted under 0 (a neutral or unsure response) and decrease evenly as the grid moves out to the extremes (see Watts and Steener 2005). After the sort has been recorded, a short interview is taken to assess why the subjected sorted the responses in the way they did. Once all sorts have been completed, a specialized Q methodology software package (PQMethod v2.35 for this study) is used to factor analyze the sorts (Watts and Stenner 2005; McKeown and Thomas 1988). After each sort is completed and recorded, a short, open-ended interview is conducted in order to allow the participant to expand on and explain their sort.

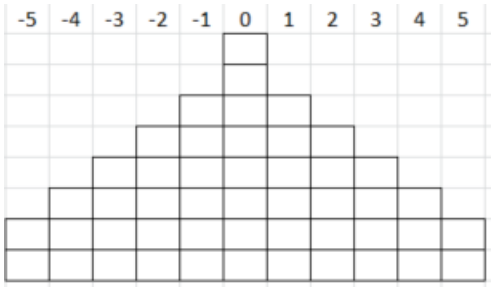

Figure 2: Sample Q sort quasi-normal distribution table

For this study, a Q set of 48 statements was used (see appendix 2 for a complete, characterized list). This Q set was chosen from a concourse of 81 items. The concourse was paired down to the 48 statement Q set using the thematic coding scheme uncovered by the grounded theory approach. Two statements were taken from each thematic area with the rest of the statements being added proportionate to their representation in the existing data.

The qasi-normal grid was arranged from -5 to 5 with eight statements under the "0", six statements under the "1" and "-1", five under the "2" and "-2", four under the "3" and "-3", three under the "4" and "-4" and two under the "5" and "-5". The sorts were completed by 9 citizens of Woodward twice: once with the condition of instruction to sort as they felt about wind power and next to sort as they thought the city government viewed wind power. Participants were selected as a resample of the interview section with one exception who was sorted in place of an individual who had left that position since the interviews were taken. The These individuals did not have any role within the city government that would have allowed them to make decisions about wind development or it's promotion. Additionally, 4 individuals in the city government with decision making roles about wind energy were asked to sort once on the condition of instruction for how the government collectively viewed wind power. All four individuals

were selected to sort based on their availability within the field collection time frame as well as their positions in planning, advising, or having extensive knowledge of municipal projects effected by wind development. These responses from government officials were triangulated using the government publication artifacts to determine the position of the government on wind energy.

Due to their specialized nature of the Q data set, it was not coded in NVIVO. Instead, a factor analysis program specifically written for Q data was used (PQMethod v2.35). Once the numeric results were generated, hypothetical sorts of any factor solutions were made and analyzed thematically in order to deduce the nature of each solution. To aid in this, the post-sort interviews were recorded, transcribed, and then coded in a line by line fashion using the NVIVO software package.

The goal of the Q methodology line of evidence was to further explore the perceptions of residents toward both wind energy and their government's treatment of the energy production method. It was also used as another method of ascertaining what the municipal government's attitudes toward wind energy were. In these ways, the Q line of evidence sought to directly address the first and second research questions. It may have, in a more indirect sense, addressed the other research questions as well.

The content analysis of popular press articles were selected from newspapers published in Oklahoma in which the perceptions of wind energy of residents or government officials in Woodward were quoted or summarized. The date range searched for these articles ran from 2000 to 2015 as this range encompasses the permitting, construction, and maintenance phases of all three wind farms currently operating in Woodward County. Articles were retrieved from the database service LexisNexis using

the following key word searches for all Oklahoma newspaper publications within the date range: wind energy, wind power, turbine, and transmission line. From this narrowed field, articles were included in the analysis that meet two further criteria. The first was those that presented perceptions of wind power siting, construction, impact, and transmission by residents, governmental representatives, or industry representatives. The second criteria included only those articles in which the perceptions expressed are from residents of Woodward County, of officials representing governing bodies in Woodward County, or wind industry personnel representing companies with wind installations or support centers in Woodward County. This selection process therefore rejected articles that may be related to wind power but do not present perceptions. For instance, an article that only discussed a meeting to take place or that siting for a new farm has been approved were rejected unless they specifically contained quotes either extoling or rejecting wind power. Each of these articles was coded line by line using the NVIVO software.

The goal of the popular press article line of inquiry was to gather triangulating evidence related to all six research questions. The preceding sampling method was used as a way to both narrow the focus of the content analysis and as a way of ensuring the data collected is generated only by those living or representing organizations within the study area.

The content analysis of governmental publications incorporated publicly available publications, statements, fliers, brochures, and logos. Items were collected from websites administered by the Woodward municipal government or in the form of physical items distributed in the city itself. Items were collected as they were observed either in

exploring online web sites or in the field. Each item was coded thematically using the NVIVIO software.

The primary goal of analysis of the government publications was to assess which frames the local government utilizes in its promotion of wind energy. Validity and reliability of these frames was aided by ensuring that all items used are produced and distributed by the municipal government in some way. The analysis of these items served to answer, in part, research questions two and three.

Found artifacts and ethnographic observations were collected during field trips to Woodward including over the eight-week period from June 22nd, 2015 to August 14th, 2015 and during the period from April 13th to the 18th, 2016 when Q data was collected. These items and observations were collected as they were encountered. Artifacts were collected in the form of pictures of objects as well as objects themselves where appropriate. The location and date of these object's collection was noted. Ethnographic observations were made during this same time period and recorded in a field note book. These observations were type written to aid in analysis. The found artifacts were coded thematically while the typed ethnographic observations were coded line by line. These artifacts and observations aided in addressing all six research questions.

CHAPTER IV

RESULTS

In total, thirty-three individuals, twenty-two Q sorts, fifty-one interviews, fifteen newspaper articles, twenty-four found artifacts, one sound recording, and pages of field notes were included in this case study. The results of analyzing those items follows according to the five lines of evidence prescribed for this study: interviews, Q methodology, newspaper articles, government publications, found artifacts, and ethnographic observations.

Twenty-eight individuals were originally sampled for the interview portion of this study. Ten months later, a resample was taken for the Q methodology section in which eight individuals who were originally interviewed also completed Q sorts. Additionally, five respondents completed Q sorts who had not been interviewed. This includes all four government respondents who completed sorts.

Interviews

A total of twenty-eight interviews were conducted about personal perceptions toward local wind power generation. These interviews immediately followed the thirteen question EPSCoR study slate. Thirty total interviews were conducted using the EPSCoR slate (appendix 1). All twenty-eight participants were asked three open ended questions about their personal knowledge of Woodward's moniker as a wind energy capitol, their perceptions of that moniker, and their perceptions about overall effect of the wind industry on Woodward.

Broadly speaking, interview participants were neutral to positive about the presence of wind energy in their city as a whole. Only one respondent, a local farmer, was notably opposed to the presence of wind turbines. A few respondents noted that they saw wind energy as being a benefit for the city despite its introduction having a negative effect on them personally.

Additionally, twelve of these participants were asked if they could see wind turbines from their residence. This question served as a simple way to approximate the distance of the participant's home to the nearest wind power installation. It was added to the interview slate partway through interview collection in keeping with the grounded nature of this study. Of these twelve, eight respondents replied that they could either see turbines directly from their property or with a short walk to a nearby vantage point. Only one noted that they had turbine leases on their property. One respondent noted that turbines had been installed on property on either side of theirs, but that they had ultimately refused to sign leases for either turbines or power lines. Of these eight, only the respondent who turned down the leases reported negative perceptions. In that one

case, the respondent predominantly mentioned the persistence of noise caused by turbine operation as the most pressing negative effect as well as fumes from trucks during the construction phase. The other seven either had a neutral or positive opinion about living near turbines.

Economic Perceptions

Respondents largely noted the financial benefits from wind energy's presence as the main benefit the city was receiving. Lease payments to residents, economic activity from installers using the city as a base of operations, the opening of a maintenance and repair facility, and an increased tax base for school and municipal services were oft mentioned financial benefits. The contribution of tax dollars that went specifically to the direct funding of area schools was a common theme in the interviews. Some respondents also noted that the revenue from wind activity, while not as high as that from oil and gas drilling, was a much steadier form of income for the area in comparison.

Environmental Perceptions

Some respondents also mentioned wind energy in a positive light for being a renewable energy source. These respondents often mentioned the ability of wind power to reduce dependence on the burning of coal for electricity. Only a few mentioned a reduction of dependence on fossil fuels generally. This is notable since the area sees considerable oil and natural gas extraction, but no coal operations. Still others mentioned that they saw wind power as the future of energy and as a signal that their town was adapting and developing as opposed to stagnating.

As far as the wind industry's effect on wildlife was concerned, most respondents noted that some impact was occurring, but frequently downplayed the significance of the effect. For instance, one respondent said that while they "hate[d] that birds fly into [turbines]," eventually wild life would "figure it out." The one respondent who was explicitly against wind development also described the negative effect of wind power construction on wildlife, specifically on the Lesser Prairie Chicken and its breeding leks. However, one other respondent reported that they had seen deer standing in the moving shadows of the turbine blades "and it doesn't bother them." Other respondents made similar statements regarding coyotes and cattle.

Negative Perceptions

While respondents often mentioned changes associated with the introduction of wind power they viewed as negative, they were typically quick to point out that they were more than willing to put up with these for the benefits of wind power as a whole. The most commonly cited annoyance, as respondents typically called it, were traffic problems caused by the shipment of turbine parts through town. Many noted being stuck in heavy traffic due to a truck having broken down or become otherwise incapacitated at Woodward's largest intersection (fig. 3). But all were quick to point out that the traffic issues were not a significant enough problem to cause wide spread

Figure 3: A wind turbine tower section is transported through 9th Street and Oklahoma Avenue in Woodward; the largest intersection in the city.

complaint. As one respondent put it, “that’s just a hiccup.” None mentioned this heavy industrial traffic as a safety concern.

The installation of transmission lines was also a topic that respondents raised. Respondents reported that, while the turbines themselves are typically welcomed and seen as positive, the requisite transmission lines often cause controversy. The controversy stems mainly from two sources. The first being that an easement for transmission lines can ultimately be taken through eminent domain. The second being that payments for the easement are only made once in a lump sum. This is in contrast to wind turbines which often pay royalties on a yearly basis.

One final overarching theme from the interviews was knowledge that there is at least some level of resistance to wind development in the community. Of the twenty-seven respondents who were neutral to positive about the presence of wind energy in their community, most mentioned that there were people who are opposed to the development. This objection was reported from when wind development was first

proposed up to the time of the interviews. Most interview respondents mentioned the aesthetic effect on the landscape, the effect on wildlife, and the subsequent installation of transmission lines (including some use of eminent domain) as the primary reasons for other's objections to wind development.

Q Findings

Four government representatives and nine non-governmental respondents provided a total of twenty-one Q sorts for this case study. All four of the governmental representatives sorted once based on the condition of instruction to sort on behalf of the government's perception of wind power in Woodward. Eight of the non-governmental respondents sorted twice; once for their own perceptions of wind power and again for how they thought the city government perceived wind power. One non-governmental respondent declined to complete this second sort.

Three statically significant factors were selected from the rotated solution (principal components followed by varimax rotation). Each factor has three or more sorts with a defining load which, by definition, achieved significance on only one factor. Table 1 displays the factor solution with a list of the sorts and the loading on each factor. The defining sorts within each factor are bold faced and marked with an "X" (see appendix 3 for a list of sort values per item for each factor). Cumulatively, the three factors account for 67% of the total variance and all sorts achieved significance on at least one factor. After the factor analysis, the statements were revealed with a z-score calculation (all statements for each factor ordered by the values of the standard scores). The statements within each are correlated to determine the similarities between the viewpoints. Factor

one correlates about as evenly with factors two and three (0.4960 and 0.5296, respectively) while factor two correlates the least with factor three (0.3459; Table 2).

Twenty-two brief interviews were completed after each sort with each respondent. This included an interview by the respondent who declined to sort for how they thought the government viewed wind energy but who would speak to that effect. Each factor is examined in more detail below with results that relate to a specific item in the Q set having that item number in parenthesis (e.g.; s27). The three factors are labeled:

1. Economic Account: strong focus on the financial opportunities and outcomes presented by wind power including increases in governmental tax base and increases in revenue for local business. Differentiated from the Community Account by its increased focus on numeric financial outcomes with less attention to community outcomes and identities.
2. Community Account: strong focus on the ability of wind power to improve the community now and into the future. Strong focus on the continuity of wind energy with the community's existing identity. Some focus on economic numbers, but less specifically about revenue and more generally about boosting overall opportunities.
3. Intrinsic Value Account: strong focus on the beauty or intrigue of wind turbines and the ability of the wind industry to make use of an abundant resource. Some focus on community improvement, less focus on financial benefits.

Table 1. Factor loadings for each participant

Participant (Sort Type)	Factor		
	1	**2**	**3**
Government Representative			
1. City Commissioner (1)[1]	**0.8220**[x]	0.2246	0.2199
2. City Commissioner (2)[1]	0.2862	**0.5629**[x]	0.3047
3. City Clerk[1]	0.1360	**0.8504**[x]	-0.1689
4. City Projects Manager[1]	0.6014	0.4551	0.3277
Non-Governmental Respondents			
1. President of Chamber of Commerce[2]	**0.8305**[x]	0.2872	0.2489
2. Church Worker[2]	**0.8085**[x]	0.1172	0.3195
3. Church Worker[3]	-0.0375	0.1655	**-0.6833**[x]
4. Farmer[3]	**0.8044**[x]	0.1801	0.2485
5. Farmer[2]	-0.2819	-0.1748	-0.4030
6. Newspaper Reporter[2]	0.2205	**0.5090**[x]	0.4233
7. Newspaper Reporter[3]	0.6556	0.4589	0.2667
8. Pastor[2]	0.0496	**0.8501**[x]	0.2322
9. Pastor[3]	0.3959	**0.7423**[x]	0.0844
10. Librarian[2]	0.3926	**0.6940**[x]	0.1847
11. Librarian[3]	0.6458	0.5702	0.0967
12. Business Representative[2]	0.3166	0.1044	**0.7517**[x]
13. Business Representative[3]	0.5686	0.2196	0.5947
14. Deacon[2]	0.2737	0.4353	**0.7066**[x]
15. Deacon[3]	0.5292	0.5757	-0.2681
16. Reverend[2]	0.3451	0.5217	0.4552
17. Reverend[3]	0.5394	0.4866	0.4243
Percent Explanation of Variance	27%	24%	16%

[x] Defining sort for corresponding factor
[1] Governmental perception
[2] Personal perception
[3] View of governmental perception

Table 2. Correlations Between Factor Scores

Factor	1	2	3
1	1.0000		
2	0.4960	1.0000	
3	0.5296	0.3459	1.0000

Economic Account

The first account of wind energy is best defined as a strongly economic view point. The items that differentiate this account are related to the amount of money that wind power development has brought into the community (s41, s24, s2, s3). These items stand apart from the other accounts due to their strong focus on numeric representations of wind energy benefits as opposed a focus on the effect those benefits have. Additionally, of the nine items with the highest z scores (moderately to strongly agree) for this account, only one item does not deal with some aspect of economic development (s20).

This account had four sorts that defined it. One is a government representative sorting on behalf of the city government as a whole. Two of the non-governmental sorts that define this account were for the respondent's personal view. These belong to the president of the city's Chamber of Commerce and to a church worker whose husband worked in the wind industry. The only sort to load on this factor by a non-governmental respondent reflecting the government's perceptions belonged to the local farmer who was opposed to wind development.

The post-sort interviews for this account reflect a focus on financial gain from wind energy. The government representative discussed their perception that wind development is responsible for large amounts of revenue to schools. When asked directly what characterized their sort, the representative replied that "economic growth" was the overarching characteristic. When asked what the city would disagree with, the representative responded that turbine development wasn't harmful to the land because it does not preclude farming and ranching operations from continuing in the same are.

The non-governmental representatives also expressed similar sentiments in their post-sort interviews. When asked about their sorts, both stated that job creation and increases in revenue were the primary benefits of the wind industry's presence. One of the respondents reiterated the wording of some of the Q items when they stated that the "future's in the wind industry. More money into Woodward than ever. Creates Jobs. That kind of thing."

The fourth sort to define this factor came from a local farmer who was admittedly opposed to the wind development. In their post-sort interview for how they thought the government viewed wind energy, they mentioned that the government is only interest in revenue and in serving "special interests and corporations instead of the people." They went out of their way to state that they agreed on nothing with the city government who "are going to [approve turbine development] come hell or high water because they want the money without looking at the long term consequences."

Community Account

The second account of wind energy in Woodward is best defined by strongly community oriented discourse. This account is qualitatively similar to the first account in that discussion of financial benefits from wind development are present, but it is less focused on the total amount of revenue produced and more concerned with the ability to wind development to benefit the community more generally. These include the ability of wind power to let the town evolve (s16) and to use an abundant resource (s14). This factor also saw more items having to do with wind energy's place in the town's overall identity than did accounts one or three (s23, s38, s20). The statements that most

differentiated this account from the others affirmed the city's identity of being an energy town, but questioned the overall importance of wind energy compared with agriculture and petroleum recovery (s38, s23). Still, this account emphasized pride in the use of the area's wind resource (s40, s14).

This account had the most defining sorts at six. Two of these sorts belong to representatives of the city government. Three of the accounts represent non-governmental, personal views. The remaining sort is a non-governmental perception of the city government's view. This sort and one of the three personal sorts belong to the same respondent.

The post-sort interviews of the government representatives reveal a stronger focus on the overall effect of wind to produce change in the community than the first account. They also reveal a much more qualified support of wind power. While both respondents were ultimately supportive of wind power, both stated that there was conflict regarding aesthetics and transmission lines. They also mentioned having safety concerns regarding both wind turbines and transmission lines as well as hearing the same from other residents. Both representatives did state that they felt it was the "wave of the future" and that, as "a green energy," wind power is something the city government and the community should endorse despite the negative consequences. One government representative also mentioned the controversy regarding the payment schemes and the use of eminent domain for construction of transmission lines and substations.

The three interviews for non-governmental respondents after their personal sorts continued these themes of qualified support for wind power and its effect on the community. One respondent, a local reporter and petroleum pump operator, stated that

"there's no question that [turbines] have been beneficial." This respondent also stated that they know turbines have harmful effects on bird and bats, but countered that other things humans build kills a greater number of birds and that the benefits of wind energy to wild life over fossil fuels make up for this negative impact. Another respondent, a local librarian, also expressed a qualified support for turbines. They stated that while the development of wind has helped the community grow, they are concerned about damage to the landscape and the aesthetics of wind turbines. This respondent also talked at length about the overall energy identity of Woodward. They mentioned that Woodward is an energy town, and that both petroleum and wind are a part of that. Both, they mentioned, allow the community to grow and move forward.

The final participant in this group saw both their personal and governmental view sorts load on this factor. The participant was a local pastor and, in their personal sort interview, discussed at length that while wind energy does provide both jobs and revenue for the city and its residents, the amount of each has been much less then hoped for. They also denied that the wind development was forced on the community and remarked that wind power has been used in the area historically to draw water from aquafers. The use of wind for power, they stated, is just "a natural extension" of past uses.

In their governmental perception interview, this same respondent remarked that the city is going to invest in anything that has potential to improve schools, jobs, the community, and over all quality of life. They reiterated that the amount of money has been less than expected, but stated that they felt the government would be satisfied with any amount of revenue as they could invest that into community improvement. They also

reiterated their opinion that wind energy was not forced on the city and that opposition to wind power, while present, is a minor facet of local discourse.

Intrinsic Value Account

The third and final account of wind energy is best defined as one that intrinsically values wind turbines and wind development. This account finds turbines as aesthetically appealing, values the use of an available resource, and, to a lesser extent than account two, sees wind power as beneficial for the community (s11, s15, s44). The items that most differentiate this account from the others express a fondness for the aesthetics of wind turbines as well as their presence in the landscape (s11, s15, s39). Whereas the other accounts saw the aesthetics of wind turbines as an unfortunate reality to gain the benefits they offer, this third account sees the aesthetic change as benefit in itself. Overall, this account is the least well defined of the three.

This account has three defining sorts; the least of the three accounts. All are from non-governmental representatives. Two of the sorts represent personal perceptions while one is a view of government perceptions. The two personal sort interviews, one from a local business organizer and the other from a deacon, reflect the intrinsic valuation of wind turbines and the acknowledgement of revenue, jobs, and community benefits. Both respondents noted that the abundant amount of wind in the area should be utilized and that they appreciate the wind industry in that regard. One stated that the wind industry "makes [them] proud of Woodward." The other described being impressed with the transportation, size, and logistics of turbine parts.

The final defining sort of this account was for how the government viewed wind energy by a church worker married to a wind technician. This sort was unique for two reasons. The first is simply that no sort by a government official defined this factor. The second is that it is the only sort in the study to correspond negatively to the solution that it loads on. In this case, the respondent felt that city viewed wind farms as bringing jobs but also as being worse off for the environment than petroleum drilling. They also felt that the city saw wind turbines as being forced on residents of the city. The respondent disagreed with both points.

Additional Findings

While there were eight sorts by seven individuals that did not define an account, the results and interviews of these sorts are still worth noting. Chiefly, one of the four government representatives failed to define one single account. Of the three that did, one defined the first account while two others defined the second. Further, of the seven sorts by non-governmental respondents that did not define an account, five were for how those not in government viewed the city's perceptions of wind energy.

The interviews of these sorts are also of interest. The findings of the post-sort interviews in the Q section are similar in content to those of the general interview sample. With one exception, respondents were neutral to positive about the presence of wind turbines and felt that they were beneficial to the city, schools, and community to some extent. This final respondent was admittedly opposed to the wind development. It should be reiterated that the non-governmental respondents (with one exception) are a resample

of respondents to the interview portion of this study. It is also worth noting that ten months passed between the general interviews and the Q sorts.

Popular Press Articles

Over the total fifteen-year window from 2000 to 2015, fifteen popular press articles were found by the prescribed method. These articles ranged in publication date from February 2008 to March 2013 (fig. 4). There were no articles that met the prescribed criteria from 2000 until 2008. Further, no articles have met the criteria for inclusion since 2013.

For reference, the first wind farm in Woodward County (and all of Oklahoma) began commercial operation in 2003. Two additional farms began operation in the county in 2009 and 2010 (KEIN 2015).

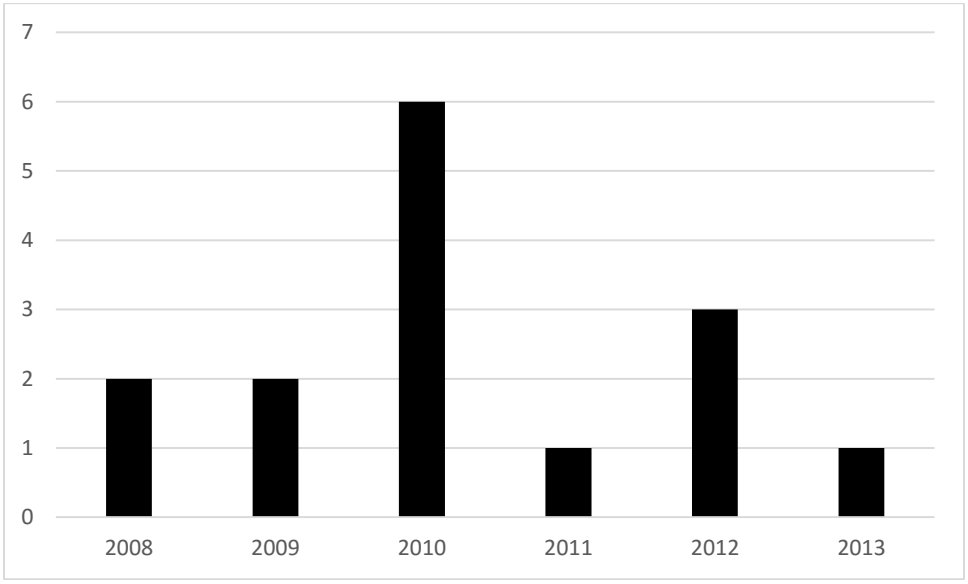

Figure 4: Number of popular press articles included in the case study by year. n=15

Two main themes predominated the discussion of wind power in local publications: the generation of economic activity and concern over high voltage transmission lines.

Economic Perspectives

Most direct quotes relating to the economic impact of the wind industry were attributed to governmental and industry personnel. For example, the head of a local business group responsible for attracting industrial activity to Woodward stated that "wind development [was] bringing new money and new energy into Western Oklahoma like [he had] never seen." In another article, the governor of the state at the time stated that "we value our wind in Oklahoma" and made reference to the state song (Oklahoma by Rodgers and Hammerstein) as proof of point. Beside the general claim that wind would help generate economic revenue, most specific mentions of this revenue focused on the ability of *ad velorum* tax revenue to help fund schools. A few government officials and the superintendent of a local school district were cited as stating that the presence of wind energy would eventually translate into funding for local schools.

Perceptions of Transmission Lines

The second main theme in the analyzed newspaper articles was concerned with the siting, construction, and presence of transmission lines. Frequently, these articles were written to summarize community informational meetings held in the area during the siting process. Some residents in these articles objected to the way they felt they were treated by local utility companies. The use or the threat of use of eminent domain as a

way of compelling owners to sell land was a common issue raised by residents. Another controversial topic involved the valuation of land being sold for utility company easements. Many farms and ranches in the area have been passed down generationally and one landowner stated that a utility company was trying to get them to "sell [their] birthright for a few pieces of silver." Others wondered what effect the presence of transmission lines would have on their commercial operations. This was well reflected in the case of a dude ranch operator who worried that the sight of transmission lines, as opposed to open countryside, would cause a decline in business. Yet more land owners had safety concerns about the durability of support structures during storms, the possible health effects of magnetic fields caused by high voltage lines, and interference to cellular phones and televisions.

One interesting distinction that was frequently made in the newspaper articles concerning transmission lines was that landowners had little to no quarrel with turbine companies themselves. One landowner protesting the siting of transmission lines on his property stated that they "had nothing against windfarm companies" since those companies "pay just compensation to owners for placing turbines on their property." These payments are typically made as royalties per turbine, per year. This model contrasts with the one utility companies offer for easements which are only one time payments. The landowner further stated that the presence of transmission lines disqualifies their land for future turbine placement, meaning that they will get a one-time payment when they could be receiving a similar sized payment every year.

Government Publications

Many of the government publications collected were produced by either the city's tourism department or the state level tourism department. A small booklet published by Woodward's tourism department features a picture of a wind turbine on the cover as part of a collage of area attractions. No oil or gas imagery is found on the cover. Wind turbines are also featured on three separate pages within the booklet with an oil and gas pumping unit being featured on one. Agricultural imagery is featured both on the cover and on three separate pages.

A booklet distributed by the state's tourism board describes Woodward as both a state leader in oil and gas production as well as in the production of green energy. The booklet continues on to describe the areas 450 turbines and the "hundreds" of jobs created by them. This same passage is also found on the city's tourism website.

That city website underwent a redesign part way through the data collection process of this study. While an earlier version of the website featured a self-guided tour of area wind farms, the updated site no longer mentions the areas turbines except for their mention in the 'history' page. The state level tourism page also previously featured this same 'self-guided tour' information, but has since removed the language from their website.

Finally, a local hotel constructed and operated by the city's tourism board features photographs from the area in its lobby and public areas. 6 pictures of wind turbines were observed including an approximately thirty-foot mural of a wind farm at night. The hotel featured two pictures of petroleum operations. Additionally, 6 pictures of agricultural scenes were observed.

Found Artifacts and Ethnographic Observations

A number of artifacts were found in and around Woodward. Many of the found artifacts in this case study take the form of promotional items displayed or found in various locations. A few comments were also publicly overheard. Overall, however, artifacts related to wind power seemed to be uncommon.

Turbine Imagery

One of the most striking items discovered were miniature wind turbine statues serving as tokens of recognition for various parties. One such statuette was found at a local vocational college which houses a wind turbine technician training program and was given to commemorate the inaugural class in 2009. Another statuette was found in a display case in city hall and was given to commemorate the efforts of the city in opening up the region to wind farm development. It is unknown who presented these statuettes.

Similar, solar powered versions of the statutes were found at the city's chamber of commerce and the vocational college and were branded with the logo of a wind farm support company operating in conjunction with area installations. A wind turbine shaped Christmas tree ornament branded with the logo of a local utility company and a set of coasters with the image of a wind turbine reading "Revolution" from an "Oklahoma Wind Energy Conference" were also found at the vocational college.

A 2015-2016 local phone book distributed in the city featured a photo of wind turbines on its cover. In April 2016, a local history museum featured the work of a local

painter which included two paintings depicting wind turbines operating on a hill. None of the works featured oil, gas, or agricultural operations.

Discussion of Wind Turbines in Public

A few comments concerning wind turbines were overheard in public, although it did not seem to be a very common topic of public discussion. One woman was overheard mentioning that she didn't really have a problem with "wind mills" but she wished they could be painted another color, "like beige. Or maybe they could paint something on there like 'Eat More Beef.'" One cashier at a local store mentioned that she had heard that wind turbines could cause tornadoes and that was worrying her.

Oil and Gas Imagery

One local roadside attraction, a large statue of a Stegosaurus with a young girl riding it's back, featured a placard reading "about 6,000 years ago God created the Earth, You, and Oil & Natural Gas." This placard was part of a fenced in display by a local resident to promote young earth creationism which also featured two large stone tablets inscribed with the ten commandments. Additionally, a bumper stick was noted on the back of an SUV which read "Oil Field Trash and Proud of it."

Triangulations

Throughout this case study, there were places where separate lines of evidence observed the same data. Some of the most compelling examples come from the

observations of the interviews, Q methodology, and newspaper articles. In all three of these lines, discussion of the positive financial benefits of wind energy can be observed. This included the increased availability of *ad velorum* taxes for schools and municipal use which was discussed in all three lines. This was a topic that was discussed by all but one of the interview respondent, was a focus of two of the three Q factor solutions, and was addressed in many of the newspaper articles. The one interview respondent who was outwardly opposed to the wind development was the only respondent to not discuss financial benefits of wind. Of the newspaper articles, many focused on the promises of financial inflow made by government, community, and wind company representatives. Even in the newspaper articles covering objection to the installation of transmission lines, the financial aspects of wind turbines were discussed positively and even used to contrast with the financial reimbursement of the lines themselves.

Discussion of transmission lines, especially negative discussion, was a topic that was observed in both the interviews and the newspaper articles. Many of the newspaper articles covered landowners who were opposed to line construction and who questioned the ethicacy and safety of their placement. A few interview respondents discussed transmission lines, with one stating that "the conflict is usually with the power lines." Another interview respondent discussed personal conflict with transmission lines which destroyed hunting land that the respondent used to use. While transmission line questions were present in the Q sort, it was not a topic that was expanded on in post-sort interviews. Additionally, all three factor solutions moderately disagreed with both transmission line questions positing that they are dangerous and that landowners are being taken advantage of.

Community identity and sense of place were also topics that were covered in the interviews, Q data, and ethnographic observations. Many interview respondents made a point of discussing that the wind energy was a welcome addition to an "energy town." That phrase, as opposed to "oil town" was echoed by respondents in the Q sorts as well. Solution factor 2, in fact, placed a defining emphasis on the ability of wind power to fit in with the community's existing identity. The woman that was overheard saying that she had "no problem" with turbines but that they should paint "Eat More Beef" on the towers may have also been speaking to community identity in trying to connect this energy aspect to the area's agricultural history.

Traffic problems was also an issue discussed in both the interviews and the Q post-sort interviews. Many respondents in both discussed the existence of occasional traffic delays caused by industrial trucking, but everyone discussed it as a small "hiccup." Overall, traffic problems were not seen as a significant consequence of wind farm construction.

CHAPTER V

DISCUSSION AND CONCLUSIONS

This case study ultimately aimed to answer six questions about the existence of energy identities in Woodward, Oklahoma and the effect on these identities caused by the introduction of wind energy into the region. Insights on these six questions are explored below based on their previously stated order.

1. **How are wind farms, a "clean" energy source, perceived in a town so heavily rooted in oil and gas?**

Overall, the perception of wind farms, wind turbines, and the wind industry in general is neutral to positive in Woodward. While there are some residents who are opposed to the presence of windfarms at all, they seem to represent a rather small number of residents. Only one of the thirty-three respondents in this case study expressed a predominantly negative perception of the wind power. It was also uncommon for residents to express a totally positive view of wind power. While there were some respondents who expressed the view that the introduction of wind turbines into the area was entirely positive, the most common response was qualified support. Most

respondents, including those within the city government, expressed that embracing wind power has brought about some negative change. These include aesthetic changes to the landscape, smaller amounts of job creation and revenue than expected, negative impacts to wildlife, traffic delays, noise pollution (in the case of those living or working near operating turbines), the use of eminent domain to construct transmission lines and power sub-stations, and payment schemes for transmission line easements that were seen as unfairly low. Again, though, the overall conclusion of most respondents was that wind energy proved to be an overall benefit for Woodward.

These last two impacts about transmission lines in particular appear to be much more controversial than the wind turbines themselves. Through the newspaper articles, many of which reported on transmission line installations and community meetings about transmission lines, many individuals impacted by line construction made a point of saying that they were not upset with the turbine construction or operation companies. Some even expressed that the reason they were upset with utility companies constructing transmission lines was due to either the use of eminent domain, a generally low, one-time payment for use of land, or both. It was common for landowners to compare the construction and compensation for turbines and transmission lines as fair and unfair. Often, landowners being asked to sell for transmission lines, or those already with lines, expressed the view that they would rather have turbines on their property. One subject of a newspaper article expressed the frustration that turbines companies "won't put turbines on [their] property because of the power lines." When this observation is combined with the amount of safety concern that residents expressed over transmission lines, while expressing little concern for the safety of wind turbines, the presence and construction of

transmission lines prove to be much more controversial than any aspect of turbine development. This observation was also corroborated by one county official and two city officials whom all worked in relation to land owners.

Despite all of these perceived negatives, however, respondents in this study were highly likely to state that the development of turbines was still a net positive for the area. It was common for respondents to state that the area had "embraced it." Many respondents expressed that even though the jobs and revenue from turbines for the city of Woodward itself have been much lower than anticipated, any amount at all was a positive for the area. Respondents were also likely to point out that during construction phases of new farms, the large numbers of workers moving into an area and spending money on food, lodging, and other items was of great benefit to the area. Many respondents also mentioned that the training program at the city's vocational college and the benefits that it brings to the community would not likely exist without the wind development.

There was one final, intangible benefit that respondents often mentioned in regards to the wind farms; the hope, inspiration, and pride they felt wind farms gave to the area. Residents and city officials both spoke of being proud to host nearby wind farms. They also expressed pride at being the "hub of the wind energy" and a center for "clean energy". One resident explained that the sight of wind turbines gave them hope for "a better way of doing things". Discussion of pride or satisfaction that clean energy was being produced in the area and was taking advantage of the area's abundant wind resource was common.

None of the respondents in this study expressed the view that wind energy was in conflict with the area's large and historic petroleum industry. One respondent even

bristled at the suggestion, stating that the research questions sounded "like somebody is being defensive about maybe the oil and gas industry being shut out of the process and acting like that's not a really important part of our local economy which, hello, it sure is."

Chiefly, respondents were quick to label their city as an "energy town" not as an "oil town" exclusively. Respondents were much more likely to frame the development of wind power as an addition to the area's energy industry, not as competition to the oil industry. As one respondent put it, "we have the oil and gas, now we have the wind." A number of respondents expressed the wish for more types of energy deployment in the area, primarily naming solar energy, but also hydroelectric. Given the evidence from this case study, it seems that the addition or expansion of any of these power generation methods would be largely welcomed as opposed to rejected for being out of line with the regions preexisting identity.

2. How does the city government's declaration of being a "wind capitol" effect the residents of Woodward?

Despite the creation and promotion of the "Wind Energy Capitol of Oklahoma" moniker by the city government, just over half of the respondents in the interview portion of this case study were unaware of the title. This included some members of the city government itself. Of those that did know about the moniker, only two identified its promotional use on websites and printed material. Of those that were not aware explicitly of the title, most immediately stated that they were not surprised of its existence.

None of the 28 respondents in the interviews spoke explicitly negatively of the title. This includes the one respondent who had an otherwise negative perception of the

area's wind energy as a whole. The majority of the respondents, whether they knew of the title before the interview or not, felt positively about it and its use for the city as a whole. Most stated that they felt it was fitting and that if the city could use it to promote itself, they should. There was also a number of respondents who were admittedly ambivalent to the title.

The only concern stated by respondents in the interviews was one of factual accuracy. Some were concerned that Woodward itself, on a statistical basis, should not be able to claim that title. Typically, these respondents felt that the region should be known as the wind capitol. Still others felt that the title was statistically justified in terms of the number of nearby turbines in operation or because of the fact that Oklahoma's first commercial wind farm was located near the city.

Consistent with the discussion of wind power and oil production in the rest of the case study, no interview respondent stated any conflict between wind energy and oil production or the city's culture. One non-governmental respondent even went as far as to say that the city should be known as the "Energy Capitol of Oklahoma" or possibly even the tristate area.

3. Is the introduction of wind farms into the area accompanied by "green" attitudes?

While green attitudes did accompany support for wind energy for some respondents, the ability of wind power to provide a renewable source of energy seemed to be secondary to the financial benefit that wind power could provide. While every participant in this case study mentioned financial benefits of wind, only 15 (just under

half) mentioned some form of environmental benefit. Most of these mentions were about how wind power was generally a "clean," "green," or "renewable" energy source with no mention of what effect that would have when compared to other sources of energy. Two respondents did mention that wind power should be used if it could "save on burning coal" or replace "coal burning power plants." None of the study respondents mentioned the ability of wind power to replace the burning of natural gas or oil as an electricity source. This is notable as the region has no coal mining to speak of while petroleum drilling is a region-defining industry.

When oil and natural gas was mentioned in the context of environmental issues, it was generally stated that the investment in wind should start now so that there is a way to replace fossil fuels when the region runs out. A number of respondents labeled wind power as the "energy of the future" and one stated that it would "not [be] very good planning" if petroleum in the area runs out and there was not a large investment in wind capacity to replace it. When petroleum exploration was mentioned in a negative capacity, it was typically regarding the point source pollution that production and burning of the fuel causes. A number or respondents mentioned that wind power had almost no negative effect on air or water quality; a consequence that is a real possibility with petroleum drilling and burning. One respondent mentioned that cleaner air might lead to a decrease in "birth defects and sickness, or whatever, that goes along with non-clean energy."

Of the thirty-three participants in the interviews and Q methodology, only one mentioned the ability of wind power to help mitigate the future effects of climate change. Even then, that respondent felt that they were in "a minority" of believers in the idea. According to models constructed by Howe et. al in 2015, 51% of county residents believe

that climate change is occurring, but only 40% attribute that to human activities. Further only 40% of county residents are worried about it. Interestingly, however, 70% of county residents want to fund research for renewables and 60% want to see CO^2 regulated as a pollutant (Howe et al. 2015). If the climate change professing participant is in a minority, they are in a rather large one. Still, this participant treated climate change as a taboo topic; something that was frowned upon in Woodward even when the majority of participants in both the Yale study and this case study want to see an increase in both number and diversity of clean energy sources in their county.

4. How has this introduction affected the sense of place that Woodward residents have? Has this change been positive or negative?

In total, the introduction of wind energy to Woodward has had little impact on the overall sense of place that Woodward residents have. What change has occurred has been positive. The development of wind turbines was almost universally seen as an economic boost for the area. While the majority of study participants did see some negative aspects of wind energy development in the area (namely the aesthetic impact of turbines), all but one participant ultimately stated that the wind development was good for the city and the region over all. Additionally, no participant saw the development of wind as being in conflict with the area's petroleum history. Instead, most respondents who addressed the area alluded that wind development was perfectly in line with the area's culture as an "energy town."

Further, a number of participants stated they felt pride from the ability of wind turbines to make use of an abundant resource, the wind industry for developing the

"energy of the future," making them hopeful for a better future, and the local vocational college's wind technician training program. When all of these aspects are taken together with the general lack of objection to current and future wind development, it seems that any effect on the sense of place Woodward residents feel trends in a positive direction.

One large caveat, however, is the development of transmission lines in the area. Transmission lines and power substations have proven to be a very contentious issue in the development of the area's wind power. Through the newspaper articles, many area residents stated that the presence of transmission lines necessitated by wind turbines could damage their quality of life, their property value, livelihoods, and their health. This is not helped by the use of eminent domain to seize easements as well as a payment scheme that is seen by some landowners as insultingly austere. The result is that landowners feel that they are being forced "to sell [their] birth right for a few pieces of silver," and the feeling that wind companies would have treated them much more fairly than the utility companies constructing the transmission lines.

This dichotomy may be since the transmission lines themselves are not seen as being a source of benefit for the area, although they are an integral part of wind energy operations. Whereas wind turbines make good use of a local resource, transmission lines transport that resource out of the area. Several respondents in this study stated frustration that "the electricity is not helping us out" in terms of lowering energy prices locally. When added to the use of eminent domain, which was never reportedly used for turbine construction, and the payment scheme, the requisite construction of transmission lines effects the sense of place of landowners negatively. These effects, though, are much more

acute in rural areas and came up infrequently for residents living in the city of Woodward.

5. **How, if at all, do residents reconcile their town's new identity with their established past?**

Simply put, the construction of wind turbines in the Woodward area does not have a large effect on the established identity that residents feel embodies the area. Respondents in both the interviews and the Q sorts frequently stated that Woodward is an "energy town" or an "energy capitol" and that, while oil and natural gas is a large part of the area's history and heritage, wind energy was not seen as a competing or diluting factor to that heritage. Wind energy seems to be well in-line with the area's identity and gives another dimension of energy production, reinforcing the "energy town" idea. That so many respondents mentioned that they would like to see more development of wind, oil, natural gas, solar, and hydroelectric further enforces this "energy town" identity. In effect, resident do not reconcile Woodward's identity as a "wind capitol" because they do not have too. Wind energy is already well in-line with the ethos of the region; no reconciliation required.

6. **Can these reconciliations be explained satisfactorily using the SRT framework that has been recently proposed?**

The Social Representations Framework does appear, at least in part, to help explain the above described reaction, or lack thereof, to the addition of wind energy to

the Woodward area. The two key concepts in SRT, anchoring and objectification, can be observed at various times in the items collected for this case study.

One of the primary places that anchoring, or the tethering of new ideas to older, socially established ones, can be viewed in this case study is in the claim that the city is an "energy town." The respondents in this study anchor the introduction of wind turbines to the older idea of the area being an energy producing town. From this social vantage point, wind turbines cease to be a foreign stimuli and can be socially understood as just another form of energy development in a region that is both accustom to, and proud of, a long history of the same.

Incidents of objectification were less common in this case study than anchoring. Interview respondents did not seem to construct explicit metaphors to better understand wind turbines. One implicit metaphor may go back the area's long heritage of being an energy producer. Any type of energy production requires equipment to be successful. Given that the area has a more than one-hundred-year history with petroleum production, including all of the equipment needed to undertake that effort, an implicit metaphor between petroleum's equipment and wind's equipment may exist. A general familiarity with regional energy extraction may serve to objectify any future changes in the area's production landscape. While no respondent explicitly stated this metaphor, it would be consistent with the "energy town" idea many respondents mentioned. One other isolated moment of objectification came from a respondent who noted that farmers in the region have used "windmills for forever to get [their] water from the aquafer." That respondent goes on to state that using the wind for electricity "was a natural extension" for the area.

One further place that SRT helps to explain reactions to socio-technologic change is in its focus on the possibility of competing ideas with in the same region or even person. Implicit in this is also a rejection of the simple NIMBY model. SRT predicts that instead of being entirely for or against change, individuals are much more likely to weigh the change that they see against existing social constructions (Batel and Devine-Wright 2014). This was readily seen in the case study as the qualified support that most respondents gave to the wind energy in the region. There were even a few cases when individuals were personally effected negatively by wind development but still supported the development over all. This was observed in two specific cases: one in which a respondent saw prime hunting land destroyed for the construction of transmission lines and the second in which a respondent who had turbines constructed close enough to a hunting lodge that the noise sharply curtailed the amount of time spent there. In both of these cases, the respondent ultimately supported wind energy on the grounds that the benefit for the community they perceived was more than enough to balance out wind's negative effects on them. This behavior seems impossible under the simple NIMBY model but is quite easily understood through the theoretical lens of SRT.

Conclusions

The purpose of this study was to examine the ways in which having a local government impose a new energy identity onto an existing one impacted the residents of that municipality. Specifically, with Woodward, Oklahoma having a history with oil drilling going back to 1903 (James 1984), how did the city government's claim of being the "Wind Energy Capitol of Oklahoma" square with resident's views of their town's heritage? Despite the initial premise of this study to be the examination and

documentation of conflict between those accepting of the area's much younger wind energy and those who opposed it as invasive to the area, very little conflict of this type was documented. All told, the introduction of wind energy to the area saw notably little conflict as residents of Woodward and the surrounding area saw the growing number of wind turbines to generally symbolize progress and a smart use of an abundant resource.

This lack of conflict is likely due to a flexibility in the identity of the area as an "energy town." Wind energy's introduction to Woodward was already consistent with many resident's sense of place. Since the area is used to the production of energy as an economic paradigm, the method by which that energy is produced is of little importance. Further, many respondents expressed a desire to see solar power generation in the future. This is important because there is a temptation to believe that political ideology or acceptance of anthropogenic climate change should be predictors of wind energy acceptance; conservative areas with large numbers of people unconvinced climate change is a problem at all should reject "clean" energy. This case study demonstrates that these are, in fact, poor indicators of "clean" energy acceptance. Instead, history and cultural familiarity with energy production has been demonstrated to be better.

While components of wind energy development, like transmission lines, have proven to be contentious in the area, controversy is generally caused by the particular details of the introduction as opposed the introduction itself. For instance, many who oppose transmission lines would be less opposed if land was secured differently, the payment scheme was more generous, or the lines were buried in the ground as opposed to being constructed above it.

Further, the number of people who oppose the entire concept of wind energy development in the area is low. Of the thirty-three respondents in this study, thirty-two ultimately stated that wind energy is something that should be embraced and continued. This is not to say that they saw no negative consequences to the development, however. While the impact to landscape aesthetics, wildlife, future land use, and property owners was recognized by the majority of respondents (including some personally effected in a negative way), most respondents still endorsed wind development as good for the community. The one respondent in this study who identified as being against the wind development still qualified their opposition. If certain things were to change or be accounted for, this individual may begin to feel more favorably toward wind energy development.

This abundance of qualified support and rejection supports the criticism that Devine-Wright (2005), van der Horst (2006), Wolsink (2006), and others have leveled at the NIMBY concept for describing the motivations and emotions of people too simplistically. Some of the observed behaviors, such as the respondent who ultimately supports wind development because of the good they perceive it does for the community despite wind turbines preventing them from utilizing their hunting lodge, are impossible under a simple NIMBY model. Under one of the two recently proposed frameworks for understanding perceptions of wind power, however, this behavior becomes understandable. This and other examples from this study make the case that sense of place or Social Representations Theory provide a much more inclusive frame work for understanding the ways in which people perceive and respond to local socio-technological change.

These frameworks should be incorporated into future research on energy introductions in place of the NIMBY concept. Their widespread adoption in the wind energy perceptions research would help address Devine-Wright's (2005) concern that the lack of a suitable frame work has led to a "situation where the extant literature is rather incoherent and devoid of a sense of cumulative progress. Also, due to their theoretical similarities, it is likely that sense of place and SRT used in tandem would be a more powerful sociologic tool than either on its own. As for the NIBMY concept is concerned, researchers must find a way to add considerable nuance to the model if it is to continue as a viable framework on par with these proposed solutions.

This study is certainly not without its limitations, but should be seen as compelling evidence that the interactions between people and nearby socio-technological change is considerably more complex than the simple NIMBY model suggests. This case study also suggests that the reception that wind development has in this Class Four area deserves to be examined in much greater detail than the passing interest that researchers have thus far given it. Given the geo-political differences that differentiate this region of the United States from other national and international areas, the opportunity to gain understanding from comparison is undeniable.

As far as Woodward is concerned, further study would help to clarify if the findings of this case study are representative or have been skewed. Most likely, the purposive stratified sample used for the interview and, by extension, Q methodology sections of this study stand the greatest chance of skewing these findings as most of the respondents were community elites of some form or the other. Further interviewing and survey work, both within the city and especially in the nearby rural areas would help to

clarify the representativeness of this data set. Additionally, repetition of this work in other cities and towns would start to clarify the generalizability of these findings to the entire Class Four wind area of the Texas Panhandle, Western Oklahoma, and Southern Kansas.

The exploration of these further research questions would allow a greater understanding of the reception to renewable energy solutions in a region with an oil soaked past. As global, national, and state leaders are under increasing pressure to contribute to the abatement of climate change, and as new industries find opportunities for growth in this region, the pace of change seems bound to increase. Understanding how local people will respond to this change will be important as the world tries to limit the effects of a man-made phenomenon that few in this region accept is occurring at all. In order to utilize the resources endemic to their region toward this goal in an ethical manner, we must have this understanding.

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APPENDICES

Appendix 1. EPSCoR Interview Slate

1. To you knowledge, does your organization/department have a plan for dealing with – or preparing for – the consequences of extreme weather/environmental events such as severe storms, drought, and/or wildfires?
    a. (If yes) Can you tell me about the aspects of that plan that you are most familiar with?
    b. What are the essential elements of this plan?
2. Have factors like drought and water scarcity affected your organization/department? (If yes, please expand on how.)
3. How about wildfires?
4. How about severe weather events like tornadoes, flooding and other storm-related factors like hail and high winds?
5. How about earthquakes? (If no, do you anticipate incorporating these elements in the future?)
6. Overall, would you say that these types of environmental events are becoming more frequent/severe over time?
    a. Do you anticipate these types of events becoming more severe in the future? Why or why not?
7. That specific measures have your organization/department taken to prepare for the types of environmental events we've been discussing?
    a. What future measures might you consider?
8. What other organizations/departments/communities/professionals have you partnered with in your response/preparedness efforts?
    a. What about non-governmental (or governmental, if speaking with an NGO) organizations (NGOs) (e.g., the American Red Cross, or local churches)?
    b. Who else might you consider partnering with in the future, if anyone?

9. What resources (such as types of data or other professionals) do you utilize when addressing (or planning to address) these types of events?
10. Do you feel like your department/organization has all the resources it needs to address these types of issues? If not, what additional resources would you like to see?
11. Are there any particular barriers you see affecting the ways you/ your organization/department respond when these types of events occur?
12. In your opinion, what does your organization/department do best? What are you most proud of (either in general or pertaining specifically to these types of events)?
13. What does resiliency mean you, both in the long and short term?
    a. In your opinion, is there a difference between short and long term resiliency?

Appendix 2. Characterization of Communication Concourse and Selected Q Statements

Overarching Theme	Sub-Theme	Q statement (Q-set number)
Windfarm Perceptions	Revenue or Income	- The wind power industry means more dollars within our city (3) - Wind development is bringing more money into Woodward than ever before (24) - The wind farms are a tourist attraction that bring people to our area (25) - Wind energy is a win-win situation for everybody (30) - Wind energy brings a lot of revenue to Woodward (41) - Wind power creates an influx of people in Woodward (42)
	Jobs	- Wind energy has created a lot of jobs in our area (2) - Wind energy has not brought the amount of jobs that I thought it would (32)
	Schools	- Wind energy has been a boost for our schools (1) - Our schools would be worse off without the wind industry (31)
	Traffic	- Wind energy causes traffic problems (8) - Driving wind turbine parts though Woodward is unsafe (33)
	Distance from Nearest Turbines	- There is a better location than Woodward for wind turbines (10) - Windfarms are being built too close to people's homes (34)
How do Government Actions Effect Resident Perception?	Feelings on Wind Capitol Designation	- The Wind Energy Capitol of Oklahoma is a good moniker for Woodward to have (9) - I consider Woodward to be the Wind Energy Capitol of Oklahoma (35) - The city government has just jumped on wind energy because it is the newest thing (45)

Appendix 2, Cont. Characterization of Communication Concourse and Selected Q Statements

Overarching Theme	Sub-Theme	Q statement (Q-set number)
Are Turbines Accompanied By 'Green' Attitudes?	Statements Displaying Green Attitudes	- I think that wind energy is not as green as it appears to be (17) - Wind turbines kill to many birds (18) - Wind farms are turning Woodward into a clean energy hub (29)
Effect of Turbines on Sense of Place	Landscape Change	- Wind turbines take away from the beauty of the land (12) - Wind Turbines are just everywhere (36) - We used to have a pretty landscape; now it's all just windmills (43) - Wind turbines haven't hurt anything (46) - I think wind turbines are beautiful (48)
	Power lines	- Landowners are being taken advantage of by power line companies (13) - Power lines are dangerous to our Community (37)
	Presence of Wind	- We have the wind, so we should utilize it (14) - I think it's wonderful they can do something with the wind we have out here (15) - I don't know why we wouldn't build wind farms (39)
	Linking Current Identity to Past	- Wind energy is *not* like our roots (7) - Energy is the major driver of our economy (23) - Wind energy is not as significant to Woodward as cattle and oil (38)
	Effect on Community	- Wind energy has allowed our community to grow (4) - Wind energy is something that my community has embraced (5) - I love looking out there and seeing the wind turbines (11)

Appendix 2, Cont. Characterization of Communication Concourse and Selected Q Statements

Overarching Theme	Sub-Theme	Q statement (Q-set number)
Effect of Turbines on Sense of Place, cont.	Effect on Community, cont.	- Wind energy is a great opportunity to move Woodward forward (26) - Our future in the wind industry is unlimited (28) - Our wind energy makes me proud of Woodward (40) - Wind power is good for Woodward (44) - Wind energy was forced on the community (47) - Wind energy causes the breakup of our Community (19)
Social Representations Theory	Statements Displaying Social Representations Theory	- People have gotten used to the turbines around here (6) - Wind energy lets Woodward move into the future (16) - Woodward an energy town (20) - Woodward is an oil town (21) - Woodward is a wind town (22) - I value our wind in Woodward (27)

Appendix 3. Q Sort Values for each Statement by Factor

Statement	Factor		
	A	**B**	**C**
1. It's a really big boost for our schools	4	-3	3
2. It creates a lot of jobs in our area	4	0	0
3. It means more dollars in our community	5	3	1
4. It allows our community to grow	2	2	1
5. It's something that my community embraces	0	0	-1
6. People are used to the turbines around here	0	0	2
7. It's *not* like our roots	-2	0	-3
8. It causes traffic problems	-1	-1	-1
9. The Wind Energy Capitol of Oklahoma is a good moniker for Woodward	0	2	-2
10. There is a better location than Woodward for wind turbines	-5	-2	-5
11. I love looking out there and seeing the wind turbines	-1	-1	5
12. Wind turbines take away from the beauty of the land	-2	0	-4
13. Landowners are being taken advantage of by power line companies	-3	-3	-2
14. We have the wind, so we should utilize it	1	3	2
15. I think it's wonderful they can do something with the wind we have out here	1	1	5
16. It lets Woodward move into the future	2	4	1
17. It's not as green as it appears to be	-4	-2	0
18. It kills too many birds	-5	-4	-2
19. It causes the breakup of our community	-4	-4	-1
20. Woodward an energy town	3	4	2
21. Woodward is an oil town	-1	2	-1
22. Woodward is a wind town	0	1	3
23. Energy is the major driver of our economy	2	5	0
24. It's bringing more money into Woodward than ever before	3	-4	-1
25. It's a tourist attraction that bring people to our area	0	-1	1

Appendix 3, cont. Q sort values for each statement by factor

Statement	Factor A	Factor B	Factor C
26. It's a great opportunity to move Woodward forward	4	5	0
27. I value our wind in Woodward	1	2	4
28. Our future in the wind industry is unlimited	1	2	2
29. Wind farms are turning Woodward into a clean energy hub	0	1	0
30. It's a win-win situation for everybody	2	1	2
31. Our schools would be worse off without the wind industry	3	1	3
32. It hasn't brought the amount of jobs that I thought it would	-4	1	0
33. Driving wind turbine parts though Woodward is unsafe	-3	-2	-2
34. Windfarms are being built too close to people's homes	-2	0	-5
35. I consider Woodward to be the Wind Energy Capitol of Oklahoma	1	0	-1
36. Wind turbines are just everywhere	-3	-1	-4
37. Power lines are dangerous to our community	-2	-3	-2
38. It's not as significant to Woodward as cattle and oil	-1	4	-3
39. I don't know why we wouldn't build wind farms	0	0	4
40. It makes me proud of Woodward	0	3	4
41. It brings a lot of revenue to Woodward	5	-2	-3
42. It creates an influx of people in Woodward	2	-1	0
43. We used to have a pretty landscape; now it's all just windmills	-2	-2	-4
44. It's good for Woodward	3	3	3
45. The city government has just jumped on wind energy because it's the newest thing	-1	-5	1
46. Wind turbines haven't hurt anything	1	-1	0
47. It was forced on the community	-3	2	-3
48. I think wind turbines are beautiful	-1	-3	1

Appendix 4. Institutional Review Board Human Subjects Approval

Oklahoma State University Institutional Review Board

Date:	Thursday, September 11, 2014
IRB Application No	AS1490
Proposal Title:	Adapting Socio-ecological Systems to Increased Climate Variability
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 9/10/2017

Principal Investigator(s):

Beth Schaefer Caniglia
431 N. Murray
Stillwater, OK 74078

Beatrice Frank
431 Murray
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1.Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2.Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3.Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4.Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Hugh Crethar, Chair
Institutional Review Board

Appendix 4, cont. Institutional Review Board Human Subjects Approval

Sample Recruitment Script

Hello, my name is _____, and I am calling to invite you to participate in a state-wide needs assessment regarding drought, wildfires, water scarcity and other severe weather events. Your community has been selected for in-depth analysis, and we sincerely hope you/your organization/tribe will help us to understand your needs, concerns and preferences regarding these important challenges.

Our study is being conducted by faculty at OSU, OU, the University of Tulsa, the Nobel Foundation and a number of other partners.

[For individuals]: Can I set up a time for you to participate in an interview?

[For organizations]: Can you please direct me to the best person in your organization to speak with about this study?

If further information is requested:

We can arrange either a phone interview or an in-person interview. We estimate the interview will last between 45 minutes and 1 hour, but we would be happy to take down as many of your views on these issues as you're willing to share!

Our questions will focus on drought, water scarcity, wildfires and severe weather events like flooding, high winds, ice storms and hail. We'd like to know how hard you've been hit by these types of events, how you are preparing for similar events in the future, and how resilient you feel your community/family/organization will be if these events intensify or increase in the future.

Our goal is to work with a variety of stakeholders, organizations and decision-makers to identify ways to help your community improve everyone's ability to face these challenges.

Can we count on your participation?

If yes: Set up an appointment time/day

If no: I understand. Is there someone else within your community/organization/tribe/family you recommend we reach out to?

Appendix 4, cont. Institutional Review Board Human Subjects Approval

SAMPLE INFORMED CONSENT DOCUMENT FORMAT GUIDE

Project Title: Adapting Socio-ecological Systems to Increased Climate Variability

Investigators:

Beth Schaefer Caniglia, PhD
Assistant Professor
Department of Sociology
Oklahoma State University

Beatrice Frank, PhD
EPSCoR Postdoctoral Fellow
Department of Sociology
Oklahoma State University

Purpose:

This research project is designed to assess Oklahoma vulnerability to climate variability and change. We aim to documente the preparedness and ability of [specific community name] to respond to climate variability and change.

You are being asked to participate in this study, because an organization you are a member of has been identified as an important "public" for these issues by the research team involved in this project. The research will be conducted by interview – either by phone or in person. If you consent to participate in this interview, your responses to interview questions will be recorded on audio tape for future transcription, and hand-written notes will be taken as back-up data to be used in the rare case of audio tape failure.

Procedures:
The interview is expected to last between 45 minutes and one hour. The questions will be open-ended, meaning that there will not be a list of responses for you to choose from. Rather, the interviewer will ask you a general question regarding preparedness and ability to respond to climate variability and change, and you will be able to provide a response in your own words.

The interview will also ask you to provide some information regarding your involvement in various organizations – whether as an employee or a citizen member, and how those organizations have been or may be affected by the topics just mentioned.

Risks of Participation:

There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.

Benefits:
The benefits of this research include:

- documenting the ability of communities with different socio-demographic characteristics to respond to environmental changes;

Appendix 4, cont. Institutional Review Board Human Subjects Approval

- understand the complex dynamics and processes causing environmental problems and social impacts;
- provide knowledge, approaches and praxis needed to address critical issues related to global climate change
- avoid pitfalls and suggest possible solutions to enhance preparedness and the response capacity of communities toward extreme weather events and climate variability
- help policy maker render decision in face of uncertain climate and environments

Confidentiality:
In keeping with standards of research ethics, this study has been designed to protect those who agree to participate. Your name will not be revealed in published reports or academic articles that result from this research. For record keeping purposes, your name and the name of your organization will remain on file in Dr. Caniglia's office until the end of the project. These records fulfill two purposes. First, they help our study team insure that we do not contact you again to participate in this stage of our research. Secondly, there is a possibility that we may contact you during a later stage of this project to ask if your concerns and preferences have changed in light of findings from the project. Tapes from interviews will be kept in the locked office of the PI until the tape has been transcribed and the transcription has been cross-checked. In the event that a professional transcription service is utilized, tapes will be coded to protect your identity. Codes will be kept in Dr. Caniglia's office, and after transcription verification through the cross-check process, the tape of our conversation will be erased.

The OSU IRB has the authority to inspect consent records and data files to assure compliance with approved procedures.

Although every effort will be made to keep your identity confidential, we would like to highlight that the community of individuals, organizations and agencies engaged in the project is relatively small. Therefore, there is a slight possibility that other participants may infer your identity.

Compensation:
No compensation is offered in return for participation in this research.

Contacts: If you have questions pertaining to this research, please feel free to contact:

Dr. Beth Schaefer Caniglia, PhD
Assistant Professor
Oklahoma State University
Department of Sociology
006 Classroom Building
Stillwater, OK 74078

Appendix 4, cont. Institutional Review Board Human Subjects Approval

Phone: (405) 744-6125
Fax: (405) 744-5780

If you have questions about your rights as a research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Chair, Dr. Hugh Crethar at 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu.

Participant Rights
Your participation in this research project is voluntary. If at any time you would like to terminate the interview process, you are free to do so. You can also request that your interview be withdrawn from consideration.

Okla. State Univ.
IRB
Approved 9-11-14
Expires 9-10-17
IRB # AS-14-90

Appendix 4, cont. Institutional Review Board Human Subjects Approval

Oklahoma State University Institutional Review Board

Date:	Wednesday, March 23, 2016	Protocol Expires:	9/10/2017
IRB Application No:	AS1490		
Proposal Title:	Adapting Socio-ecological Systems to Increased Climate Variability		
Reviewed and Processed as:	Exempt **Modification**		
Status Recommended by Reviewer(s)	**Approved**		

Principal Investigator(s):

Beth Schaefer Caniglia
431 N. Murray
Stillwater, OK 74078

Terry Scott Ketchum
444 Murray Hall
Stillwater, OK 74078

The requested modification to this IRB protocol has been approved. Please note that the original expiration date of the protocol has not changed. The IRB office MUST be notified in writing when a project is complete. All approved projects are subject to monitoring by the IRB.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

The reviewer(s) had these comments:

Mod to add Q-sort method to study.

Signature :

Hugh Crethar, Chair, Institutional Review Board

Wednesday, March 23, 2016
Date

VITA

Grant Perry Samms

Candidate for the Degree of

Master of Science/Arts

Thesis: "THE SAUDI ARABIA OF WIND": ENERGY IDENTITIES AND CONFLICT IN A HISTORIC OIL TOWN

Major Field: Sociology

Biographical:

Education:

Completed the requirements for the Master of Science in Sociology at Oklahoma State University, Stillwater, Oklahoma in July, 2016.

Completed the requirements for the Bachelor of Science in Wildlife, Fisheries, and Conservation Biology at Kansas State University, Manhattan, Kansas in May 2014.

Experience:

Lead Researcher, Woodward Research Unit, Oklahoma State University Social Research Observatory, Oklahoma EPSCoR Program.

Graduate Teaching Assistant, Department of Sociology, Oklahoma State University.

Field and Laboratory Technician, Department of Biology, Kansas State University

Field Technician, Department of Biological Sciences, Notre Dame University