

# A Comparison of Perceptions towards Wind Power among Local and Foreign Residents of Jeju Island, South Korea

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## Abstract

This article focuses on the attitudes of people towards wind power on Jeju Island. The perceptions of the foreign residents can provide a unique insight into the discussion of attitudes towards wind power. Korea is a newcomer to the development of wind power and Jeju Island is the first place in Korea to provide power by the wind. As Jeju states in its advertising and mottos, “To the world with green wind” and “The world comes to Jeju and Jeju goes to the world,” the Jeju residents are concerned about their world image. The foreign residents can provide perspectives from their experiences in their home country to which the local residents might not have been exposed.

The purpose of the study is to compare the attitudes of foreign and local residents of Jeju Island and see if there is a difference. The results are then compared to the literature. The comparison between the two groups using an independent samples t-test highlights the concerns of the Jeju Island people. On the whole, the Jeju Island people have more concerns about wind power than the foreign residents. The local residents have less general support, more concerns about the environmental effects of wind farms.

Although large general support is found, it is recommended that the local residents’ concerns be considered if Jeju is to meet its carbon free goal by 2030. Public participation can be encouraged through the promotion of knowledge about wind energy in general and about Jeju’s wind energy plans.

**Key Words:** Wind Farm, Wind Power, Public Perceptions.

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# I. Introduction

## 1. Research Background

The adoption of renewable energy technology around the world is gaining pace. In 2010, renewable energy sources supplied 16.7% of global final energy consumption with 8.2% of that total coming from modern renewables. By the end of 2011, total renewable power capacity exceeded 1,360 GW, providing more than 25% of global power-generating capacity (REN21, 2012).

Wind power has become one of the most visible symbols for renewable energy technologies. Worldwide wind power capacity increased 20% in 2011 to 283 GW making this increase rate the largest of any renewable technology (REN21, 2012). At the same time, onshore wind turbine prices fell between 5% and 10% (UNEP 2012).

Energy demands are a reality and driver of the modern economy. South Korea is not blessed with the natural resources that many other developed countries enjoy. Instead, South Korea must import nearly 98% of its energy needs. This puts a significant strain on South Korea and as the country develops, this strain is forcing it to find an affordable and self-sufficient solution. As a result, South Korea is intent on becoming a world leader in renewable energy technology. Since 2008, the former President of South Korea, Lee Myung Bak announced a “Low Carbon/Green Growth” development policy to promote green energy. Part of this plan includes the promotion of wind power.

Jeju Island, famous in Korea for its seemingly endless supply of wind, has become the centerpiece of wind energy development in South Korea. Jeju is the home to the first wind farm in Korea. There are currently eight onshore wind farms and two offshore demonstration sites with plans to build more.

Relationships between local people and governments are an integral part in the development of renewable technologies. Wind power has been met with resistance in all parts of the world, from the first large scale wind power development installations US in the 1990s to the NIMBYs in the UK. Although wind power in general has broad support, the resistance has been fierce at times.

This research will focus on the attitudes of people towards wind power on Jeju Island. Concerned about the rapid growth of wind power developments and possibility of corresponding growing conflicts over wind development in Jeju, this study seeks to find the reasons.

The perceptions of the foreign residents can provide a unique insight into the discussion of conflicts on wind power. Korea is a newcomer to the development of wind power, and Jeju Island is the first place in Korea to provide wind power. They will provide their perspectives from experiences from their home countries that the local residents might not have had. The foreign residents included in this study have enough interest to spend a year or more of their lives living on the island. Their interest in the island might focus around different perspectives than that of the local people.

A comparison between the two groups can give policy implications for future wind power

development. This article aims to: (1) investigate the attitudes toward wind farms between local residents and foreign residents and (2) identify factors that influence local and foreign residents' perceptions toward wind farms if there is any difference.

In order to achieve the aims, the article is organized as follows. Chapter two begins with a discussion on the literature that explains attitudes towards wind farms. Chapter three introduces the survey that was used to measure the attitudes and perceptions of the local and foreign residents of Jeju Island. We also present the hypothesis and describe how the survey is evaluated. In chapter four, the attitudes and perceptions of the residents are compared and the results are presented. Finally chapter five presents the conclusions, policy implications of the research, and directions for future research.

## II. Literature Review

### 1. Attitudes and Perceptions

Although there is not a universal definition of attitude, Gets (1994) argues that attitudes may be defined as enduring predispositions towards a specific aspect of the individual's environment. A person establishes that attitudes are reinforced by perceptions and beliefs and are closely related to the values and even the personality of an individual. Such predisposition may reflect in the way of thinking, feeling and behaving towards a specific entity of reality, for attitudes are structured by three components: cognitive, affective and behavioral (McDougall and Munro, 1994). In this framework and within a wind farm context, the attitudes between local and foreign residents may be described as the group of beliefs, predispositions and the behavior towards specific aspects of wind farms such as clean energy and environmental issues.

Countries that produce wind power tend to have strong overall public support. Studies repeatedly show general support levels towards wind power in general up to 90%. Nevertheless, the minority that does not support wind power can be loud, vocal, and successful. If there is such overall support, the question has been why then does the majority of wind power projects not seem to get off the ground? Researchers have focused on this 'social gap' and why wind power is met with fierce opposition (Krohn & Damborg, 1999; Bell et al, 2005).

There is a large amount of research to date on attitudes towards wind farms coming from Europe and the US. Table 1 shows a compilation of these attitudes from different sources. The table is divided into attitudes for wind power, positive attitudes and attitudes against wind power, negative attitudes. It is interesting to note that many studies are focused solely on negative attitudes rather than positive attitudes. Many factors are repeated throughout the studies such as noise, impacts to

the environment, and unreliability. This table is only a sampling of the numerous studies available. Other studies also commonly show the most heavily weighted negative attitude is the impacts of wind turbines on the landscape.

Positive perceptions towards wind energy in Table 1 follow mainly on the socio-economic path. People who think renewable energy is safe, clean, limitless, and provides energy security commonly have positive attitudes. Also, people who believe climate change must be taken seriously and people who have positive perceptions towards wind power in general will have a generally positive attitude.

〈Table 1〉 A compilation of attitudes towards wind power from different sources

	Attitudes for	Attitudes against
(Simon, 1996) (Krohn & Damborg, 1999)	<ul style="list-style-type: none"> <li>- Renewable energy is very much an alternative to other energy sources</li> <li>- The climate change theory must be taken seriously</li> <li>- Wind energy is limitless unlike fossil fuels</li> <li>- Wind energy is non polluting</li> <li>- Wind energy is safe</li> </ul>	<ul style="list-style-type: none"> <li>- Renewable energy cannot solve our energy problems</li> <li>- Wind turbines are unreliable and dependent on the wind</li> <li>- Wind energy is expensive</li> <li>- Wind turbines spoil the scenery</li> <li>- Wind turbines are noisy</li> </ul>
(Swofford, 2010)	<ul style="list-style-type: none"> <li>- Allows land to be reverted to its natural state</li> <li>- Allows multiple land uses</li> <li>- Is a safe energy source</li> <li>- Is a clean energy source</li> <li>- Is a renewable energy source</li> </ul>	<ul style="list-style-type: none"> <li>- Increases property values</li> <li>- Causes TV interference</li> <li>- Creates a disturbing noise from turbines</li> <li>- Creates a strobe effect from turbine blades</li> <li>- Requires too many number of turbines</li> <li>- Is an unattractive feature of the landscape</li> </ul>
(Wolsink, 2000)		<ul style="list-style-type: none"> <li>- Noise pollution causing annoyance</li> <li>- Spoiled scenery</li> <li>- Interference with natural areas, particularly bird endangerment</li> <li>- Unreliability of the energy supply</li> <li>- The (supposed) expensiveness of wind as a source of energy</li> </ul>
(Devine-Wright, 2005)		<ul style="list-style-type: none"> <li>- Visual Impact (Size, Shape, Color, Landscape or Environmental Context)</li> </ul>
(Graham, 2009)	<ul style="list-style-type: none"> <li>- Attitude towards wind power in general</li> <li>- National good/security of supply</li> </ul>	<ul style="list-style-type: none"> <li>- Cumulative effects of neighboring projects</li> <li>- Proximity to important features</li> <li>- Perception of developer</li> <li>- Economic effects (property values)</li> <li>- Social impact</li> <li>- Local impacts of construction</li> <li>- Local environment</li> </ul>

General attitudes of wind power in places have been found to develop along a U-shaped curve. Attitudes are generally high before a project is announced. Attitudes then turn negative during the development and construction phases, but return to their generally high levels after completion of the project (Wolsink, 2000). Krohn and Damborg (1999) succinctly said, “positive acceptance of wind power is largely based on public attitudes towards wind energy, while negative opposition of wind power is based on negative public attitudes towards wind turbines.”

Researchers once exclusively and still sometimes use only the commonly cited and catchall NIMBY theory behind negative attitudes towards unwanted land uses to describe opposition to wind power. This is despite the fact that recent studies show that resistance towards wind power is complex and cannot simply be attributed to NIMBY alone. Other theories used include place attachment, the theory of social representations (Devine-Wright, 2005) and multi-dimensionalism (Brannstrom, 2011).

Since much of the research towards wind power has been through surveys of attitudes. Aitken in his (2010) study gives us some reminders to think about when we study attitudes towards wind power. Aitken states five key assumptions that are noted through the literature when discussing attitudes towards wind power that the researchers need to watch out for. The five assumptions are as follows: the majority of the public supports wind power; opposition to wind power is therefore deviant; opponents are ignorant or misinformed; the reason for understanding oppositions to overcome it; and trust is key.

Each of these assumptions has some major flaws. The public support of wind power is not static, and in fact has shown overall declines in recent years. Support for wind power can follow a U-shape. (Wolsink 2000) Support for wind power is shown to be initially strong, dips during the planning phase, and then regains support after completion of the project.

Aitken’s other assumptions found in the literature include that because wind power continues to have such high support, the opposition is then categorized as ‘deviant.’ This view encourages researchers to consider opponents to wind power simply as something to overcome rather than to learn from them or incorporate their view. People who oppose wind farms might have good reasons for their opposition and it is the researcher’s role to find the reasons and explain how both sides can benefit.

## 2. Clean Energy and Environmental Issues

One factor that influences people’s perceptions towards wind power is their perception towards clean and green energy in general. The biggest factor driving wind energy development is the movement towards clean, green and renewable energy. As the world becomes increasingly aware of the effects of climate change, countries are taking action to reduce the effects of fossil fuels.

Wind energy has become the symbol of the green energy movement. Wind turbines among a grassy field with blue skies in the background can be found on advertisements, and magazine covers of anything promoting renewable energy. Pictures of peacefully rotating turbines in the breeze are clearly marketed producing the opposite feelings of large smokestacks spewing large amounts of pollution into a smoggy sky. Support for wind energy in general is inescapably linked to that of clean energy.

Opponents of wind energy often remark about the unreliability of the wind. The wind does not always blow. Wind power companies often provide statistics of the kilowatt (KW), megawatt (MW), and gigawatt (GW) production power of a turbine, but if the wind is not blowing, the turbine produces no electricity. In fact, a reasonable capacity factor of a wind farm is 20% (Lu et al, 2009). There is also nothing more harmful to the perceptions of wind power than that of a strong breeze blowing but a turbine standing still. Turbines require maintenance and the upkeep of a wind farm is highly visible and easily scrutinized. A local town that is being compensated for the use of their land for a wind farm that sees a turbine standing still only sees money that is being thrown away.

Survey researchers often include questions about clean energy and find broad support. Theron et al. (2011) produced a study in Central Illinois on the public's beliefs and attitudes towards wind energy. They found that 82% of people in the community support wind energy. The people in the community believed that wind farms are good for the environment, jobs, and rural development. They also found that the people believed wind energy's top attribute is the reduction of foreign oil dependence. Slattery et al. (2012) suggest approaching wind energy from a perspective of a clean and safe source of energy is more persuasive than arguing for more renewable sources of energy based on reducing our carbon footprint.

As Pasqualetti (2004) elegantly states, "Like the gold rush of the 1850s, the modern wind rush started in California." The modern wind farm first appeared in the 1980s with the development of Altamont Pass outside of environmentally progressive San Francisco. The developers were expecting widespread acceptance but were surprised at the fierce resistance (Pasqualetti, 2004). The irony behind wind power, the environmentally friendly energy source, is that even though it started with lofty environmental goals to abate climate change, the origins of its resistance had environmental origins.

Throughout the literature, in other parts of the US and in many places in Europe, opposition towards wind energy trends towards an environmental standpoint. The complaints developers face about wind energy include such factors as noise, damage to wildlife, and damage to scenery. These complaints lead to negative perceptions of wind power development.

Environmental effects are found in many studies to affect resident's opinions more than other factors. Visual impact is a major factor in the reaction of the public to the development of new wind farms (Molnarova, 2012). Perceived unity of the environment and personal attitude toward

the effects of wind turbines on landscape aesthetics and recreation caused intentions to oppose according to Johansson and Laike (2007). On the other hand, Warren and McFaydyen (2010) found that visual impact is one of the most significant concerns but majorities regard wind turbines visual impact as positive.

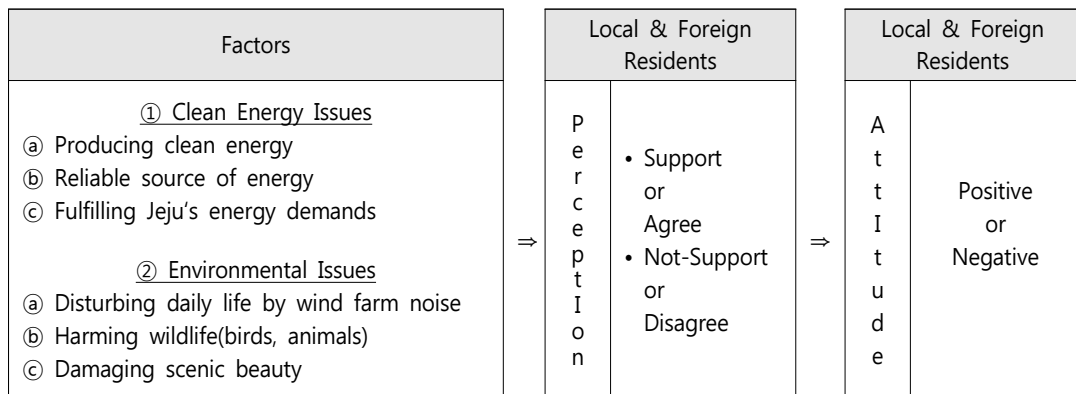
The environmental conflict is an interesting conflict because the environmental benefits of wind energy are the reasons given for its implementation over fossil fuels yet it's other environmental negatives that cause the conflict. Warren et al (2005) call this unique conflict the "green on green" conflict that puts environmentalists against environmentalists.

Public perceptions about wind turbines killing birds also persist. Damage to birds, animals, and wildlife are a commonly cited problem by environmental groups opposed to wind power. The fierce resistance came after the experience of California's first large-scale wind farms in Altamont Pass mentioned earlier (Pasqualetti, 2004). Hundreds of birds were killed including 39 golden eagles per year. Pasqualetti lists many resources that show that Altamont might have been the exception rather than the rule and that although it is true that wind farms can hurt bird populations, the damage can be greatly exaggerated. Mortality rates should be kept into perspective, especially when compared to everyday common thing such as glass windows, house cats, automobiles and airplanes.

Johansson and Laike (2007) performed a study on the importance of visual perception and attitudinal factors in public intention to oppose wind farms. They found that if the turbines didn't fit in with the landscape, the residents were more likely to oppose. On the other hand, if the residents showed positive perception to the environment or wind turbines, these attitudes should be strengthened.

Based on the previous research that we examined, we identify factors that influence people's perceptions (either support or not-support) towards clean energy and environmental effects of wind power leading towards their attitudes (either positive or negative) for wind power. A research model Figure 1 is built by a sequential relations, factors affecting perceptions and perceptions forming attitudes of local and foreign residents on wind farm.

<Figure 1> A Research Model



### III. Research Methods

#### 1. Survey Design

To meet the objectives of this research, a quantitative approach was utilized. A questionnaire survey was distributed that highlights dimensions of support or opposition towards wind farms on Jeju Island.

The questionnaire survey focused on comparing the support, opposition, and perceptions of wind power among foreign residents and Korean residents. The questions were chosen and categorized based on the research of Wolsink (2000) and Devine Wright (2005). Seven questions about perceptions focus on the following topics: general support for wind power, clean energy, and environmental issues.

The survey was written in English and translated into Korean before distribution. The cover letter gave a brief introduction describing the purpose of the survey as a comparison of attitudes of local and foreign residents. The cover letter then gave a brief description of the current state and plans of Jeju's wind energy projects. After the twenty-three survey questions, the survey contained six demographic questions asking gender, age, education, employment, and location in Jeju.

The questionnaire survey was distributed face-to-face during October of 2013. The local residents were chosen due to their location throughout Jeju Island. The foreign residents were sampled face-to-face at two different events as well as through surveys sent through email. As the survey for the foreign residents was written in English, only residents who have full command of the English language were selected. All samples chosen were assumed to have some knowledge or experience with wind power.

#### 2. Hypothesis

As stated before, the purpose of this study is to investigate the local and foreign attitudes and perceptions towards wind power on Jeju Island and compare the opinions of the local residents and the foreign residents to see if there is any difference.

The perceptions of the foreign residents can provide a unique insight into the discussion of conflicts on wind power. Korea is a newcomer to the development of wind power, and Jeju Island is the first place in Korea to provide wind power. They will provide their perspectives from their home country's experience that the local residents might not have had. The foreign residents included in this study have enough interest to spend a year or more of their lives living on the island. Their interest in the island might focus around different perspectives than that of the local people. A comparison between the two groups can highlight the concerns of the Jeju Island people.



The results from the survey provide data from two different groups, local residents and foreign residents. Thus, the data is analyzed using bivariate statistical methods using SPSS version 17.0. The same survey was distributed to both the local residents and to the foreign residents. Means of the local, Korean residents ( $M_l$ ) are compared with the means of the foreign residents ( $M_f$ ) using the independent samples t-test. Research (alternative) hypotheses ( $H_a$ ) are built as follows:

$H_{a1}$ : The attitudes towards wind farms are not the same between local residents and foreign residents in Jeju.

$H_{a2}$ : The perception that wind farms produce clean energy is not the same between local residents and foreign residents in Jeju.

$H_{a3}$ : The perception that wind power is a reliable source of energy is not the same between local residents and foreign residents in Jeju.

$H_{a4}$ : The perception that we should use more wind energy to fulfill Jeju's energy demands is not the same between local residents and foreign residents in Jeju.

$H_{a5}$ : The perception that the noise from wind farms disturbs your daily life is not the same between local residents and foreign residents in Jeju.

$H_{a6}$ : The perception that wind farms disturbs birds, animals, and their natural habitats is not the same between local residents and foreign residents in Jeju.

$H_{a7}$ : The perception that wind farms damage areas of scenic beauty is not the same between local residents and foreign residents in Jeju.

## IV. Empirical Results

### 1. Descriptive Statistics

In total, 210 surveys were collected. From the foreign resident population, 101 surveys were returned and from the local Korean resident population, 109 surveys were returned. To minimize statistical error, the distribution method ensured that a total of 210 surveys were returned ( $n = 210$ ).<sup>1)</sup> Of the total, both groups Korean and foreigners, were evenly represented. 110 surveys (52%) came from the local Korean community and 101 surveys (48%) were from the foreign community. The surveys completed were used in the statistical analysis.

Jeju is divided administratively into two city regions and two rural regions. Jeju City is located

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1) This study originally distributed face-to-face, 110 surveys to local Korean and foreign residents each. However, some returned surveys (9 from foreign residents and 1 from local residents) included missing information, resulting in 101 surveys from foreign and 109 surveys from local Korean residents.

in the north and Seogwipo City is located in the south. The rural regions are divided by a longitudinal line that divides in half with Jeju rural areas in the north and Seogwipo rural areas in the south. Since proximity to wind farms is an important factor in this study, a relatively even distribution of location was strived for and came out rather well in the Korean sample. Jeju City provided 33 surveys (31%), Jeju rural areas provided 25 surveys (23%), Seogwipo City provided 31 surveys (29%) and Seogwipo rural areas provided 19 surveys (18%). In the foreign sample, as most foreign residents on Jeju live in Jeju City, the distribution turned out as expected with Jeju city providing 52 surveys (52%), Jeju rural areas 10 surveys (10%), Seogwipo City 13 surveys (13%) and Seogwipo rural areas bringing 23 surveys (23%).

Gender in the local resident population distributed well with 57 males (52%) and 52 females (48%). Age was also well distributed within the local resident population with 19-29 year olds bringing 34 surveys (31%), 30-39 year olds bringing 26 surveys (24%), 40-49 year olds bringing 22 surveys (20%) and those over 50 bringing 27 surveys (25%). In the foreign resident population, gender was relatively evenly distributed with 57 males (57%) and 43 females (43%).

Unfortunately, the foreign sample represents a younger group with 19-29 year olds bringing 49 surveys (49%), 30-39 year olds bringing 43 surveys (43%), and those over 40 years old brought 7 surveys (7%). Although this sample does not match up well, this younger sample is likely representative of the foreign resident population of Jeju. There are very few from the older generations living in Jeju.

While many of the local population (29%) has only a high school diploma, nearly all (98%) of the foreign population has some university or higher. The local population is more evenly distributed than the foreign population in terms of employment with most Koreans working in manufacturing, retail, and service jobs (28%). The foreign residents heavily represent the public sector (41%) and the private sector (50%), or they are students (8%). In contrast, only a total of 20% of the Korean sample works in the public and private sectors combined.

The biggest difference between the foreign and local demographics is in employment. Most of the English speaking foreign residents who live in Korea come to reside in Korea due to the huge demand for English teaching jobs in the public schools or private academies. Hence there is a high frequency of young foreign residents with a similar income. These jobs show up on the questionnaire as people working either as a public official or professional. This weakness in the survey was expected.

The foreign resident population was asked an additional question about how many years they've lived in Jeju with a distribution of 32% living in Jeju less than 1 year, 22% living in Jeju 1-2 years, 22% living in Jeju 3-4 years, and 22% living in Jeju more than 5 years.

## 2. Results

### 1) General Support

The first question asked whether the respondent generally supports or opposes wind energy in Jeju. The vast majority of both groups support the development of wind power in Jeju. Table 2 shows the results of the survey and comparison. The result of the t-test ( $t=-2.448$ ) turned out to be statistically significant at the level of  $\alpha=0.05$ , meaning alternative hypothesis ( $H_{a1}$ ) is accepted. These results show much stronger support for wind power among the foreign residents and more opposition from the local Korean residents. In fact, the foreign residents show near unanimous support for wind energy (97%) while the local residents show more opposition (12%).

〈Table 2〉 Comparison results of general support

Variable	Local		Foreign		t	df	p
	M	SD	M	SD			
General Support	1.88	.326	1.97	.171	-2.448	207	.015

Notes: 1 = Oppose, 2 = Support

These results agree with the hypothesis that there is a significant difference in support between both groups in regards to wind power. The literature also shows that wind power in general tends to lend itself to large general support. Although the local Korean residents show more opposition than the foreign residents, their level of support is still quite large (88%). This high level of support by the local Korean residents matches the large general support shown in the literature.

### 2) Clean Energy

The next set of questions deal with whether or not the respondents believe in the value of having clean or green energy. A person's views on clean and green energy tends to affect their views towards wind power. The literature has shown that a person who has a more positive perception towards clean energy will in turn have a more positive attitude towards wind power. Table 3 presents the results of the comparison of the two groups in regards to clean energy.

The first question in this section asks whether the respondent agrees or disagrees that wind farms produce clean energy. The result of the t-test ( $t=-2.248$ ) turned out to be statistically significant at the level of  $\alpha=0.05$ , meaning alternative hypothesis ( $H_{a2}$ ) is accepted. These results show stronger belief in the clean energy attributes of wind power among the foreign residents. Interesting to note is that none (0%) of the foreign respondents either somewhat disagreed or completely disagreed

that wind energy produces clean energy. Within the local Korean residents, 4% disagreed and roughly 9% from each, the foreign and the local group, said they were unsure. This shows very large acceptance of both groups of the clean energy aspects of wind power.

The next question asks whether the respondent agrees or disagrees that wind power is a reliable source of energy. A common perception is that because the wind is not constant, wind power is an unreliable source of energy. If wind power is perceived to be an unreliable source of energy, it is reasonable to assume that the person will have a negative attitude towards wind power. The result of the t-test ( $t=-2.215$ ) turned out to be statistically significant at the level of  $\alpha=0.05$ , meaning alternative hypothesis ( $H_{a3}$ ) is accepted. These results show the foreign group more strongly agreeing that wind is a reliable source of energy than the local group.

〈Table 3〉 Comparison results of perceptions towards clean energy

Variable	Local		Foreign		t	df	p
	M	SD	M	SD			
Wind farms produce clean energy	4.15	.870	4.39	.648	-2.248	208	.026
Wind power is a reliable source of energy	3.89	.956	4.15	.792	-2.125	208	.035
We should use more wind energy to fulfill Jeju's energy demands	3.83	.977	4.50	.716	-5.634	208	.000

Note: 1 = Strongly disagree, 2 = Somewhat disagree, 3 = Not sure, 4 = Somewhat agree, 5 = Strongly agree

The third question in the clean energy section asks whether the respondent agrees or disagrees that Jeju should use more wind energy to fulfill Jeju's energy demands. The result of the t-test ( $t=-5.634$ ) turned out to be statistically significant at the level of  $\alpha=0.001$ , meaning alternative hypothesis ( $H_{a4}$ ) is accepted. It is very interesting that up to 90% of the foreign group completely or somewhat agrees that Jeju should use more wind, while only 71% of the local group completely or somewhat agrees. Much more of the local group (28%) leans towards not sure or disagreeing. These results suggest grounds for the doubts toward wind power among the local people of Jeju.

As the literature states, if a group has a more positive perception towards clean energy, they are more likely to support wind power. This holds true with both groups, as both have a generally positive view in regards to the three clean energy questions. Also, the fact that the foreign residents have a much stronger perception than the local residents coincides with the foreign resident's stronger general support.

### 3) Environment

The next set of questions deal with resident's perceptions of how wind farms relate to the environment. The review of the literature showed that although the push for wind power is rooted

in climate change, wind turbines get resistance for the sake of the environment. Table 4 shows the results of the comparison of perceptions towards the environment.

The first question asks whether the respondent agrees or disagrees that the noise from wind farms disturbs their daily lives. The result of t-test ( $t=8.638$ ) turned out to be statistically significant at the level of  $\alpha=0.001$ , meaning alternative hypothesis ( $H_{a5}$ ) is accepted. These results show that foreign residents much more strongly disagree that noise from wind farms disturbs their daily lives than local residents. The local group is much more evenly distributed than the foreign group. Among the foreign group, 72% highly lean towards somewhat disagreeing or strongly disagreeing while among the local group, 20% completely or somewhat disagree. Note that disagreeing that wind farms noise from wind farms disturbing ones daily life indicates a positive perception towards wind farms.

The next environmental question asks whether the respondent agrees or disagrees that wind farms disturb birds, animals, and their natural habitats. The result of the t-test ( $t=1.988$ ) turned out to be statistically significant at the level of  $\alpha=0.05$ , meaning alternative hypothesis ( $H_{a6}$ ) is accepted. These results show that the foreign resident sample more strongly disagrees that wind farms disturb the local wildlife than the local resident sample. Although both groups are somewhat evenly distributed, the local Korean residents tend to be unsure or lean toward somewhat agreeing that wind farms harm wildlife. The foreign residents are also relatively evenly distributed but with 20% disagreeing that wind farms harm wildlife. The foreign resident view that wind farms don't disturb birds, animals, and their natural habitats shows a positive perception towards wind farms and their effects on the environment.

〈Table 4〉 Comparison results of perceptions towards environment

Variable	Local		Foreign		t	df	p
	M	SD	M	SD			
The noise from wind farms disturbs your daily life	3.06	.955	1.85	1.077	8.638	207	.000
Wind farms disturb birds, animals, and their natural habitats	3.35	.917	3.07	1.116	1.988	208	.048
Wind farms damage areas of scenic beauty	2.93	1.060	2.67	1.234	1.599	208	.111

Note: 1 = Strongly disagree, 2 = Somewhat disagree, 3 = Not sure, 4 = Somewhat agree, 5 = Strongly agree

The third question asks whether the respondent agrees or disagrees that wind farms damage areas of scenic beauty. The test result ( $t=1.599$ ) does not appear to be statistically significant at the level of  $\alpha=0.05$ , implying that there is no difference in perception of the effects of wind farms on the local landscape among foreign residents and local residents. Both groups are evenly distributed with the local group having doubts, leaning to the somewhat agree or disagree and 29% not sure. The foreign group on the other hand has an opinion either way, albeit not strong. The foreign group

did not show strong convictions either way, but as only 10% were not sure, they had more of an opinion.

As was stated earlier, the literature shows that negative perceptions about the environmental effects leads to a negative view of wind power. The findings are consistent with this hypothesis that the local residents and the foreign residents would differ in their perceptions towards the environment. The local residents lean towards a more negative perception of the impacts of wind farms toward the environment while the foreign group leans towards a more positive view. These findings are also consistent with the literature. It was expected that the local group might have a stronger sense of place protection or NIMBY, which should result in more doubts about the environmental friendliness of wind farms.

## V. Conclusions

### 1. Discussion

Throughout the literature, wind power consistently shows a high level of support. The findings of the questionnaire show that a high level of general support exists for wind power in Jeju among the local Korean residents. This high level of general support is consistent in most wind energy findings (Wolsink, 2000). However the difference of their support as compared to the foreign residents is statistically significant and the difference leans towards less support in the local Jeju residents (88%) than the foreign residents (96%) who showed a near unanimous support for the development of wind power in Jeju.

The results show that the possibility to increase support remains. The comparison of the local Korean residents to the foreign residents in the other categories points out factors that the residents believe in that can lead towards greater acceptance of wind energy technology.

The local residents could be showing less support due to a stronger sense of place protection than the foreign residents. There could also be many alternative explanations for the differences in support, but one possible explanation that cannot be ruled out could be due to some the differences in demographics of the foreign population who tend to be younger and work in professional fields that could not be helped when distributing this survey.

In the survey, the respondents were asked a series of questions in regards to the environmental impacts of wind farms. The responses towards these questions showed some of the most striking differences in the comparison between the two samples. In particular, two responses showed large differences in opinions. First, significantly fewer foreign residents believe that the noise bothers their daily life. Second, the significantly fewer foreign residents believe that the wind farms harm local

wildlife. Although few foreign residents claimed to live within 10km of a wind farm, they were much more positive on the environmental impacts.

Interestingly, although there is no statistically significant difference, foreign residents tended to be much more split in their opinions about the effects of the wind turbines on the landscape. The Korean respondents (32%) more than foreign respondents (10%) said that they were not sure. This shows that the people of Jeju have not quite made their mind up about the effects of wind turbines on the local landscape. The split decision shown by the foreign residents could show that they have more familiarity with wind energy and have thus acquired well-formed opinions about wind turbines. Both groups lean towards belief that wind farms do not damage the landscape.

## 2. Policy Implications of the Research

With the emergence and rapid growth of wind power in less than a decade, it's important to understand how the public perceives this technology. Before now, little formal research has surveyed the attitudes of Jeju residents towards wind power.

This study provides a clear and accurate survey of the attitudes toward wind power of the residents of Jeju Island. On the whole, the Jeju Island people have more concerns about wind power than the foreign residents. The local residents have less general support, more concerns about the environment. This is useful for the government and developers in decision making for siting future renewable energy technology. The opposition that exists in most of the literature tends to focus around an environmental base. The opposition that seems to exist by the Jeju Island residents encompasses environmental and financial areas (Hilty, 2012).

Throughout the literature, one of the major themes in getting wind development projects started is including the public in the decision making progress and allowing them to have a stake in the projects. When people first hear about wind projects, not only in Jeju, but also through out the world they aren't necessarily opposed to the projects themselves but might be opposed any number of other factors. Often, local residents tend to be opposed to any kind of top-down planning that big corporations are accustomed to. Jeju Island in its tourist industry has seen this kind of top-down planning in the numerous resorts and development projects. The local residents have to live with the resorts, but they perceive very little of their financial effects.

Community participation has been shown to improve support. The success in the established and developed wind industry in European countries as Denmark and Portugal is attributed to community based wind projects (Christiansan and Lund, 1998). It's important to remember that there is more than one way to bring community benefits to an area. Szarka (2006) emphasizes the need for enhancing community participation stakeholder involvement.

In order to reduce the negative attitudes of local residents, information and education opportunities

on wind power must be given to local residents by local governments, academia and wind power related industry. Correct information on the factors affecting people's perceptions will lessen the negative attitudes towards wind farm projects. When local residents are involved in the process of wind farm development throughout education and community participation, we can expect higher probabilities of success for wind farm development and lower negative reaction from local residents.

The following example for enhancing community participation could be useful for not only wind farm developers and policy makers. Gasi Village wind power project (Gasi-ri, Pyoseon-myun, Seogwipo City) completed in 2012 faced less challenges from local residents who are well-informed on the wind farm project. The village is getting to be well known due to the fact that wind power has brought such a successful rural revitalization (Hilty, 2012).

This research is limited to onshore wind power and nothing in the survey suggests applies to offshore wind turbines specifically. Offshore wind power is a relatively new technology and as a result, only a handful of studies have been undertaken. As Jeju Island's plans for onshore wind are nearly complete, and the island's future plans include lofty offshore projects, further research into the attitudes of offshore could be useful. In addition to the needed offshore projects study, our sample size, specifically 109 surveys from local Korean residents is rather small in generalizing the findings of this research. We hope larger survey samples are will be utilized in future research. The research was also limited by focusing on surveying residents throughout the island rather than residents directly affected by wind farms. Future research of those directly affected could help fill this gap.

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다니엘 요셉 코우틴(Daniel Joseph Kojetin): 미국 Indiana University에서 지리학을 전공한 후, 2008년부터 2013년까지 제주대학교 사회과학대학에서 영어강사를 하였다. 2014년 2월 제주대학교 행정학 석사학위를 받은 후, 현재 제주대학교 사회과학연구소 특별연구원으로 재직 중이다. 주요 관심분야는 자치행정, NGO와 시민사회, 환경정책 등이다(dankojetin@gmail.com).

민기(閔基): University of Kentucky에서 행정학 박사학위(논문명: Does Foreign Government Policy Matter?: The Case of U. S. Direct Investment Abroad in Manufacturing, 2000)를 받았으며, 국회사무처와 국무총리실 근무를 거쳐 현재 제주대학교 행정학과 부교수로 재직 중이다. 주요 관심분야는 재정, 지방자치, 지역정책 등이다. 주요 논문으로는 ‘지방자치단체의 자치재정권과 조세경쟁’ ‘재정준칙 PAYGO 도입 방안에 대한 시론적 고찰’ 등이 있다(minkee@jejunu.ac.kr).

국문요약

## 풍력발전에 대한 지역주민의 인식에 관한 연구: 제주도 거주 내국인과 외국인을 대상으로

다니엘 요셉 코우틴  
민 기

본 연구는 제주도에 거주하는 내국인과 외국인을 대상으로 풍력발전에 대한 주민 인식을 분석하는데 목적이 있다. 최근들어 화석연료의 고갈, 원자력 발전의 위험성 등으로 인해 풍력발전을 비롯한 대체 신재생에너지 산업이 각광을 받고 있다. 풍력은 신재생에너지 산업 중 가장 선도적인 위치에 있으며, 풍부한 바람을 가진 제주도는 한국에서 최초로 풍력발전을 시작한 곳이다.

풍력발전이 주는 장점에도 불구하고 풍력발전으로 인한 환경훼손, 청정에너지에 대한 인식 부재, 에너지의 안정성에 대한 주민 인식에 따라 풍력발전에 대한 지지가 달리 나타나고 있다. 본 연구는 제주도 거주 외국인 101명과 내국인 110명을 대상으로 풍력발전에 대한 일반적 지지와 청정 에너지, 환경훼손 등에 관한 인식을 총 7개 질문지를 통해 조사하였다.

조사결과 풍력발전에 대한 일반적 지지, 청정에너지에 대한 인식, 에너지 안정성, 풍력에너지를 통한 제주전력수요 충족여부, 풍력발전에 대한 소음, 야생동물에 대한 피해는 내국인과 외국인 간에 통계적 유의성( $\alpha=0.05$  수준)이 있는 차이가 존재하는 하는 것으로 나타났다. 단지, 경관의 피해에 대한 두 집단 간의 인식에는 통계적 유의성( $\alpha=0.05$  수준)이 나타나지 않았다.

주제어: 풍력발전소, 풍력발전, 주민인식

