

**Comparing the perceptions and socioeconomic impacts of wind farms over
time: a case study of Weatherford, Oklahoma**

By: Jake Mammen

Abstract

Wind energy has become one of the leading producers in renewable energy. The demand for energy will always be present, so being able to extract clean renewable energy has become very important for the public and the surrounding communities. Research suggests fossil fuels are known to have harmful impacts on the environment, and many may attribute wind energy to be a contributor to that as well. This provides an opportunity to gauge the public's knowledge of wind energy, along with the socioeconomic impacts. There have been several other studies that look to focus more on the economic or social aspects of wind farm development. This particular study, however, will be a study that examines the perceptions over time and compare them to the research found in the Greene and Giesken (2013) case study about the perceptions and socioeconomic impacts of wind farm development in Weatherford, Oklahoma. This study will look similar, analyzing the combined and varied perceptions associated with wind power, as well as the socioeconomic impacts in the same location. This study will use a mixed-methods approach to investigate the perceptions people have now in Weatherford, Oklahoma, with a large wind farm nearby. This approach consists of three components: a survey, semi-structured interviews, and economic modeling. The economic modeling will be completed to determine both direct and indirect economic impacts. Results from this research will show the comparisons of economic impact on the local community and the differences in perceptions over approximately the last 12 years. In addition, the interviews and surveys will illustrate and describe the overall attitudes of the population towards the present wind farm compared to when it was being developed several years ago. The conclusions will expectantly highlight any differences between the Greene and Giesken (2013) case study. Research like this is very

important in order to fully understand the impacts wind farms have on the local community and how those impacts may change over time.

Introduction

This project is intended to be an extension to the Greene and Giesken (2013) case study on the same location regarding wind farms. It will help to better understand how the perceptions have changed approximately over the last decade. I have always kind of had an itch for wind energy. There is just something that fascinates me when I see those giant wind turbines as I drive by. Now a days you can't even drive west down I40 headed without seeing several large wind farms with turbines as far as the eye can see extending all the way out to Amarillo (see figure 1). The same goes for most of western Oklahoma and portions of northern and southern Oklahoma.

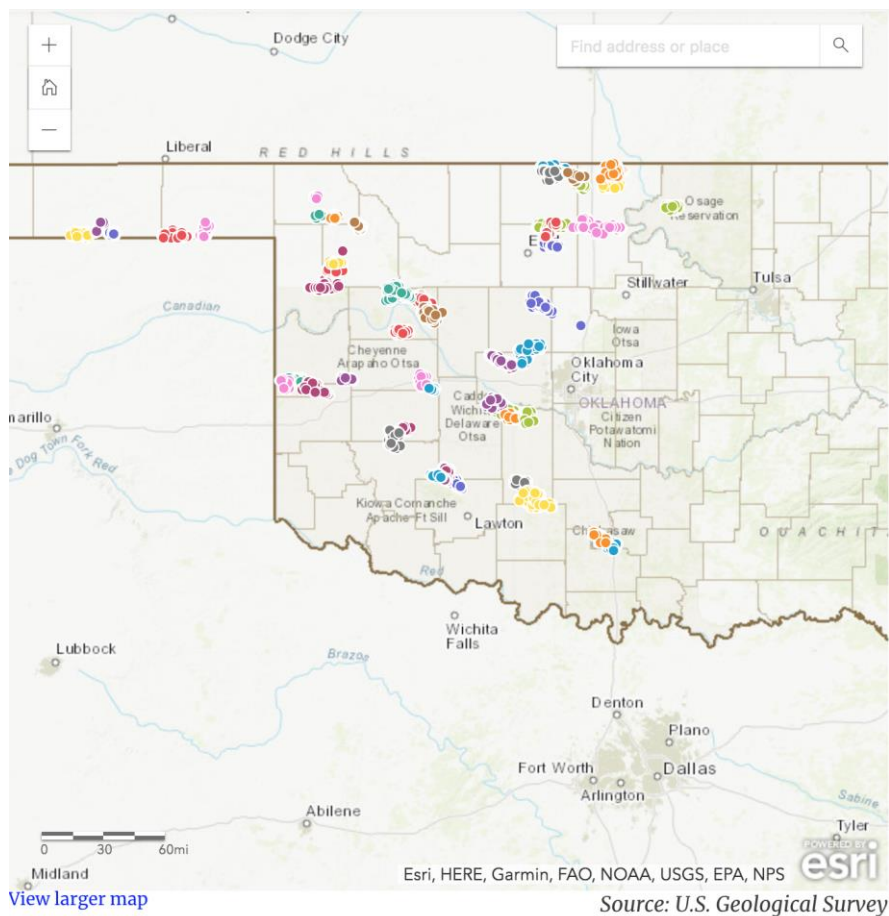


Figure 1: Map of operating wind farms in Oklahoma.

I began to think why not do a research project over wind energy? It wasn't soon after that when Dr. Greene my capstone advisor suggested I consider a study that would be an extension to the Greene and Giesken (2013) case study. I was very eager and excited to take on this challenge of studying the perceptions and socioeconomic impacts of today in regard to the Weatherford wind farm. The curiosity of learning more about wind energy, wind farms, and turbines really motivated me to perform this research. I used many of the same approaches as did the Greene and Giesken (2013) did. The only difference will be the type of content in which I use to gather data and of course the results. I will work closely with Dr. Greene as my advisor who has sufficient knowledge to guide me in my efforts. Overall, I hope to find out what the citizens of Weatherford, Oklahoma perceive of the wind farm nearby. I also hope to be able to draw conclusions that show the differences in perceptions that people may have now compared to when the wind farm was being developed. The results will hopefully show any differences in the socioeconomic impacts as well. The significance of this research will provide new information on what communities consider doing in this era of harvesting cleaner renewable energy. In addition, it will highlight the potential back lash from the public as the development for new wind farms will continue to increase in the coming years.

Research Context

As many may already know wind energy is one of the leading producers in renewable energy. It is considered to be one of the fastest-growing entities of new electrical power capacity in the United States, which could possibly still see growth in the future (Ferrell et. al 2013). However, in the early nineties wind advocates in Washington D.C. got to witness a wind turbine for the first time. It wasn't soon after when they all got to witness the start to what would be the

beginning of potential success for wind power in renewable energy. It began to raise questions like; will wind energy live up to the high expectations of environmentalists? Will it grow and be able to contribute to the industry (Righter, 1996)? Much of the back lash for the development of wind turbines would come from questions like these, with the overall confidence being more of a risk than it would be beneficial.

Oklahoma is a state known for being very windy. It sits right smack in the middle of the central plains where wind tends to come from all directions. According to an article discussing the impacts of wind energy on the state of Oklahoma, wind as a resource has always played a vital role in the development of Oklahoma (Ferrell et. al 2015). Back in the days when Oklahoma wasn't considered a state yet, wind-powered water pumps were the most utilized asset in order to help pump water out of the aquifers making it productive land use (Hays and Allen, 1983). Oklahoma ranks among the top leaders in wind power in the United states and has done so ever since the early 2000s. The way Oklahoma operated in utility-scale wind development was noticeably different however, compared to that of California, Texas, and Iowa. Oklahoma has historically paid the lowest in cost compared to any of the surrounding states making it best for wind energy centers to be placed near lower populated areas (Ferrell et. al 2015).

As there many different wind farms all across the state, this study focuses more on just one area specifically. Weatherford, Oklahoma which is home to the Weatherford Wind Energy Center. This wind farm is located in west central Oklahoma, in Custer and Washita Counties, on the outskirts of the city. The owner of this wind farm is American Electric Power with NextEra Energy being the developer. The Weatherford wind farm is located on about 5,000 acres of land which include 98 GE 1.5 MW turbines with a rated capacity of 147 MW of electricity. This is enough electricity to power approximately 44,000 homes. Each wind turbine is roughly 262 feet

tall from ground to the hub center of the blades. The turbines are placed in a region that is higher in elevation which adds to the daily experience of consistently strong winds. The majority of the turbines can be seen from Interstate 40 as you drive by (Greene and Giesken 2013). It should also be noted Weatherford's identity mainly stems from agriculture but was soon altered after commercial operation began in 2005.

Now that several years have passed, and a study has been produced that discussed the socioeconomic impacts of wind farm development, this literature looks to examine the differences in the public's attitudes and beliefs. After reviewing a handful of study's there seems to be a pool of theories or ideas for how people view wind farms. One of the most commonly critiqued themes known as NIMBY which stands for "not in my back yard" can be attributed to the public's mindset on support or opposition (Krohn and Damborg, 1999). The reason for this concept is to understand that many believe that even though people see wind energy as beneficial to society, their self-interests lead them to think otherwise. Aitken (2010) suggests that individuals who use NIMBY as their driving force are doing so in a deviant manner. In another study it is believed that the NIMBY label is used as an emotional and irrational response (Cass and Walker, 2009). The reason is it is important for us to not look deeply into the meaning of NIMBY and accept it as a form of opposition is because it doesn't really do a good job of telling us why people don't want a commercial wind farm on his or her property. It may provide some sort of explanation for why people make decisions to oppose based on perceived personal costs of wind farms exceeding potential benefits to their society. But the main point to consider is that NIMBY doesn't explain why people who oppose view impacts of the wind farms as too costly or why that the costs exceed the benefits (Bidwell, 2013). There are also other reasons to not rely completely on the NIMBY explanation. In a study done by Linden et al. (2015) two hypotheses

are being examined that helps to bridge the gap between community attachment and municipal economy and the perceived attitudes toward wind power in a local context. The two hypotheses are the community attachment hypothesis and the economic trouble hypothesis. One states that basically for people who live in small municipalities they are likely to display NIMBYism. The other hypothesis explains that municipalities with weak economies have people who have stronger attitudes towards support (Linden et. al, 2015). However, just like the other similar studies it is important for people to understand that the values of NIMBYism are just related to people's opinions rather than actual information that supports positive impacts. In terms of the NIMBY explanation it would be helpful for further research to be done in order to weave out the indicators of impacts in a local context.

In addition, researchers sometimes look past the NIMBY explanation and examine other common themes to explain the public's perceptions on wind farms. Slattery et. al (2012) offers a new approach for why people may support or oppose wind farms in the great plain's regions. Furthermore, wind energy is so abundant and powerful that it would be wrong to overlook (Pasqualetti et. al, 2002). According to Bolinger and Wiser (2009), they suggest wind energy growth in the U.S. is primarily due to federal tax incentives, new stat-level legislation, concerns over climate change, and what will happen with the future cost from electricity which comes from fossil fuels origins. Results from Swofford and Slattery's (2015) study suggest attitudes are mostly based off of environmental issues as well as the economic benefits. In this similar area of focus it was found that people supported wind power in their communities solely due to socioeconomic factors rather than moral values (Slattery et. al, 2012). In other words, people believed wind farms would reverse the economic decline. For the city of Weatherford, economic impacts are identified by county demographics including population levels, education levels, and

economic diversity. As many may know the wind power industry and its development has drastically increased over the last several years. In order for policymakers to adhere to the potential economic impacts from wind power they have to consider the studies done or the input-output models estimates to assess such impacts. With the nearby wind farm research describes that there is a median of 0.5 jobs per megawatt of wind power capacity (Brown et. al, 2012). This example does a great job of supporting the above statements on how wind farms can be the mechanism for economic stability. With regard to the input-output models there can be some issues that have to be dealt with. Brown et. al (2012) suggests that the models tend to assume that all the industrial inputs and factors of production are used in fixed proportions when the other numbers don't quite match up. This could be problematic for wind power numbers in rural areas where the upwardly biased estimates could influence positive local impacts. Another gap needing bridged is the concept of communication. In a study by Khrhn and Damborg (1999), they conclude that the lack of communication between the constituents, developers, and local politicians could lead to the perfect catalyst for converting local skepticism and negative attitudes. Also, this gap can cause misunderstanding because when policies are being discussed and put out on the table negative attitudes can originate from mere communication problems. Politicians tend to have a mindset that the public is knowledgeable on the environmental and economic benefits when it's very possible the public has no idea those important details (Wolsink, 2007). One of the last hypotheses this study will look to examine is the proximity hypothesis. Swofford and Slattery (2010) suggest that people who live closer to a wind farm tend to have greater opposition as well as negative attitudes. However, Dear (1992) argues that "the closer residents are to an unwanted facility, the more likely they are to oppose it."

Analyzing the socio-economic impacts of community wind power involves using an input-output model. It should be suggested that:

community wind power offers ways to generate resources to be re-invested in local development purposes, such as community businesses, social services, and infrastructure. The input–output model is an application of the neo-classical theory of general equilibrium to the empirical analysis of the interdependence between economic sectors, such as industries, consumption and exports and compensations for households and imports. It was originally developed to analyze the connections between different industries within a national economy and is a useful tool for showing the structure of the economy in terms of the flows of goods and services and for analyzing the impacts of changes in final demand (Okkonen and Lehtonen, 2016).

How socioeconomic impacts affect the local economy are very interesting thoughts that will help to determine the public's attitudes towards aspects associated with wind farms. Questions like; Do wind farms really benefit the local economy or do knowledge and communications really play vital roles in how people view wind turbines will be answered.

As Texas is a close neighbor to Oklahoma physically and in the wind industry there have been insightful studies that examine the public's perceptions on wind power development in West Texas. In Brannstrom's (2011) study they were able to find that the perceptions of wind power are multidimensional. This study was done in a region where energy capacity was rapidly on the increase. It is a similar scenario in Weatherford, Oklahoma in which the wind farm is one of the leading producers in the state. There are several factors that play into why it is seen to be a positive perception of wind farm development in western Texas. These factors include place-based experiences, tax incentives, economic change, housing market, and distribution of benefits.

However, the information from the ownership was limited because it didn't allow for much public participation even though it was seen to be helpful in the results. As the U.S. continues to evolve and the competition begins to increase for wind power development and production, Brannstrom et. al (2011) leads us to believe that the overall attitudes from the public should start to be more positive as there is a direct link in relation to the economy of wind-power growth.

Wind energy development is also seen as means to support rural economies. In a paper written by Phimister and Roberts (2012), it goes on to discuss the roll in which ownership plays in the distribution of economic impacts within the rural part of a region. It would raise the question of how local ownership in Weatherford, Oklahoma distributes the economic benefits to it rural community. If GDP were to increase it is said that there would be no effect on household incomes due to no local ownership. It is found that, "local ownership increases the household income benefits but there are still limited positive spill-over effects on the wider economy unless factor income is re-invested in local capital" (Phimister et. al, 2012). Could it be that public attitudes are influenced by how local ownership distributes the benefits?

How can public opinion and policy making be related to each other? Well of course when policies are made it either usually influences public attitude in a positive or negative way. A study done by Firestone and Kempton (2007) looks to examine how public opinion changes through several different factors. It was found that first that public opinion was based off of how the community felt as a whole to off shore wind power. The second was had to do with how the public believed the offshore wind power development would affect the environment. In order to really dive into those perceptions, they had to look into why the individual thought certain things could be impactful which is similar to many other studies. It should be noted that the perceptions from the public differ than those from environmentalists, scientists, etc. and also from the

politicians (Firestone et. al, 2007). If it was possible for the public and politicians to be on the same page, then it might be possible for perceptions to have more of a successful impact.

Data and Methods

This project consisted of several different steps utilizing a mixed-methods approach. Using this approach, it will look to investigate how the presence of a large wind farm nearby effects the public's attitude in the city of Weatherford, Oklahoma. This mixed-methods approach will consist of three parts: a survey, three semi-structured interviews, and economic modeling. I chose to use a mixed approach for two reasons. One is because I wanted to follow the same structure that the Greene and Giesken (2013) case studied followed. The other is because research states that mixed methods approach for qualitative data collection helps tremendously in expanding the scope and by improving the analytical power of the study (Sandelowski, 2000). In research that requires more than one approach, the mixed methods approach proves to be more adequate in gauging the logic than would a one method approach (Palinkas et al. 2015).

When I first began preparing for data collection, I started my process by producing a survey that consisted of about twelve questions which included: demographics questions, knowledge based questions, and awareness questions (See Appendix 1). Survey research has a very long and complex history in geographic research with the overall goal of acquiring information about the public's attitudes pertaining to certain issues (Mclafferty, 2003). The survey had to go through several revision sessions before I could start handing or sending it out to people. Not knowing what this process was about to look like, I began to question how I could get the best results from the survey. So that transitioned into figuring out where the best places in Weatherford were so that I could potentially pass out the survey to get most balanced results. At first, I thought places such as the town hall, public library, and city buildings would be sufficient

enough to give me the best opportunities. I soon found out that making time to travel there would be harder than I had originally thought. After several meetings and consulting with my advisor we decided it was best that I try and figure out a different approach to get my survey out there to the public. So, I began searching some of the best possible ways to do so and with the increasing popularity of social media, in the world today, I thought what better way than to convert my survey into digital form. Moving forward I chose to use Qualtrics which is a, “simple to use web-based survey tool to conduct survey research, evaluations and other data collection activities” (California State University). Through the University of Oklahoma, I was able to use an account to input my survey and create a link to take my survey online. The problem then became what platforms should I push it out through, and can I get permission to post on those specific platforms. I was fortunate enough to have spoken with Mike Brown, the Mayor of Weatherford, during one of my three phone interviews and he was generous enough to let me contact the representative in charge of social media for the City of Weatherford. I contacted Lisa Young with the City of Weatherford and she posted the link to my survey online to both the city of Weatherford’s website and Facebook page. It was a rather slow process as far as response rate went, only receiving about 24 responses over a span of three weeks. After those weeks passed, I had to figure out a way to increase the amount of responses I had got, so I debated on making a trip to Weatherford or contacting more people to post my survey on social media. I asked both the mayor and Lisa Young if they could provide me with another contact and/or post my survey again. Lisa suggested I contact the Weatherford Daily News which is the local newspaper. So, I sent an email to one of the editors and he was generous enough to accept my request. Upon approval the only thing they asked for in return was to see the results from my research. The Weatherford Daily News posted my survey to their Facebook page immediately after approval

and within twenty-four hours I had an influx of responses. I went from just over twenty responses to 134 total responses. I waited a few more weeks and the responses had stopped coming in. Once that process was finished, I began collecting the results and started to analysis process. Qualtrics was such a great tool allowing me to export my data into SPSS and start running the desired tests.

In conjunction with the survey, I performed 3-5 semi-structured interviews with select citizens and representatives from the city of Weatherford. In qualitative research interviews have increasingly become the most common method for data collection. In order to receive responses in greater detail, semi-structured interviews aid in allowing the interviewer or interviewee to dive deeper (Gill et al. 2008). I chose to use interviews as one of the methods for collecting data in this case study because interviewing is different than other approaches in which the participant can engage in conversation with the researcher generating deeply contextual information (Schultze et al. 2011). Once again, I took this method upon myself not knowing what I was going to be in for. After consulting with my advisor, Dr. Greene, we decided it was best I try to call the Mayor, a representative from the economic development division, and one other individual that suited my research objective best. Similar to the discussion about traveling there to hand out surveys, time didn't allow for me to take a trip to Weatherford to conduct the semi-structured interviews. That left me with the option of conducting over the phone semi-structure interviews. I first emailed the mayor asking him for his time and if he would be willing to speak with me for a short period time to answer questions that I had put together for such interview. He responded agreeing to be interviewed over the phone. In order to record our interview, I had to download a voice recorder app on my iPad. I gave him a call and put my phone on speaker and began asking him a list of questions. I developed this list of questions through research of interview questions

about wind energy from online. The questions were designed to gauge the attitude these individuals had about the wind farm in their community. It was structured differently than the survey in order to obtain a variety of response. The list contained 10 questions with a few follow up's pertaining to those questions (See Appendix 2). I asked questions which included: telling me about their opinions on wind energy, how the wind farm has impacted the economy, and how the wind farm has impacted tourism? Mike Brown, mayor, spoke to me the longest giving me lots of insightful information. During this time, I was having a little trouble contacting the two other individuals I was hoping to speak with. Mike was very helpful because he recommended, I speak to both Mike Hickson and Dana Ratcliffe. Mike Hickson works for the Public Service Company of Oklahoma and is stationed out of Weatherford. Dana Ratcliffe is the City of Weatherford Treasurer. I was unable to contact somebody from the Economic Development office mainly because the guy who ran the office was retiring and they had yet to fill that position. My approach was the same for setting up interviews with the other two individuals. I made phone calls and recorder each interview separately. Once all the interviews were recorded, I transcribed each one by playing each recording and writing them in a word document (See Appendix 3).

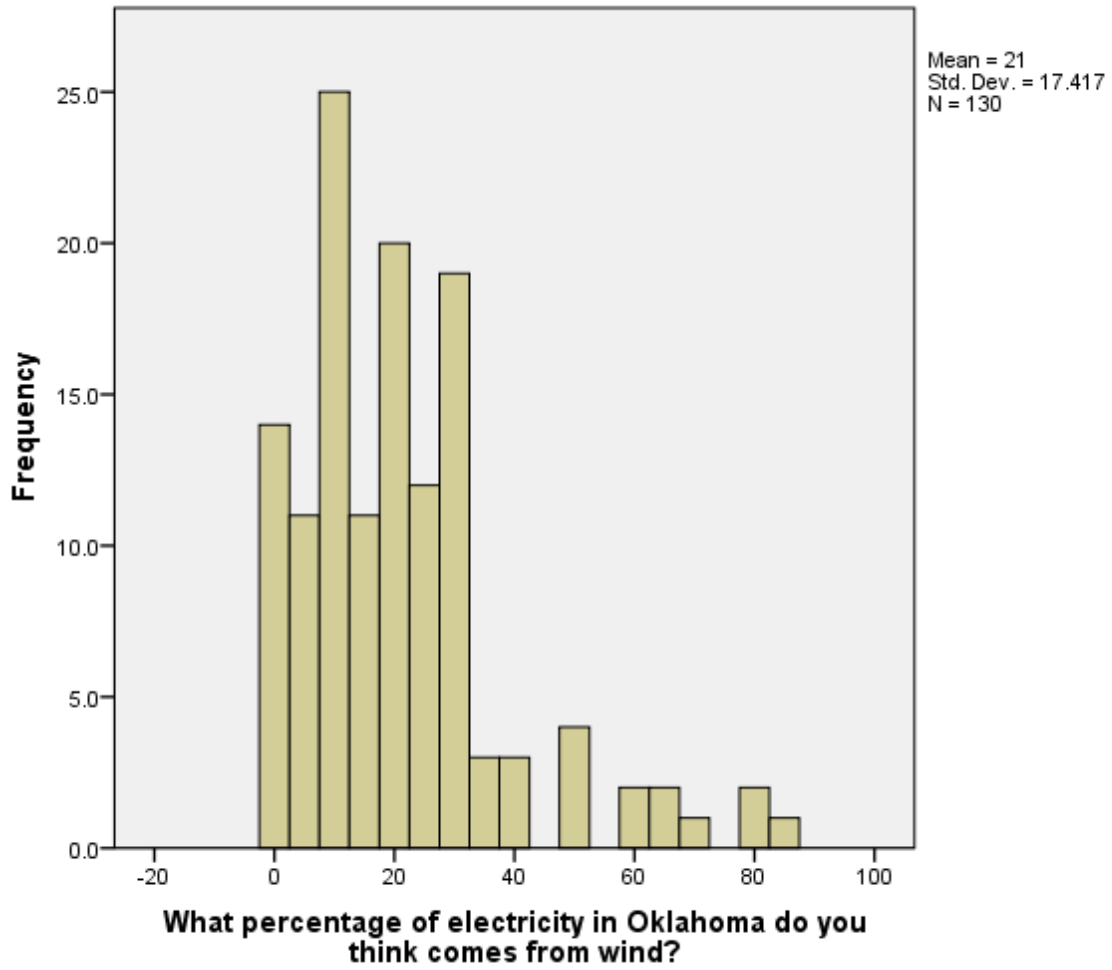
The last step in my mixed methods approach consisted of performing an economic analysis using the JEDI economic model. According to a study produced by Loomis et. al (2016) the Jobs and Economic Development Impacts model helps demonstrate the economic benefits associated with developing wind farms in the U.S. The model provides insight on how revenue is flows through the community due to the wind farm. I first had to download the JEDI land based wind model which was available online (NREL). After the download I opened up the excel sheet and enabled macros on my computer. The great thing about using this model is that all the

computations were already created so all I had to do was input the correct values (See Appendix 4). Most of the project descriptive data values I was able to locate from the City of Weatherford's website about the wind farm. Next, I had to run the summary and the data was then readily available. I can then take the data and determine the direct impacts, indirect impacts, and induced impacts.

Results

In this section I will discuss the results I found from the survey, semi-structured interviews, and economic analysis. The survey consisted of 18 questions. The survey started by asking demographic questions, then the next portion asked knowledge/perceptual questions, and lastly asked questions based off the Likert scale (See Appendix 1). When I began analyzing my results, I started with the knowledge questions. So, for questions 8-11 the survey asked for them respondent what percentage of electricity they think comes from wind, oil, gas, and other sources. In order to interpret these questions, I chose to create histograms to look at the distribution and use One Sample T-Tests to test the mean value from the distribution against the actual percent value for each of those sources.

Figure 1. Distribution of percentage for wind and One Sample T-Test



One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
What percentage of electricity in Oklahoma do you think comes from wind?	130	21.00	17.417	1.528

One-Sample Test

Test Value = 39

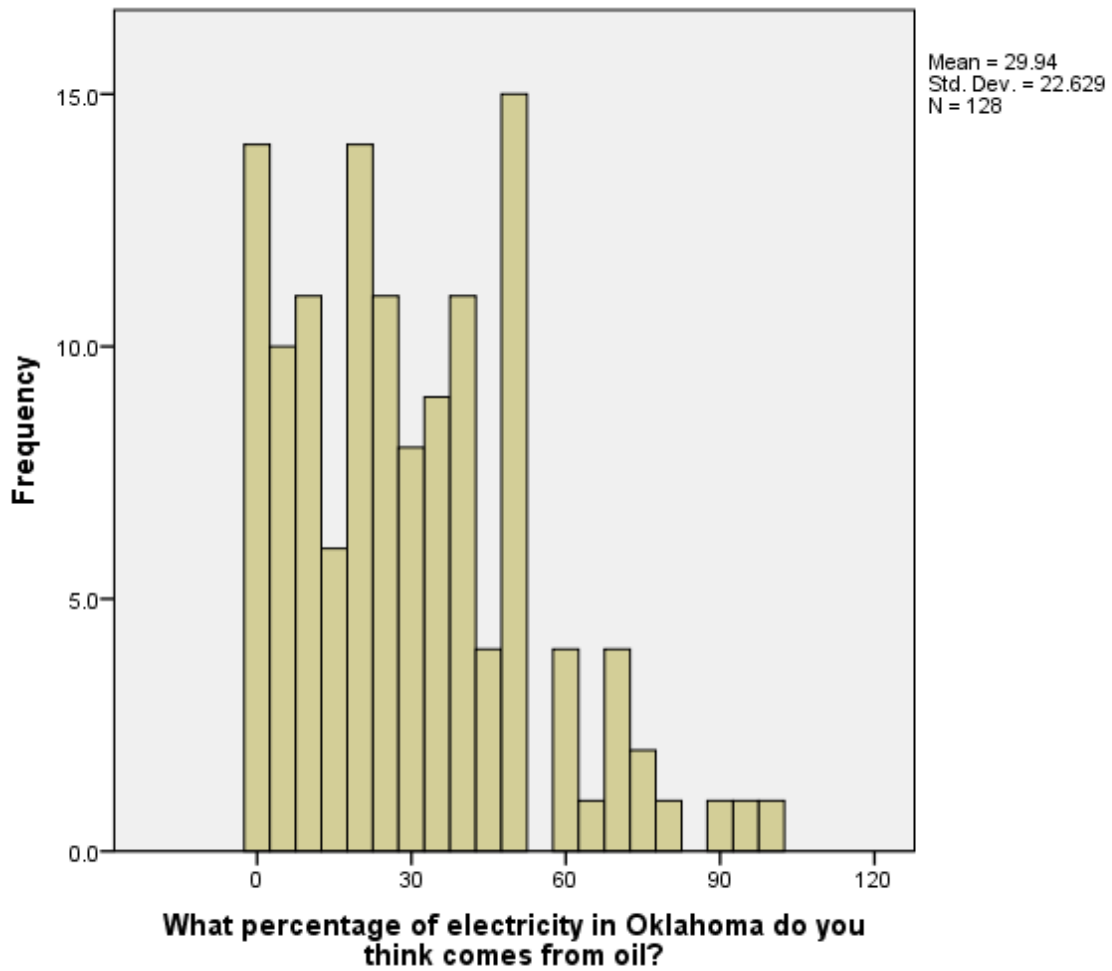
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower
What percentage of electricity in Oklahoma do you think comes from wind?	-11.783	129	.000	-18.000	-21.02

One-Sample Test

	Test Value = 39	95% Confidence Interval of the Difference Upper
What percentage of electricity in Oklahoma do you think comes from wind?		-14.98

In the above figure you can see the distribution is skewed right. The distribution mean is 21, so I took that number and tested against the actual percent value for wind which is 39. The One Sample T-Test returns a statistically significant value which describes the mean as being 2 standard deviations from the actual mean. Therefore, these findings suggest that the public's perception or knowledge is very minimal. The public doesn't have a very good understanding of what percent of electricity comes from wind.

Figure 2. Distribution of percentage for oil and One Sample T-Test



One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
What percentage of electricity in Oklahoma do you think comes from oil?	128	29.94	22.629	2.000

One-Sample Test

Test Value = 1

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower
What percentage of electricity in Oklahoma do you think comes from oil?	14.468	127	.000	28.938	24.98

One-Sample Test

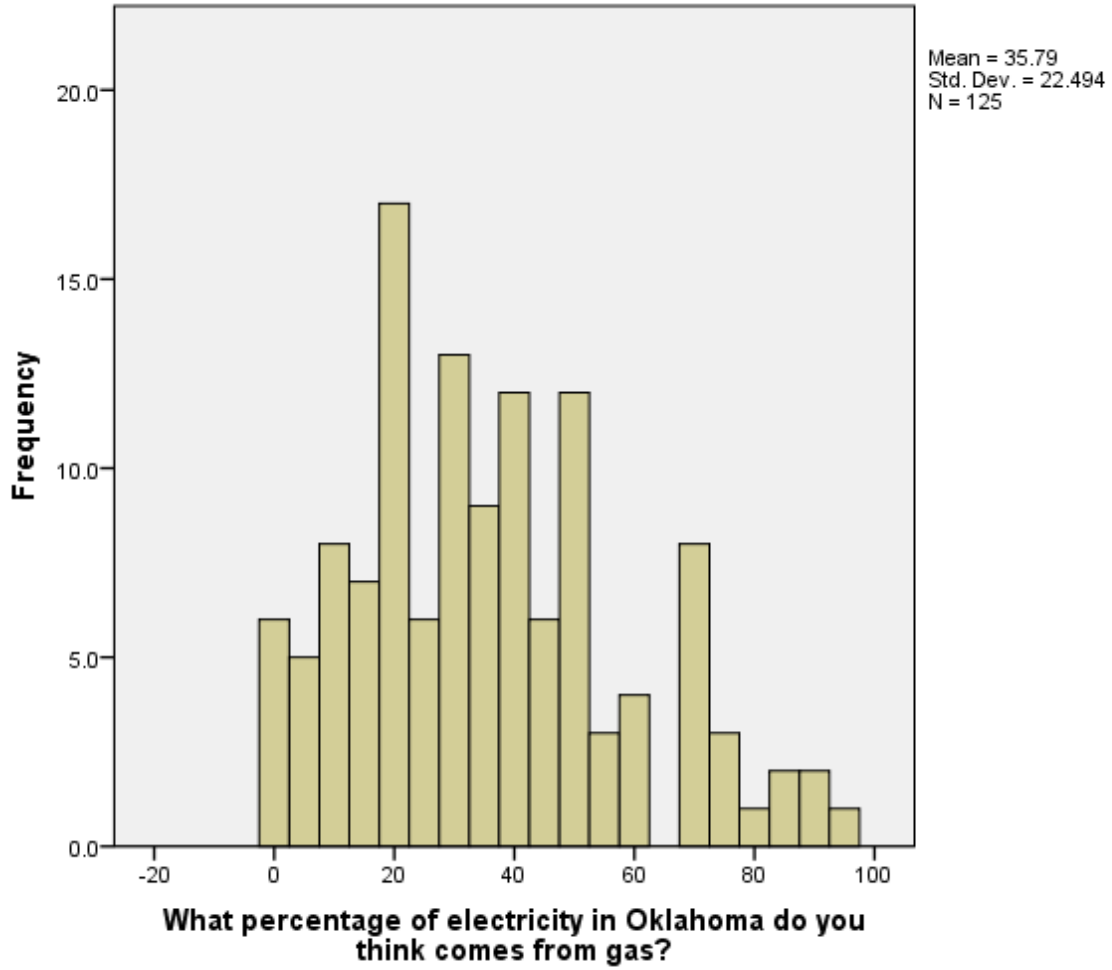
Test Value = 1

95% Confidence Interval of the Difference

	Upper
What percentage of electricity in Oklahoma do you think comes from oil?	32.90

In the above figure you can see the distribution is skewed right again. The distribution mean is 29.94, so I took that number and tested against the actual percent value for oil which is 1. The One Sample T-Test returns a statistically significant value which describes the mean as being 2 standard deviations from the actual mean. Therefore, these findings suggest that the public's perception or knowledge is very minimal. The public doesn't have a very good understanding of what percent of electricity comes from oil.

Figure 3. Distribution of percentage for gas and One Sample T-Test



One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
What percentage of electricity in Oklahoma do you think comes from gas?	125	35.79	22.494	2.012

One-Sample Test

Test Value = 35

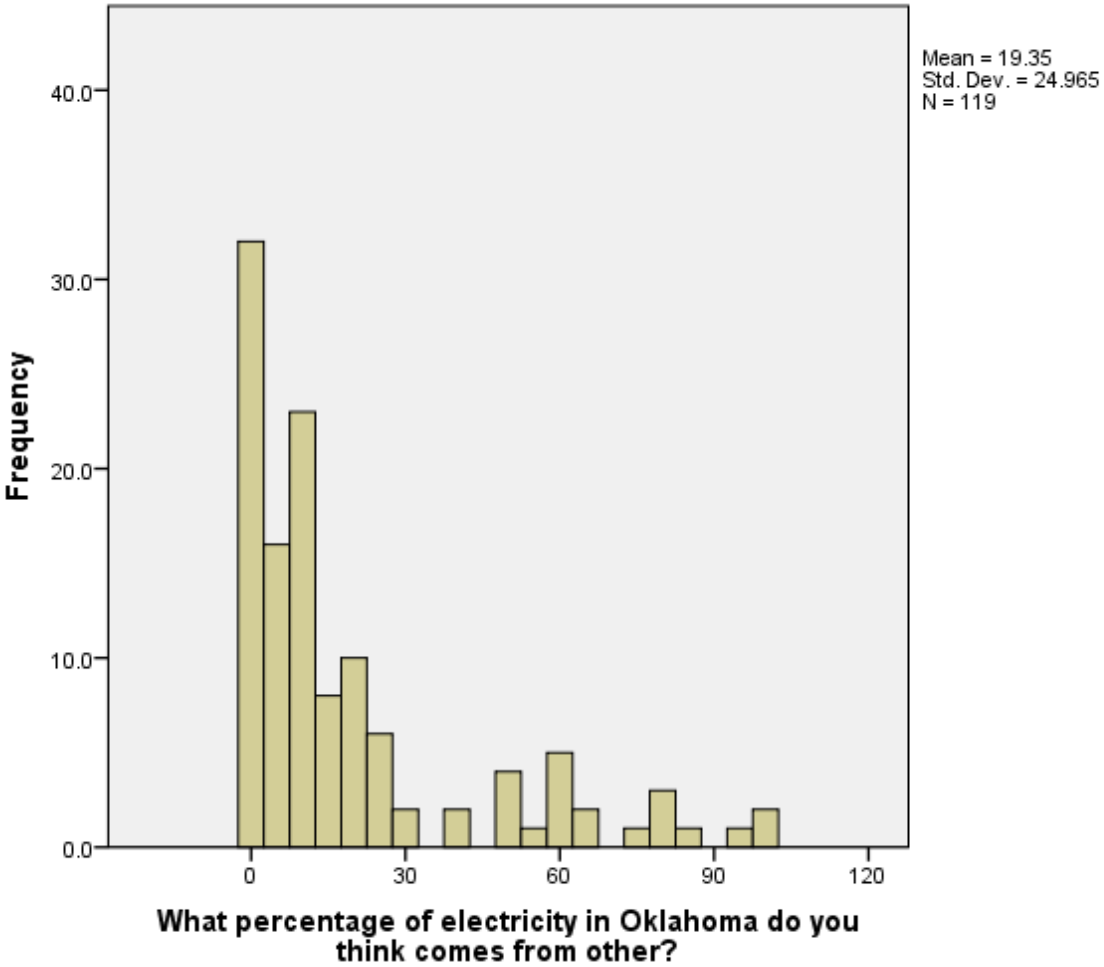
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower
What percentage of electricity in Oklahoma do you think comes from gas?	.394	124	.695	.792	-3.19

One-Sample Test

	Test Value = 35	95% Confidence Interval of the Difference Upper
What percentage of electricity in Oklahoma do you think comes from gas?		4.77

In the above figure you can see the distribution is fairly normal. The distribution mean is 35.79, so I took that number and tested against the actual percent value for gas which is 35. The One Sample T-Test returns a non-statistically significant value. Therefore, these findings suggest that the public's perception or knowledge is very somewhat sufficient. Most of the public has very good understanding of what percent of electricity comes from gas.

Figure 4. Distribution of percentage for other sources and One Sample T-Test



One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
What percentage of electricity in Oklahoma do you think comes from other?	119	19.35	24.965	2.289

One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
What percentage of electricity in Oklahoma do you think comes from other?	8.325	118	.000	19.053	14.52

One-Sample Test

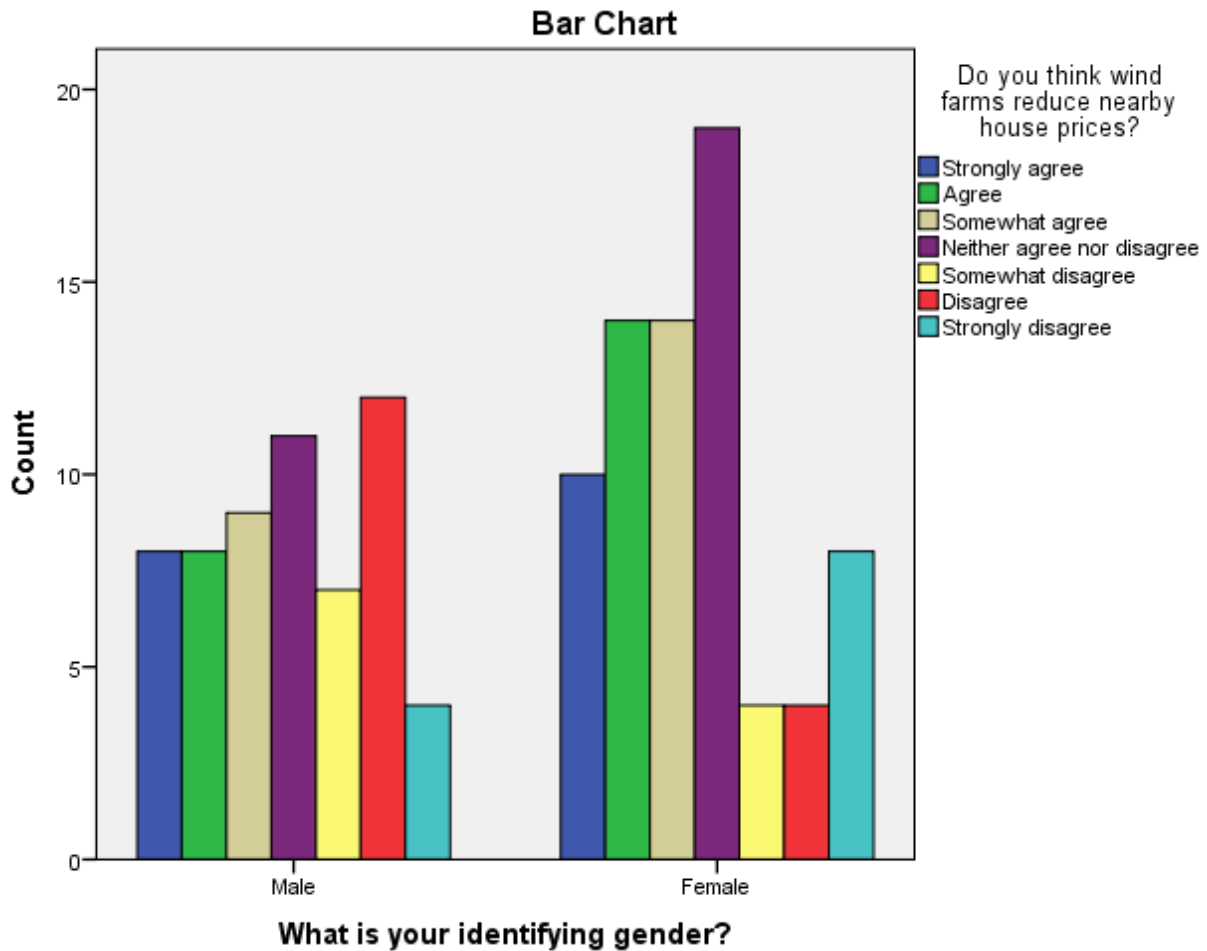
	95% Confidence Interval of the Difference
	Upper
What percentage of electricity in Oklahoma do you think comes from other?	23.58

In the above figure you can see the distribution is skewed right. The distribution mean is 19.35, so I took that number and tested against the actual percent value for the other sources which is 0.3. One Sample T-Test returns a statistically significant value which describes the mean as being 2 standard deviations from the actual mean. Therefore, these findings suggest that the public's perception or knowledge is very minimal. The public doesn't have a very good understanding of what percent of electricity comes from the other sources.

After I analyzed those questions, I wanted to look at the relationships between several categories. In order to interpret these questions, I chose to use the Chi-Squared tests to if there are any significant relationships between several categories. Some of the questions I've decided to look include are gender, education, type of housing, visual, and impacts. When performing these tests there has to be assumptions made first. In this case hypotheses are the assumptions. There are two hypotheses I considered, and they are the null and alternative hypotheses. The null hypothesis states that there is no relationship between the two categories. The Alternative

hypostasis states that there is a relationship between the two. In order to figure out which hypothesis to accept or reject, the significance value is needed. If the significance value is less than 0.05 then we can reject the null hypothesis and accept the alternative. If the significance value is greater than 0.05 then we will reject the alternative and accept the null.

Figure 5. Gender and wind farm reducing nearby house prices



What is your identifying gender? * Do you think wind farms reduce nearby house prices? Crosstabulation

Count	Do you think wind farms reduce nearby house prices?			
	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree
Male	8	8	9	11

What is your identifying gender?	Female	10	14	14	19
Total		18	22	23	30

What is your identifying gender? * Do you think wind farms reduce nearby house prices? Crosstabulation

Count

		Do you think wind farms reduce nearby house prices?			
		Somewhat disagree	Disagree	Strongly disagree	
What is your identifying gender?	Male	7	12	4	59
	Female	4	4	8	73
Total		11	16	12	132

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.856 ^a	6	.131
Likelihood Ratio	10.021	6	.124
Linear-by-Linear Association	1.480	1	.224
N of Valid Cases	132		

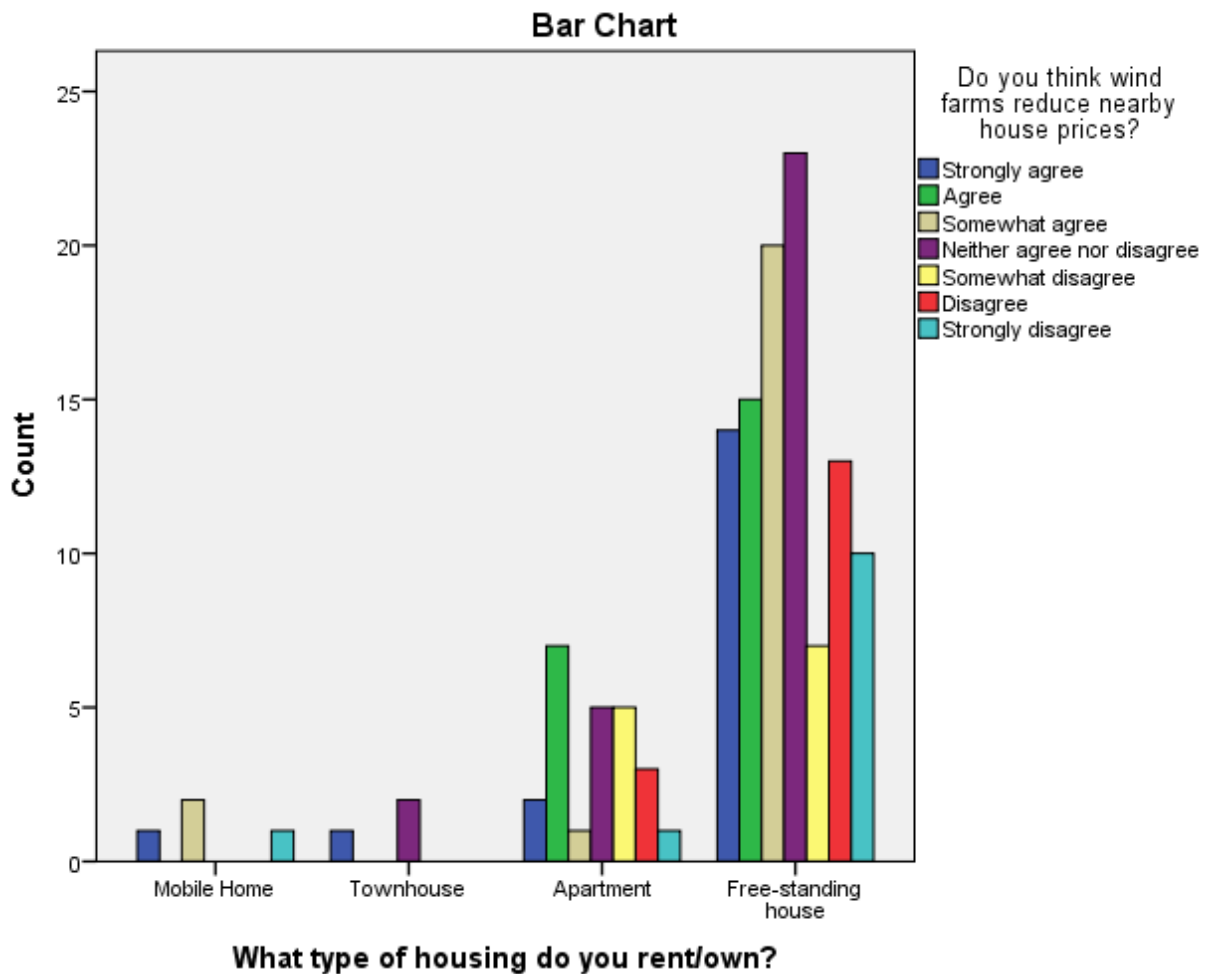
a. 1 cells (7.1%) have expected count less than 5. The minimum expected count is 4.92.

Chi-Squared Results
H_o : There is no relationship between gender and do you think wind farms reduce nearby house prices.
H_a : There is a relationship between gender and do you think wind farms reduce nearby house prices.
Result: Reject H_a there isn't a relationship that exists.
Sig. value: .131

The sig. value for this Chi-Squared test is greater than .05 so I rejected the alternative and accepted the null hypothesis. This suggests that there is no significant relationship between gender and whether or not people perceive wind farms impacting house prices. I chose to show this not because there isn't relationship but because I think it is interesting to look at how gender may affect the way people perceive wind farms.

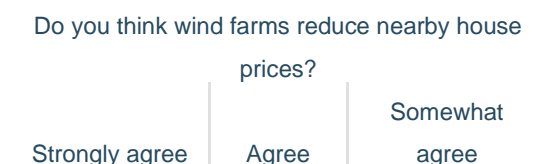
The next Chi-Squared test looks at the relationship between the type of housing people live in and whether or not wind farms reduce nearby house prices.

Figure 6. Type of housing and do you think wind farms reduce nearby house prices



What type of housing do you rent/own? * Do you think wind farms reduce nearby house prices? Crosstabulation

Count



What type of housing do you rent/own?	Mobile Home	1	0	2
	Townhouse	1	0	0
	Apartment	2	7	1
	Free-standing house	14	15	20
Total		18	22	23

What type of housing do you rent/own? * Do you think wind farms reduce nearby house prices? Crosstabulation

Count

		Do you think wind farms reduce nearby house prices?		
		Neither agree nor disagree	Somewhat disagree	Disagree
What type of housing do you rent/own?	Mobile Home	0	0	0
	Townhouse	2	0	0
	Apartment	5	5	3
	Free-standing house	23	7	13
Total		30	12	16

What type of housing do you rent/own? * Do you think wind farms reduce nearby house prices? Crosstabulation

Count

		Do you think wind farms reduce nearby house prices?	Total
		Strongly disagree	
What type of housing do you rent/own?	Mobile Home	1	4
	Townhouse	0	3
	Apartment	1	24
	Free-standing house	10	102
Total		12	133

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	22.498 ^a	18	.211
Likelihood Ratio	24.269	18	.146
Linear-by-Linear Association	.185	1	.667
N of Valid Cases	133		

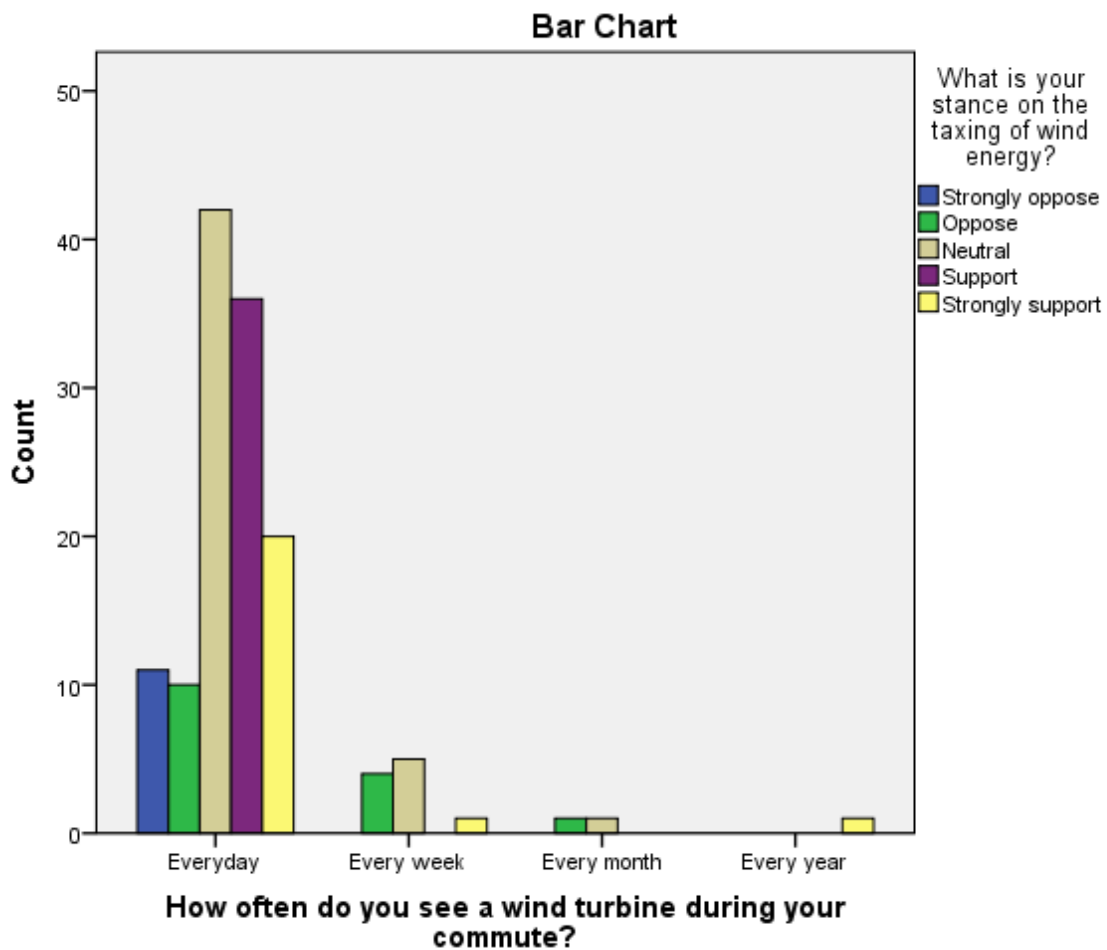
a. 20 cells (71.4%) have expected count less than 5. The minimum expected count is .27.

Chi-Squared Results
H_0 : There is no relationship between type of housing and do you think wind farms reduce nearby house prices.
H_a : There is a relationship between type of housing and do you think wind farms reduce nearby house prices.
Result: Reject H_a there isn't a relationship that exists.
Sig. value: .211

Similar to gender, type of housing doesn't have any significant relationship to whether or not people perceive wind farms reducing house prices. The significance value is greater than .05 so we reject the alternative and accept the null hypothesis. I think however the distribution is interesting to look out and provides some insight on how people who live in free-standing homes may perceive wind farms as more of an impact to house prices than do people who don't live in a free-standing home.

Now I begin to look at the relationship between how often people see a wind turbine on their commute and what their stance is on taxing wind energy.

Figure 7. How often do you see a wind turbine during your commute and what is your stance on the taxing of wind energy



How often do you see a wind turbine during your commute? * What is your stance on the taxing of wind energy? Crosstabulation

Count

What is your stance on the taxing of wind energy?			
Strongly oppose	Oppose	Neutral	Support

How often do you see a wind turbine during your commute?	Everyday	11	10	42	36
	Every week	0	4	5	0
	Every month	0	1	1	0
	Every year	0	0	0	0
Total		11	15	48	36

How often do you see a wind turbine during your commute? * What is your stance on the taxing of wind energy? Crosstabulation

Count

		What is your stance on the taxing of wind energy?	
		Strongly support	Total
How often do you see a wind turbine during your commute?	Everyday	20	119
	Every week	1	10
	Every month	0	2
	Every year	1	1
Total		22	132

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.792 ^a	12	.040
Likelihood Ratio	20.951	12	.051
Linear-by-Linear Association	.085	1	.770
N of Valid Cases	132		

a. 15 cells (75.0%) have expected count less than 5. The minimum expected count is .08.

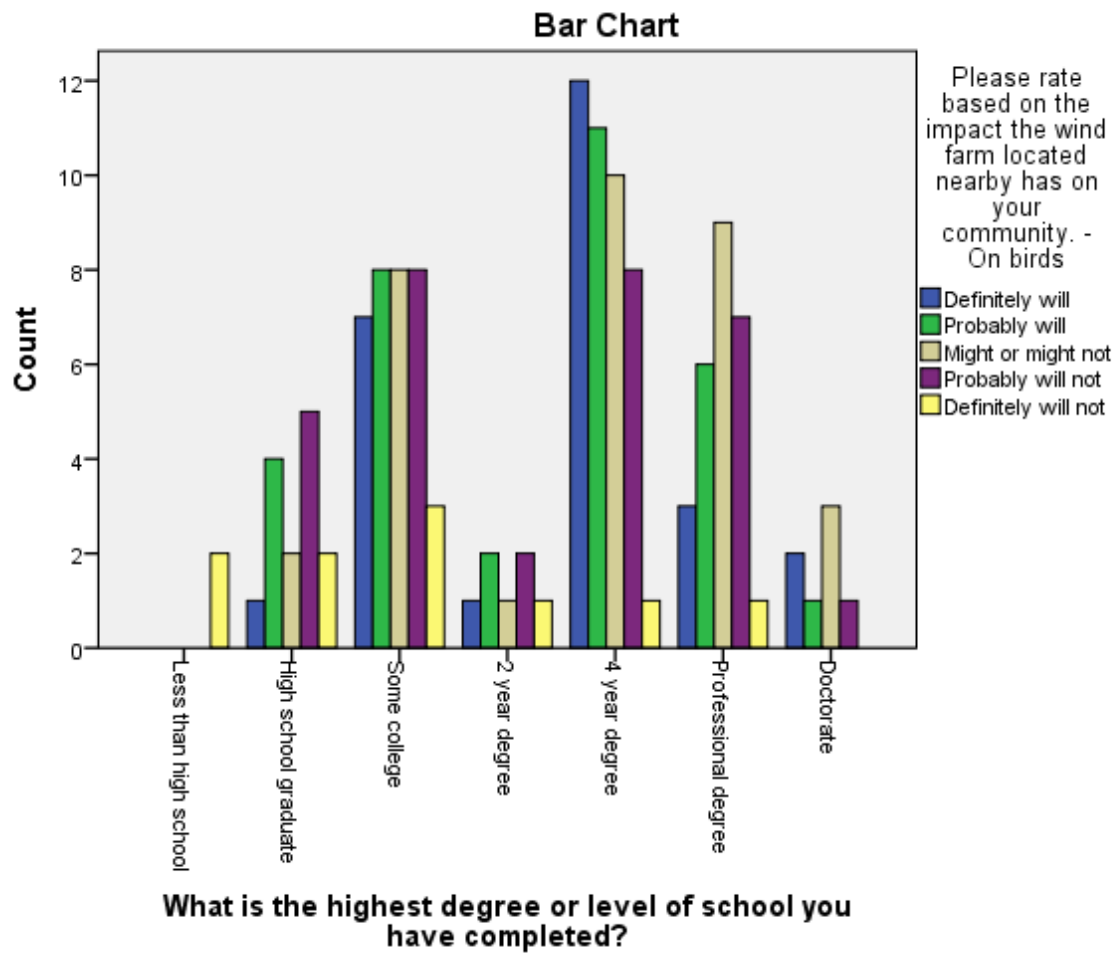
Chi-Squared Results
H_o : There is no relationship between how often do you see a wind turbine during your commute and what is your on the taxing of wind energy.
H_a : There is a relationship between how often do you see a wind turbine during your commute and what is your on the taxing of wind energy.
Result: Reject H_o there is a relationship that exists.
Sig. value: .040

This test proved to be significant with a sig. value less than .05 so therefore we reject the null and accept the alternative hypothesis. This means that there is a relationship between whether or not people see a wind turbine on their commute and if it potentially influences their stance on the taxing of wind energy. I find this very insightful because this suggests that the more people see a wind turbine on their commute the more they think about wind farms.

For the last part of my Chi-Squared testing analysis, I look at the relationships between education and the amount of impact people think the wind farm has on different aspects of the community. In addition to that I look at the relationships between the type of housing and the amount of impact the people think the wind farm has on different aspects of the community.

Figure 8. Education and impact the wind farm located nearby has on your community –

On Birds



What is the highest degree or level of school you have completed? * Please rate based on the impact the wind farm located nearby has on your community. - On birds

Crosstab

Count

		Please rate based on the impact the wind farm located nearby has on your community. - On birds		
		Definitely will	Probably will	Might or might not
What is the highest degree or level of school you have completed?	Less than high school	0	0	0
	High school graduate	1	4	2
	Some college	7	8	8
	2 year degree	1	2	1
	4 year degree	12	11	10
	Professional degree	3	6	9
	Doctorate	2	1	3
Total		26	32	33

Crosstab

Count

		Please rate based on the impact the wind farm located nearby has on your community. - On birds		
		Probably will not	Definitely will not	
What is the highest degree or level of school you have completed?	Less than high school	0	2	2
	High school graduate	5	2	14
	Some college	8	3	34
	2 year degree	2	1	7
	4 year degree	8	1	42
	Professional degree	7	1	26
	Doctorate	1	0	7
Total		31	10	132

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	37.409 ^a	24	.040
Likelihood Ratio	24.433	24	.437
Linear-by-Linear Association	3.735	1	.053
N of Valid Cases	132		

a. 23 cells (65.7%) have expected count less than 5. The minimum expected count is .15.

Chi-Squared Results

H_0 : There is no relationship between education and impact the wind farm has on your community – On Birds

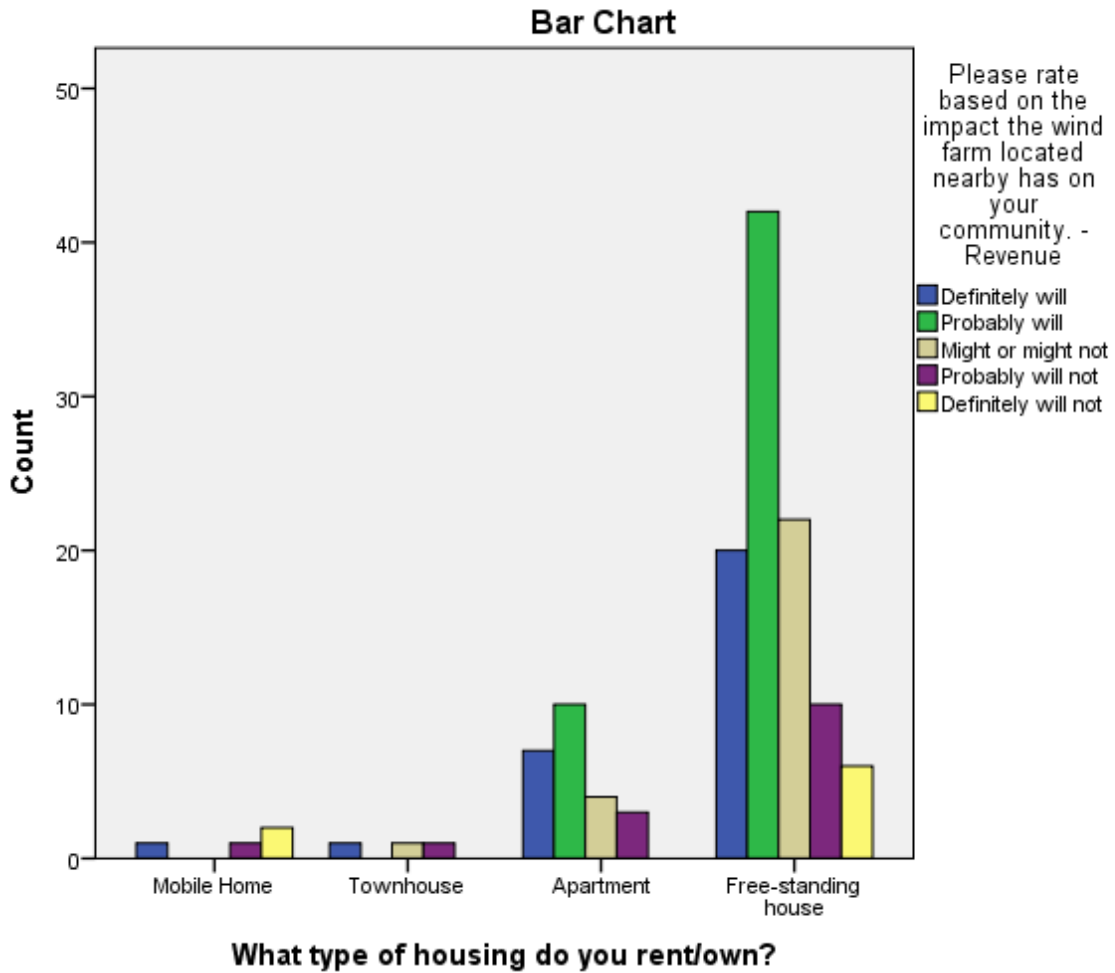
H_a : There is a relationship between education and impact the wind farm has on your community – On Birds

Result: Reject H_0 there is a relationship that exists.

Sig. value: .040

The relationship is significant because we have a sig. value less .05 so we can reject the null and accept the alternative hypothesis. This test suggests that the level of education people have influences their perception on how the wind farm may impact certain aspects of the community.

Figure 9. What type of housing and impact the wind farm located nearby has on your community – Revenue



What type of housing do you rent/own? * Please rate based on the impact the wind farm located nearby has on your community. - Revenue

Crosstab

Count

Please rate based on the impact the wind farm located nearby has on your community. - Revenue

		Definitely will	Probably will	Might or might not
What type of housing do you rent/own?	Mobile Home	1	0	0
	Townhouse	1	0	1
	Apartment	7	10	4
	Free-standing house	20	42	22
Total		29	52	27

Crosstab

Count

Please rate based on the impact the wind farm located nearby has on your community. - Revenue

		Probably will not	Definitely will not	
What type of housing do you rent/own?	Mobile Home	1	2	4
	Townhouse	1	0	3
	Apartment	3	0	24
	Free-standing house	10	6	100
Total		15	8	131

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	21.570 ^a	12	.043
Likelihood Ratio	18.420	12	.104
Linear-by-Linear Association	1.703	1	.192
N of Valid Cases	131		

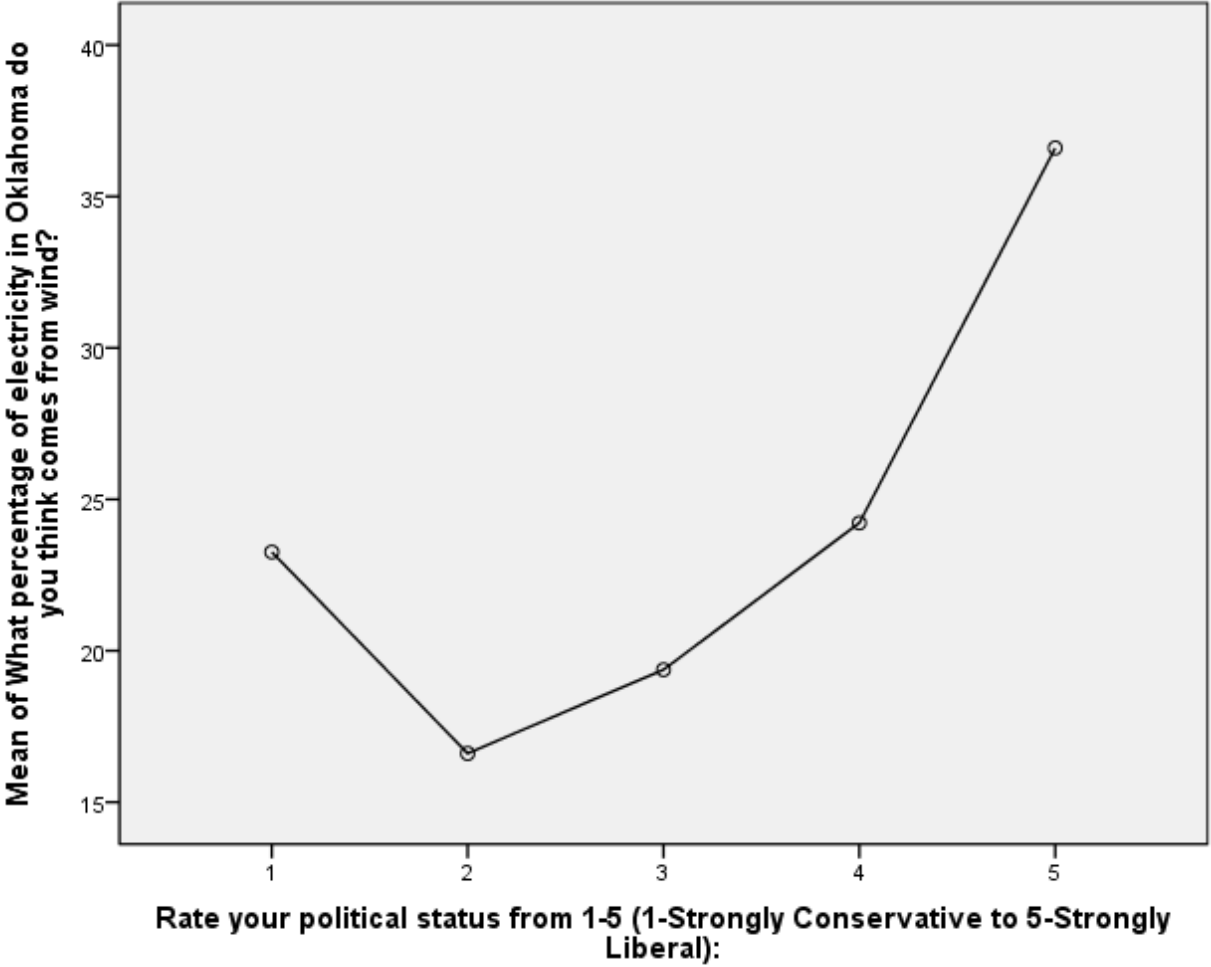
a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .18.

Chi-Squared Results
H_o : There is no relationship between type of housing and impact the wind farm has on your community - Revenue
H_a : There is a relationship between type of housing and impact the wind farm has on your community - Revenue
Result: Reject H_o there is a relationship that exists.
Sig. value: .043

The relationship is significant because we have a sig. value less .05 so we can reject the null and accept the alternative hypothesis. This test suggests that the type of housing people live in influences the perceptions people have on how the wind farm impacts revenue in their community.

The last test I used to look at my survey data in an ANOVA test which compares the means of two or more categories.

Figure 10. What percentage of electricity do you think comes from wind and political affiliation



ANOVA

		Sig.
What percentage of electricity in Oklahoma do you think comes from wind?	Between Groups	.102
	Within Groups	
	Total	
What percentage of electricity in Oklahoma do you think comes from oil?	Between Groups	.597
	Within Groups	
	Total	
What percentage of electricity in Oklahoma do you think comes from gas?	Between Groups	.673
	Within Groups	
	Total	
What percentage of electricity in Oklahoma do you think comes from other?	Between Groups	.770
	Within Groups	
	Total	

There wasn't any significance to this test however I found it very useful in showing how political affiliation may influence how much people know about wind energy.

Now I turn to my results from the semi-structured interviews and begin to analyze them. I called and talked to three individuals from the City of Weatherford. I spoke with Mike Brown (mayor), Mike Hickson (PSO), and Dana Ratcliffe (Treasurer) over the course of two months. Mike Brown talked to me the longest while the other two interviews were sufficient, they were a tad shorter in length. As I started transcribing each of the interviews, I felt the best way to summarize the responses was to establish a set of themes. The three themes I felt were best include: energy that is useful and efficient, great source of revenue/\$ opportunities, and tourism.

Energy that is useful and efficient:

Mayor, Mike Brown:

- “Well I think it’s good I think it’s just you got to have multiple sources.”
- “It’s like hey you know we have got to go where it is the least expensive way for them to produce power and you know that’s what I think they have done.”
- “I think about western Oklahoma within windmills you know here for the last 100 years. So, people understand the concept they understand how it works. One thing about Weatherford if you have ever been here, the wind blows here about every day.”

Public Service Company, Mike Hickson:

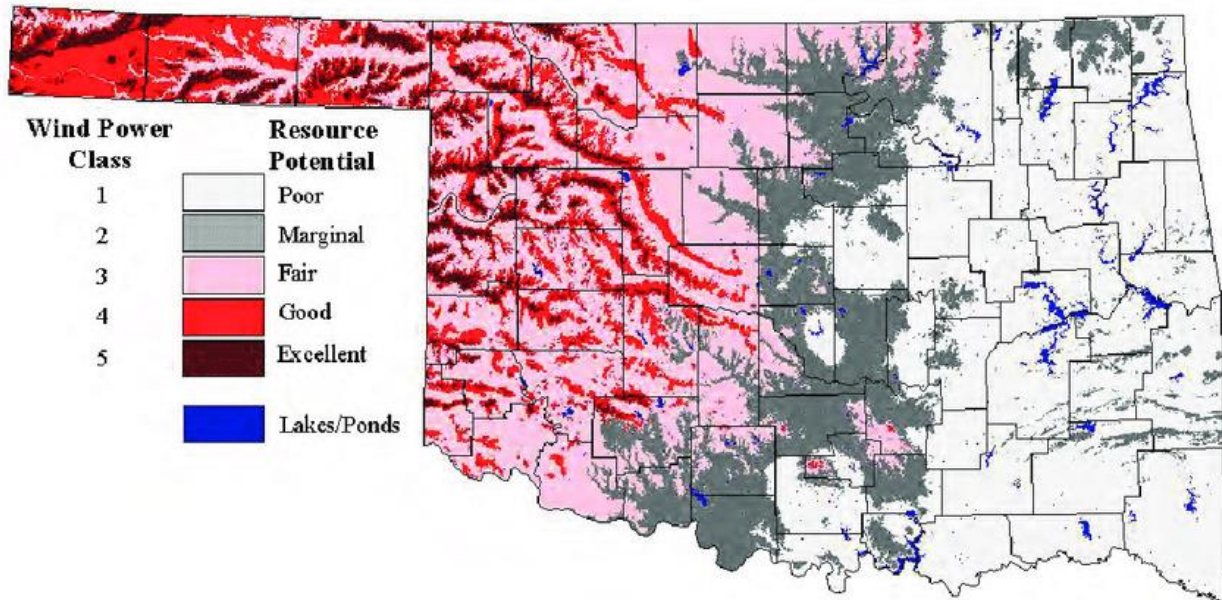
- “I think the positives which several are, is one it’s a clean source of energy. Two it’s a pretty consistent source of energy, meaning we’ve got an abundant supply of wind and it’s windy a good portion of the year. Also, it’s one of the least expensive forms of energy that we can provide.”

Treasurer, Dana Ratcliffe:

- “I think it’s a good source of clean energy.”

I found this information from all three very interesting. The more I thought about it though, it makes a whole lot of sense. I think people may not really fully think about the abundant source of wind the state of Oklahoma sees on a daily basis. You can see just how much wind the state receives in this map below.

Figure 11. Oklahoma wind resource map provided by the Oklahoma Wind Power Initiative



Great source of revenue/\$ opportunities:

Mike Brown:

- “Yeah, you know I think back when they did ours most of the land owners, they received \$4,000 a year per turbine. So, you know if you had 7 turbines you know had \$28,000 what you would receive a year and that was for about a 20 year lease.”

Mike Hickson:

- “With wind energy there is no charge, no extra fuel charge, so the wind is I don’t want to use the term free, but there is no charge for the wind, an additional charge ya know. Right, which is why it is one of the most economical forms of electricity that we can provide.”

Dana Ratcliffe:

- “This next era energy are the people that have these around us, and they do pay the city \$25,000 dollars each year, we have a contract with them. And that has allowed us to do some capital projects with that money and part of that money goes to 4-H like \$500 and \$500 goes to FFA, and \$1000 dollars goes to the Chamber for their dues. And we get to keep the rest of it and use on whatever we want to.”

This portion of the interview I think brings in very important information. It appears a lot of people may not know how money flows in and out because of this wind farm. It clearly has a very stable impact in terms of revenue and presents several opportunities to bring in money.

Tourism:

Mike Brown:

- “We have a little museum we have a couple museums here in town. One of the museums does wind turbine tours you know so if people want to come, they take them out there you know they got a video to show them explaining how they work.”

Mike Hickson:

- “I can tell you though I have taken groups from the Tulsa Global Alliance because PSO is a big sponsoring partner of the Tulsa Global Alliance. And we get engineers in sometimes from Russia and other places from around

the world. And they will come out here and they will get a tour of the wind farm.”

Dana Ratcliff:

- “And then probably tourists stop because of it. Because they want to see the blade and we don’t ever advertise that blade or market that blade or anything. I think it’s because it’s on route 66 and they see it and want to stop.”

This section of the interview also brings in very important information. I include myself as one of the people when driving by can’t help but notice the giant wind turbines operating as the wind blows. Having a museum and a tourist center for the wind farm is a really good way to tell how many people are curious to learn more about them. This suggests to me that they may not know much about them and would like to learn more.

Lastly, I look at the economic impacts from the Weatherford wind farm. I plugged in the correct data into the JEDI model excel sheet and it computed the results. I then took those results and compared them to the JEDI model from the Green and Giesken (2013) case study when the wind farm was being developed.

Figure 12. JEDI Model for Weatherford Wind Farm

Wind Farm - Project Data Summary based on User modifications to default values				
Project Location		OKLAHOMA		
Year of Construction		2005		
Total Project Size - Nameplate Capacity (MW)		147		
Number of Projects (included in total)		1		
Turbine Size (kW)		1500		
Number of Turbines		98		
Installed Project Cost (\$/kW)		\$1,660	\$1,600	without taxes
Annual Direct O&M Cost (\$/kW)		\$28.80	\$28.00	without taxes
Money Value (Dollar Year)		2018		
Installed Project Cost		\$243,990,532		
Local Spending		\$51,037,435		
Total Annual Operational Expenses		\$40,045,529		
Direct Operating and Maintenance Costs		\$4,233,904		
Local Spending		\$1,129,729		
Other Annual Costs		\$35,811,624		
Local Spending		\$558,904		
Debt and Equity Payments		\$0		
Property Taxes		\$0		
Land Lease		\$441,000		
Local Economic Impacts - Summary Results				
	Jobs	Earnings	Output	Value Added
During construction period				
Project Development and Onsite Labor Impacts				
Construction and Interconnection Labor	77	\$4.61		
Construction Related Services	10	\$0.45		
Total	86	\$5.05	\$5.91	\$5.37
Turbine and Supply Chain Impacts	310	\$17.39	\$55.38	\$23.92
Induced Impacts	115	\$5.75	\$17.70	\$9.88
Total Impacts	511	\$28.20	\$78.99	\$39.17
During operating years (annual)				
Onsite Labor Impacts	8	\$0.52	\$0.52	\$0.52
Local Revenue and Supply Chain Impacts	10	\$0.62	\$2.07	\$1.18
Induced Impacts	4	\$0.21	\$0.64	\$0.36
Total Impacts	22	\$1.35	\$3.23	\$2.06

Immediately I noticed that the Installed Project Cost (\$/KW) was slightly different a decade ago to now. The annual direct cost had also increased from \$15.50 to \$28.80. The table results show that many of the costs and expenses have increased since the year it was developed. However, the local spending for both operational expenses and other annual costs have decreased over the last decade. Greene J., 2019 states that direct impacts refer to the changes that occur in the onsite construction which direct final demand, indirect impacts refer to changes in purchase resulting in direct final demand, and induced impacts refer to changes in household spending as the income increases or decreases due to the effects on final demand changes. The table results suggest that the amount of jobs, the earnings, and the output have all increased since development. Since this is true that would prove that the wind farm has served as a stable environment for sustaining jobs and generating more revenue. As the workers receive their paychecks, they tend to go spend more of it within the community which can be seen from the earnings and output values. There has been a tremendous increase in all of these categories compared to the values found in the Greene and Giesken (2013) study.

Discussion:

Many researchers out there believe in the NIMBY narrative. NIMBY which stands for “not in my backyard,” was believed to be a poor source for gauging how people feel towards wind farms. Remember this is because it is very easy for an individual’s self-interests to get in the way of their own intuition of wind turbines being more beneficial for society. It was expected to see past the NIMBY explanation and to receive more in-depth responses for why people believe the impacts of wind farms are either supported or opposed. With the expectations that Oklahoma will continue to be one of the leading producers in installed wind power one can only assume that the industry of wind power it will continue to have an increasing role in the

development of western Oklahoma (Kaldellis, 2011). In comparison to the Green and Giesken (2013) study the results I found from my survey both agree and disagree. When I asked the people of Weatherford to tell me what percentage of electricity comes from wind the majority of people had no idea. The distributions suggested that most of the people underestimated the actual percent of electricity that comes from wind. Therefore, I stated most of the people don't have a good understanding of wind energy. The Greene and Giesken study stated that 75% of the respondents had some knowledge of wind energy. Now it was interesting because their study asked if the public's knowledge had increased since development and 79% of the people said it had. Greene and Giesken (2013) suggested that may be because the wind farm's high visibility may have increased the public knowledge of wind energy. The findings in my study suggested that the more often people see the wind farm the more inclined they are to support wind energy and wind farm development. This would dispute what some of the literature stated above suggests about people who see it wind turbines more often or who live relatively close to wind farms opposing wind energy. The Greene and Giesken (2013) study asked people what their thoughts were on wind farms impacting property taxes and their property values. The study stated that 55% of the people survey felt it had helped the property taxes. In my findings there was no significant relationship explaining how people thought the nearby wind farm would impact reducing nearby house prices. However, it was interesting to see the distribution of the type of housing people live in and whether or not they thought the wind farm reduced nearby house prices. That being said most of the people who owned/rented free standing homes mostly agreed that it did. Again, though there is no relationship stating that is true. The results from the survey suggest that overall many people are uneducated or unaware of the impacts that wind energy has.

The results from the survey don't necessarily provide a sufficient scope to say whether or not the perceptions people have been more positive or negative.

The results from my interview portion of this study really enhance the results from survey. The interviews do a great job of providing a little more emotion than does the survey. I was able to speak with three individuals over the phone and being able to hear them speak their minds was very beneficial to this research. In comparison to the Greene and Giesken (2013) study my interview with the mayor felt very similar and that is partly because he has been there for so long. I can remember the mayor telling me that there were not very many negatives he could think of at all and the Greene and Giesken study stated the mayor said he "could count on one hand the number of people against it". In both studies the mayor explained that Oklahoma is the wind capital of the world. Also, the other two individuals I interviewed stated that the wind is always blowing in Weatherford so that being said it's a great operation. My study was a little different in regard to the people interviewed to that of the Greene and Giesken study. Instead of being able to interview with the economic developer I spoke with the treasurer. Both the treasurer and economic developer seemed to have agreed upon the fact that the wind farm has benefited the local economy tremendously. They both touched on the tourist center there in Weatherford which has also proved to support the city in several different ways. Overall the interview section in my study and in the Greene and Giesken study really help to provide useful information to determine or gauge the perceptions people have. More specifically this section really shows how the people of Weatherford that have been there for a while support the wind farm and development of new wind farms.

Lastly, this study examines the economic impacts the wind farm has on the city of Weatherford. Through the use of the JEDI model my study was able to show the similarities and

differences in economic impacts from the Greene and Giesken study. Even back when the wind farm was being developed Greene and Giesken stated that there is no doubt the development of the wind farm had benefited and had positive impact on Weatherford. With the combination of the responses from the interviews and the economic analysis in this study, Weatherford still is benefiting in a positive way. Some of the literature in this study suggests that the economic impacts have most of the influence on how people view wind energy. I would agree because my results also suggest that Weatherford is benefiting positively and therefore the respondents are more in support of it than against it.

Conclusion:

When this research began, the overall goal was to assess and compare the perceptions and socioeconomic impacts since the Weatherford Wind Farm had been developed. This study was intended to be an extension of the Greene and Giesken (2013) study over the socioeconomic impacts of wind farm development in Oklahoma. The survey and interview results provide a reasonably good idea of how people perceive the wind farm in Weatherford, Oklahoma. The general vibe seemed to be more positive than negative as a result of my findings. As for the public, there may not be a complete understanding of wind energy; However, there is still the potential for a fairly strong understanding to be obtained in which the positive impacts from the wind farm outweigh the negative impacts. In comparison, the Greene and Giesken (2013) study agrees with this study stating there is no doubt Weatherford has been positively impacted from the wind farm

since the development to present day. This study turned out to be fairly successful because I was able to collect plenty of data as well as conduct informational interviews.

If I could go back and do things a little differently I would. I think being able to have gathered my survey and interview questions early enough in advanced helped me obtain very sufficient results, not to mention receiving over 100 responses which I didn't think I would be able to do. However, I think one of my limitations regarding the survey was having questions on my survey that allowed for the respondent to type in whatever they pleased presented some issues. I had to manipulate the data or end up having to throw some of the data out in certain cases. As far as the interviews, it would've been nice to be able to go interview them in person for recording purposes and to be able to gauge their emotions a little better. Over the phone interviews were sufficient enough in this case but being able to conduct in person interviews I believe would've help to enhance the results. Some of my limitations in regard to my interviews included: time, recording errors, and possible misinterpretation while transcribing. I believe further research should be encouraged as the development for more wind farms in Oklahoma is on the rise. It would be interesting to see if communities were to ever push for wind farm development after seeing the benefits other communities have received. I believe there is still just so much to learn about wind energy, and I think this provides a great stepping stone into numerous research opportunities going forward.

References

- Aitken, M. (2010). Why we still don't understand the social aspects of wind power: A critique of key assumptions within the literature. *Energy Policy*, 38(4), 1834-1841.
- Ball, J. (2009). Currents -- Power Shift: Renewable Energy, Meet the New Nimbys --- Solar and Wind-Power Proposals Draw Opposition from Residents Fearing Visual Blight; a Dilemma for Some Environmentalists. *Wall Street Journal*, p. A.13.
- Bidwell, D. (2013). The role of values in public beliefs and attitudes towards commercial wind energy. *Energy Policy*, 58, 189.
- Borst, Alan. (2007). Wind power energizing Rural America: Increasing share of U.S. wind energy sector held by community and producer groups. (Wind Power). *Rural Cooperatives*, 74(6), 10-13.

- Brannstrom, C., Jepson, W., & Persons, N. (2011). Social Perspectives on Wind-Power Development in West Texas. *Annals of the Association of American Geographers*, 101(4), 839-851.
- Brown, Pender, Wisser, Lantz, & Hoen. (2012). Ex post analysis of economic impacts from wind power development in U.S. counties. *Energy Economics*, 34(6), 1743-1754.
- Cass, & Walker. (2009). Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects. *Emotion, Space and Society*, 2(1), 62-69.
- Dear, M. (1992) Understanding and overcoming the NIMBY syndrome
Journal of the American Planning Association, 58, pp. 288-300
- Donnelly, Robert A. *The Complete Idiot's Guide to Statistics*. Alpha, 2007.
- Eltham, Harrison, & Allen. (2008). Change in public attitudes towards a Cornish wind farm: Implications for planning. *Energy Policy*, 36(1), 23-33.
- Ferrell, S., & DeVuyst, E. (2013). Decommissioning wind energy projects: An economic and political analysis. *Energy Policy*, 53, 105.
- Ferrell, Shannon L., and Joshua Conaway. *Wind Energy Industry Impacts in Oklahoma*. Oklahoma State University Department of Agricultural Economics, Nov. 2015, www.okstatechamber.com/sites/www.okstatechamber.com/files/RevisedReport_WindStudy9_3_15.pdf.
- Firestone, & Kempton. (2007). Public opinion about large offshore wind power: Underlying factors. *Energy Policy*, 35(3), 1584-1598.
- Giesken, M. (2007). *Economic Impact of Wind Farm Development in Oklahoma / by Mark Louis Giesken*.
- Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in

- qualitative research: Interviews and focus groups. *British Dental Journal*, 204(6), 291-5.
- Greene, J., & Geisken, S. (2013). Socioeconomic impacts of wind farm development: A case study of Weatherford, Oklahoma. *Energy, Sustainability and Society*, 3(1), 1-9
- Greene, J., & Morrissey, M. (2013). Estimated Pollution Reduction from Wind Farms in Oklahoma and Associated Economic and Human Health Benefits. *Journal of Renewable Energy*, 2013, 7.
- Group, N., & United States. Department Of Energy. Office Of Energy Efficiency Renewable Energy. (2003). Appropriate Methodology for Assessing the Economic Development Impacts of Wind Power.
- Grover, S. (2002). The Economic Impacts of a Proposed Wind Power Plant in Kittitas County, Washington State, USA. *Wind Engineering*, 26(5), 315-328.
- Hays D. and Allen B. (1983) *Windmills and Pumps of the Southwest*, 2.
- Jacquet, J., & Stedman, R. (2013). Perceived Impacts from Wind Farm and Natural Gas Development in Northern Pennsylvania. *Rural Sociology*, 78(4), 450-472.
- Krohn, & Damborg. (1999). On public attitudes towards wind power. *Renewable Energy*, 16(1), 954-960.
- Lindén, Rapeli, & Brutemark. (2015). Community attachment and municipal economy: Public attitudes towards wind power in a local context. *Environmental Science and Policy*, 54, 10-14.
- Loomis, Jo, & Aldeman. (2016). Economic impact potential of solar photovoltaics in Illinois. *Renewable Energy*, 87(P1), 253-258.
- Okkonen, & Lehtonen. (2016). Socio-economic impacts of community wind power projects in Northern Scotland. *Renewable Energy*, 85, 826-833.

- Palinkas, L., Horwitz, A., Green, S., Wisdom, M., Duan, C., & Hoagwood, J. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533-544.
- Pasqualetti, M., Gipe, Paul, & Righter, Robert W. (2002). *Wind power in view : Energy landscapes in a crowded world / edited by Martin J. Pasqualetti, Paul Gipe, Robert W. Righter.* (Sustainable world series). San Diego: Academic Press.
- Phimister, E., & Roberts, D. (2012). The Role of Ownership in Determining the Rural Economic Benefits of On-shore Wind Farms. *Journal of Agricultural Economics*, 63(2), 331-360.
- Rajakumar, D., & Nagesha, N. (2013). ESTIMATING WIND MILL CLUSTER PERFORMANCE: A MULTI-CRITERIA APPROACH. *Journal of Sustainable Manufacturing and Renewable Energy*, 2(1-2), 45.
- Reynolds, C. (2012). *Oklahomans' Perceptions of Wind Energy*
- Righter, R. (1996). *Wind energy in America : A history / by Robert W. Righter.* Norman, Okla.: University of Oklahoma Press.
- Sağlam, &. (2017). Assessment of the productive efficiency of large wind farms in the United States: An application of two-stage data envelopment analysis. *Energy Conversion and Management*, 153, 188-214.
- Sandelowski, M. (2000). Combining Qualitative and Quantitative Sampling, Data Collection, and Analysis Techniques in Mixed-Method Studies. *Research in Nursing & Health*, 23(3), 246-255.
- Sara L. McLafferty. (2003) *Conducting Questionnaire Surveys. Key Methods in Geography*, SAGE, 2003, pp. 129–142.

Schultze, & Avital. (2011). Designing interviews to generate rich data for information systems research. *Information and Organization*, 21(1), 1-16.

Slattery, Johnson, Swofford, & Pasqualetti. (2012). The predominance of economic development in the support for large-scale wind farms in the U.S. Great Plains. *Renewable and Sustainable Energy Reviews*, 16(6), 3690-3701.

Swofford, & Slattery. (2010). Public attitudes of wind energy in Texas: Local communities in close proximity to wind farms and their effect on decision-making. *Energy Policy*, 38(5), 2508-2519.

United States Geological Survey.

Wolsink, M. (2007). Wind power implementation: The nature of public attitudes: Equity and fairness instead of ‘backyard motives’. *Renewable and Sustainable Energy Reviews*, 11(6), 1188-1207.

Appendix 1: Survey

Survey: Perceptions of Wind Farms

Disclaimer: Thank you for taking the time to fill out this survey. As part of a University of Oklahoma capstone project, it is intended to understand people’s perceptions on wind farms. Please read the directions for each portion and answer each question to the best of your ability. Do not write your name on the survey to ensure confidentiality.

- 1) What is your identifying gender?
 - a. Male
 - b. Female
 - c. Non-binary
 - d. Prefer not to say

- 2) What is your ethnicity?
 - a. White
 - b. Hispanic or Latino
 - c. Black or African American

 - d. Asian / Pacific Islander
 - e. Native American
 - f. Middle Eastern

 - g. Other
 - h. Prefer not to say

- 3) What type of housing do you rent/own?

- a. Mobile home b. Townhouse c. Apartment d. Free-standing house

- 4) How many years have you or relatives lived in Weatherford? _____
- 5) Is your immediate family associated with the oil industry, Circle: Yes or No
- 6) Rate your political status from 1-5 (1-strongly conservative to 5-strongly Liberal): _____
- 7) What is the highest degree or level of school you have completed? If currently enrolled,
- Less than high school diploma, High school degree or equivalent, Some college or no degree, Associates degree, Bachelor’s degree, Master’s degree, Professional degree, and/or Doctorate
- 8) What percentage of electricity in Oklahoma do you think comes from wind? _____
- 9) What percentage of electricity in Oklahoma do you think comes from oil? _____
- 10) What percentage of electricity in Oklahoma do you think comes from gas? _____
- 11) What percentage of electricity in Oklahoma do you think comes from other? _____
- 12) How far away do you live from a wind farm in (miles)? _____
- 13) How often do you see a wind turbine from your home?
- a. Everyday b. Every week c. Every month d. Every 6 months e. Every year
- 14) How often do you see a wind turbine from where you work?
- a. Everyday b. Every week c. Every month d. Every 6 months e. Every year
- 15) How often do you see a wind turbine from your commute?
- a. Everyday b. Every week c. Every month d. Every 6 months e. Every year
- 16) What is your stance on the taxing of wind energy?
- a. Strongly oppose b. Oppose c. Neutral d. Support e. Strongly support
- 17) Do you think wind farms reduce nearby house prices?
- a. Strongly agree b. Agree c. Neutral d. Disagree e. Strongly disagree
- 18) Please rate based on the impact the wind farm located nearby has on your community.

	Not very strong	Not strong	Neutral	Strong	Very strong
Visually					
Tourism					
Noise					
On birds					

On habitats					
On the land					
Roads and transport routes					
Revenue					
Health					
Clean energy for future generations					
CO2 savings					
Locally produced energy					
Energy dependency					

Appendix 2:

Interview Questions

- 1) How long have you been the _____ in Weatherford, Oklahoma?
- 2) What are your opinions on wind power?
- 3) What would you say are the positives as well as the negatives that come from the Weatherford wind farm?
- 4) What would you describe as the toughest thing about your job in regard to the Weatherford wind farm?
- 5) What has been the community's response to the Weatherford wind farm?

- 6) Tell me a little bit about how and why your constituents have opposed the nearby wind farm.
 - a. Tell me about how and why your constituents have supported.
- 7) Explain how you handle the moments when people raise concerns about the wind farm.
 - a. Follow up: How aware would you say the public is on the sustainability and affordability of wind energy.
- 8) Can you inform me about how the economy has been impacted with regard to the wind farm?
 - a. Explain or describe the job market difference between the wind energy sector and the oil field sector.
- 9) Describe the affects the nearby windfarm has had on tourism and rural regeneration?
- 10) If you had an opportunity what would you say to people who might be looking to live in Weatherford but are unsure of the nearby wind farm?

Appendix 3:

Interview with Mayor Mike Brown

Well I think it's good I think its just you got to have multiple sources. We've had a good relationship with FPL the company that come in and of course they sell that power to PSO you know which provides our electricity here in Weatherford. So you know that relationship has been good. If it is a way to you know keep the price competitive you know as far as what they charge the consumer then I'm for it. You know I think that you have got to change with time and you know I think that's what PSO and some of the other electric companies have done. It's like hey

you know we have got to go where it is the least expensive way for them to produce power and you know that's what I think they have done.

Yeah, you know I think back when they did ours most of the land owners they received \$4,000 a year per turbine. So you know if you had 7 turbines you know had \$28,000 what you would receive a year and that was for about a 20 year lease. You know I know that has change a little bit now some of them you get a percentage, or the amount you pay is more. But that is what you know they did out here, like I said we had 98 turbines you know times the \$4000 so that is quite a bit of money that is put back into our economy.

There've been a few people that have said well they do put off a little sound kind of like a you know a woosh sounds a woosh sound as they turn I mean you know you would have to be really looking for something to you know to do that. But umm you know like I said I can't think of a lot of negatives that we have experienced that's not to say that some other places might not but that's you know for us hasn't been very negative. But we did have I guess we did have one of them burn up one of them the motors you know burned and you know they had to do that. Then I think one time we had a couple of guys working on them that uhh something happened and they were like dangling from the top. You know but nobody was killed, nobody was injured but you know that was a freak type deal that kind of happens but anyway. It wasn't a pretty sight seeing them up there dangling but you know it all worked out.

You know the umm, yeah I think probably just the potential push back that ugh you know, I guess maybe the things that I can think of is that ugh. You know they are fairly close to town, I mean they don't really surround Weatherford but they are on the west side and south side of Weatherford. And so you know it is potentially you know kind of making your footprint. You know we really can't expand as far as businesses and housing right in the middle of it. You know

I guess we could there are houses all around it as they are now. But you know it kind of you know maybe shrinks that footprint as far as the growth of the city, you know potentially. You know I know they were concerned at the very first about you now we have an airport a municipal airport on the east side of town. And you know they were concerned okay is that going to interfere you know with people flying in and out of Weatherford. It didn't you know they were able to get the you know all the air space approved through FAA and all that. But you know that was a concern, okay is that going to cause danger for the pilots you know that type of thing. But you know really as far as what's been hard about it, you know there have been some communities that have called us that have been looking to put them in. Of course they are looking for partners for as why we shouldn't allow them. You know we've always said they hey it worked for us. You know may not, you know we are pretty wide open out here in western Oklahoma, like I said I can't think of a whole lot of negative.

I think it was positive, just because you know they were, they made basically a donation. You know that money were you know were reinvested into the community and the facilities and that type of thing. We have you know another one of the things they did they set up kind of a community fund that I mean it's not a large amount but like they give us \$25,000 every year for community projects you know we can pick and choose. So, you know we have done a lot of things over the last you know 13-14 years however long they have been here. You know we have done a lot of little projects that we wouldn't have had otherwise without you know the use of that money. So you know they have been a good corporate partner if you will. So you know I think we have always kind of talked more about the positives than we have the negatives. So you know as a result we haven't had a lot of problems.

I guess the, yeah, the things that I've heard, then again this is a very small number, but you know maybe the sound you know that it puts off a little bit of sound. They are concerned that you know maybe that the sound bothers them or they are concerned about what affect it has on the wildlife that maybe it is scaring off you know whatever deer or you know any wildlife they might have you know you know so that has been a concern. You know I don't know, then again, just the you know I think the number of turbines course you know now I mean you know you drive along the highway you know there everywhere, you know it seems like. So I think that kind of bothers some people, its like okay they kind have taken over in so many places and you know they've continued to expand. Even though we were one of the first ones in Oklahoma, you know now, I mean like I said there are plenty of wind farms in the state now.

Yeah, well I think as I mentioned you know for the financial side of it, has been an opportunity for farmers who in some cases have struggled, it is another source of income for them to continue to do their business. You know it has provided jobs for our community you know 8-10 full time jobs I mean in a community like ours 8-10 good jobs that means something. So, you know I think that has been positive. You know I think that just the technology of it all has been you know I mean just thinking about having you know some other ways that don't create any pollution, you know I don't know, it's been kind of that clean energy type thing, anyway.

Course people have their own opinions. You know and I'm more one to talk about the positives of it. So you know if somebody raises that question to me you know I'm probably going to just respond that overall it has been overall that it has been positive for our community. Probably not perfect but yet you know there have been a lot of people that benefit from it. I mean it's, I guess, here is what, honestly the people that have complained the most are the ones that

didn't have the turbines on their property. You know like why somebody next-door they are mad because their next door neighbor got them but they didn't so you know its kind of like so now they are mad now. If they were collecting checks if they were getting a check it would probably be different. But its kind of like, you know honestly, we've had more people calling us how do you get those on your spot instead of how do you not.

Well, you know I think that it probably hadn't been as much talk about it you know as when it first came in , but you know at that time, I think people were looking at the alternative, you know, energy producing thing. So I think that we are all concerned about the planet but you know it's one of those I think that people bought into that. We are not southern California we don't have everybody all in arms about everything that happens. You know but on the other hand I think you know I guess I think about western Oklahoma within windmills you know here for the last 100 years. So people understand the concept they understand how it works. One thing about Weatherford if you have ever been here, the wind blows here about every day. So you know it's one of those they have done well. Of course, they were those turbines you know I think at one time they said they were about 2 million dollars apiece and you know but they said they actually pay for themselves you know in like 7-9 years. You know so it's a money maker or they wouldn't be doing it. And you know but on the other hand you know it's also provided you know I guess maybe some alternative sources. You know the bad part about it is I guess the reliability you know if the wind doesn't blow it's not making any energy. But like I said that doesn't happen a whole lot out here. No it doesn't mean you lose anything it just means they aren't generating during that time. They talked about trying to, you know I don't know anything about as far as storing when its blowing 50mph 10 days straight are they able to store the energy or you know get it while you can.

Yeah you the money the land owner receives for the leases that goes right back into the community. Those people spend that money locally hopefully. You know as I mentioned you got 8-10 full time people with good jobs that you know are a part of our community. You know that probably be the complaints right off.

I think they are pretty similar I mean you know I think like I said the jobs that are out there are good jobs you know. So you know I think a lot of our engineers a lot of them have the background where demand pretty good salaries. So you know I mean the oil field of course is a little more up and down you know than what the wind energy has been for us at least out here it has been steady. So you know I mean I can't say that they are losing employees you know out of the wind energy to go to the oil field, I mean they could but chances are those are pretty good jobs.

Well I think as far as tourism, of course you know we have I40 that runs right here beside and through Weatherford and so you know you've got 30-40 thousand people a day that are traveling that and you know I think most people you know they like to see the wind turbines. And we've got here by city hall one of the wind turbine blades sitting out in the park right beside us just for a visual for people to be able to take a look at those. You know I think its, I'm not saying it is a destination that people you know are driving here just to see those. But we have a little museum we have a couple museums here in town. One of the museums does wind turbine tours you know so if people want to come they take them out there you know they got a video to show them explaining how they work. You know some people want to get up there close and personal so they can do that. So you know we've probably taken advantage of it as much as anybody.

Well you know I guess I would tell them that it is a part of our community. You know they have been established here for 10 plus years you know has been positive for our community. So I wouldn't look at that as a negative by any means. That you know it is kind of a way that we are able to do our part and you know producing clean energy. So you know I certainly wouldn't look at it as a negative as far as trying to convince somebody to come to Weatherford and be a part of our community.

Interview with Mike Hickson, Public Service Company

5 years

Well I think it's a great from of clean energy in Oklahoma, wind is an abundant source. I support it very much.

I think the positives which several are, is one it's a clean source of energy. Two it's a pretty consistent source of energy, meaning we've got an abundant supply of wind and it's windy a good portion of the year. Also, it's one of the least expensive forms of energy that we can provide. As far as any kind of a negative, would probably be just visual. Yes that's correct, it is a good source of income.

Umm, I really don't, I don't see that there is any. One more thing I kind of wanted to give you a little background on. Well when we get power from like fossil fuels from a coal plant or even natural gas or something like that, there is a fuel charge associated with that. So the fuel charge for the coal plant is what is the price of the coal you know that we have to burn. And then so we have to recover that from our customers, now there is no mark up on it we can't make any profit but it is an additional charge. With wind energy there is no charge, no extra fuel charge, so the wind is I don't want to use the term free, but there is no charge for the wind, an additional

charge ya know. Right, which is why it is one of the most economical forms of electricity that we can provide.

Since I've been here, I think it has been very positive.

Well okay, so as far as any opposition, I'd say as far as trying to build new wind farms, there would be opposition from the oil and gas community. And the thought process is that it may take from the natural gas industry. And just to give you an example of that, like PSO is the number 2 purchaser of natural gas in the state of Oklahoma, but we were going to build the largest wind farm in the nation in the panhandle. That got nixed but guess what we still would've been the number 2 purchaser of natural gas in Oklahoma. That is what I'm saying it wouldn't effect but there is that I guess there is that perception and there is lobbying in the oil and gas industry against it. And then the other opposition would be the land owners that just do not want the structures on their land and they don't want to look at them.

It is, it is clean, it provides a source of income for land owners and uhh it provides jobs as well because they have to be maintained. Yes I definitely think it is a good thing for the economy. One is to provide once again an economical source of electricity to keep the rates below the national average as far as talking for Oklahoma and PSO. Because lots of time for businesses to relocate they are looking for a price of electricity and to make sure that it is reliable.

I think just educate as much as you can about it, being renewable, clean, and as far as Oklahoma goes it's good for Oklahoma because we have an abundant supply its one of our resources, we have an abundant supply of we are rich in wind.

I think they are yes, but I think there could be more education on it, absolutely.

Right, the one thing that I do want to let you know is that, there is an option for either for both residential customers and commercial customers for green energy, and so lots of our industrial customers want to have that in their portfolio that they are purchasing green energy. So it is important to them for the environment, the clean environment and to say that they are a part of that.

Well, there is definitely a growing demand for like the wind technicians but as far as pay I really don't know I can't speak on that.

Yeah, I really don't have enough information on that. I can tell you though I have taken groups from the Tulsa Global Alliance because PSO is a big sponsoring partner of the Tulsa Global Alliance. And we get engineers in sometimes from Russia and other places from around the world. And they will come out here and they will get a tour of the wind farm. I've got a connection where we do a lot of that and that is a pretty neat deal to do that. We do so I make a day of it when I schedule. So a portion of it is classroom where you know they can get a presentation on the actual Weatherford wind farm and have a little Q and A time. And then we go out where they can look up inside of a tower of the wind turbine. And that is about as far as they go up to it when they see it in person. Then we will go to the Stafford Air and Space museum and get a tour of that.

Well I tell you what it's just kind of just part of the area, and before long it just kind of blends in and just kind a part of the overall area. And so they really don't make people might there might be a perception that they make noise, they don't make any noise they are quiet. As far as you know I mean unless you are probably right up next to one, you could probably hear it the blade rotate around but it's not loud and it's just kind of nice really when you are kind of out just to look at them and watch them. Yeah, I mean they are kind of intriguing.

I would tell ya I think that we are going to see more, more wind farms. Oklahoma will continue to grow until, we will probably lead the nation. There will be another case like the windcatcher project but probably not quite as large but it will happen again.

It is an important topic and it is perfect for our state, like I said it is renewable energy and we have a good source of supply here.

External affairs manager for the Public Service Company of Oklahoma.

Interview with Dana Ratcliffe, Weatherford Treasurer

Since 2007

I think it's a good source of clean energy. As far as the community here that wind power does not stay here, we don't get to use it. Yes, the way I understand it they send it out in to their electrical grid. I know there is some other government people who say it leaves the state of Oklahoma, but I don't know that for a fact.

Umm, the positives are, they do pay albarium tax, they pay property tax on those to the county. It provides an economic stimulus to the land owners because they lease the land those are sitting on. It doesn't create any pollution. It doesn't stress our already aging infrastructure here, like say manufacturing plant, or things of that nature would. The negatives are the city of Weatherford doesn't get any albarium or any of that property tax. We don't get any property tax. This next era energy are the people that have these around us and they do pay the city \$25,000 dollars each year, we have a contract with them. And that has allowed us to do some capital projects with that money and part of that money goes to 4-H like \$500 and \$500 goes to FFA, and \$1000 dollars goes to the Chamber for their dues. And we get to keep the rest of it and use on whatever we want to. Last year we used part of it, we partnered with the Weatherford's iguana club and put in a playground with some equipment. This year we installed a bridge, we

have a walking trail and a fishing, a small fishing pond and we put in a bridge with it. And then I think we are planning on with some of the money putting in a dog park. The county does get the property tax but we do not.

There's not really anything about it that impacts my job.

Well I think I think they appreciate it being here because we are right on route 66 and across from city hall we have one of the blades out there. And so we get a lot of travelers on route 66 that I've seen stop and look at that blade. And then one of the museums, the Heartland Museum they give tours of those. So different people get to go take tours, usually it's tourists, and they get to go see them up close and personal. So I think that's probably been a positive. Because I can see this blade outside my window and there's people out there constantly looking at it. A full grown man can stand inside the end of it, it just gives perspective of how big those are.

Some of the negatives I've heard, and you talking about from around the community? I mean I don't oppose them, I'm all for any type of business here. Yes, I have talked to some people who own land right around them. And they are supposed to be quiet, and one person I talked to said that their not quiet, that you could hear a slight hum. It's like a vibrating hum. And then some other comments and I don't know if it's just something that people have dreamed up or not. Supposedly they are a hazard to birds, but I don't know that for a fact. That is just some of the hearsay I've heard. But nobody within the Weatherford community has ever, I mean I've never heard anybody say anything about them, other than they are cool to look at.

I don't really, I mean I don't really give comments. If anybody says anything about them, I usually just listen. Because I don't know, I'm not experienced, I've never been up next to one

myself personally. So I don't know if what they are saying you know means anything, usually I just listen I don't offer.

No, I'm pretty sure most people don't really understand how that works. I mean cause I myself don't really understand how those capture energy and where it goes. So I think for the majority of people they don't really understand it either. No, and I don't think even people understand we don't get anything from it as the city. I don't think they realize that.

Well, they have a small staff here, I believe they have about 8 employees. Now nationwide I think they have quite a few, but just right here they only have like 8. So it's a few jobs and of course they do pay property tax. And then probably tourists stop because of it. Because they want to see the blade and we don't ever advertise that blade or market that blade or anything. I think it's because it's on route 66 and they see it and want to stop.

Yes, we have quite a few, we have quite a lot of jobs in the oil and gas industry around. And the support the supporting companies that support those industries to we have quite a few jobs here too. Cause we get sales tax from that and all sorts of things from the oil and gas.

Yeah probably so and people like to photograph those. You know we have really pretty sunsets and so they are fun to photograph with those in it. And then of course people post it on social media, and it gets out. So probably things of that nature.

They don't I mean we don't, if you're living in Weatherford you don't even know they are there because you know at a distance you can't hear them. Umm the only negative I got on that was a guy that lived right practically right under one. But other than that you don't even know they are there. They don't make any noise, they don't like I said they don't create any air and water pollution, they don't use up water and they don't stress our infrastructure.

No, I would say not at all. The positive impact is that Next Era Energy pays the city of Weatherford \$25,000 annually and we get to use that for umm capital projects or anything we see fit. And we try to do something constructive that all the community can benefit from.

Appendix 4:

	A	B	C	D	E	F
8	Additional information is available by pointing to the red triangles located in cell corners and in the FAQ tab.					
9	Only those cells with a white background can be changed (accept new values).					
11	Project Descriptive Data					
13	Project Location	OKLAHOMA				
15	Year of Construction	2005				
16	Total Project Size - Nameplate Capacity (MW)	147				
17	Number of Projects (included in Total Project Size)	1				
18	Turbine Size (kW)	1,500				
19	Number of Turbines	98				
20	Installed Project Cost (\$/kW)	\$1,600				
21	Operations and Maintenance Cost (\$/kW)	\$28.00				
22	Money Value (Dollar Year)	2018				
24	Utilize Project Cost Data default values in analysis? Choose "Y" to accept default values below or "N" to over-ride default values and utilize new user defined values as entered below. See FAQ for related topics.	Y			Press 'Go To Summary Impacts' Button	
26					Go To Summary Impacts	
27	If desired, default values (in cells below - based on Project Descriptive Data entered above) may be restored by pressing the 'Restore Default Values' button. Note: it is not necessary to restore defaults to incorporate default Project Cost Data in system analysis - simply choose "Y" in cell B24 above.				Restore Default Values	
29	Project Cost Data					
31	Construction Costs	Cost	Cost Per kW	Percent of Total Cost	Local Share	
32	Equipment Costs					
33	Turbines (excluding blades and towers)	\$105,116,075	\$715	43.1%	0%	
34	Blades	\$24,609,115	\$167	10.1%	0%	
35	Towers	\$27,245,805	\$185	11.2%	0%	
36	Transportation	\$18,808,395	\$128	7.7%	0%	
37	Equipment Total	\$175,779,389	\$1,196	72.0%		
38	Balance of Plant					
39	Materials					
40	Construction (concrete, rebar, equip, roads and site prep)	\$25,400,122	\$173	10.4%	90%	
41	Transformer	\$2,873,280	\$20	1.2%	0%	
42	Electrical (drop cable, wire,)	\$3,028,632	\$21	1.2%	100%	
43	HV line extension	\$5,532,300	\$38	2.3%	70%	
44	Materials Subtotal	\$36,834,334	\$251	15.1%		
45	Labor					
46	Foundation	\$1,543,593	\$11	0.6%	95%	
47	Erection	\$1,748,338	\$12	0.7%	75%	
48	Electrical	\$2,547,855	\$17	1.0%	70%	
49	Management/Supervision	\$1,322,087	\$9	0.5%	0%	
50	Misc.	\$8,937,600	\$61	3.7%	50%	
51	Labor Subtotal	\$16,099,473	\$110	6.6%		
52	Development/Other Costs					
53	HV Substation					