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THE RICHARD STOCKTON COLLEGE OF NEW JERSEY

# Public Views on Energy Policy: Results from a Southern New Jersey Deliberative Poll®

William J. Hughes Center for Public Policy

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**May 2009**

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This is a report on the results of the southern New Jersey Deliberative Poll® on Nuclear and Wind Power in New Jersey held in Pomona, New Jersey, with the initial poll administered from March 20th to March 30th and deliberations on May 2, 2009. The Deliberative Poll® was conducted by the William J. Hughes Center for Public Policy at The Richard Stockton College of New Jersey and Zogby International was contracted to perform the original poll.

## The Southern New Jersey Deliberative Poll

The point of Deliberative Polling® is to provide an idea of what people would think about a given policy issue if they were more familiar with the subject. Most people know and think limitedly about most policy issues, this includes energy alternatives. The lack of forethought in voters is a problem for decision makers that wish to understand and utilize meaningful public input. Public hearings, focus groups, and other similar events tend to be minimally attended and dominated by strong, underrepresented minority opinions. Conventional surveying elicits views that are more representative of the public; however, the public is largely uninformed. Deliberative Polling® draws a random sample, gets participants to deliberate, and then retrieves their opinions, which provides public input into policy debate that is both representative and informed.

### Sampling and Recruitment

A survey of twenty-eight questions, plus questions on general demographics, was developed to determine the perceptions of southern New Jersey residents in reference to alternative sources of energy. Zogby International was commissioned by the William J. Hughes Center for Public Policy to conduct a hybrid telephone/online survey of 800 adults. 174 interviews were completed interactively and 644 interviews conducted by telephone for a final total of 818 adults across the seven counties of southern New Jersey.

Telephone samples were randomly drawn from telephone cd's of a national listed sample. Zogby International surveys use sampling strategies in which selection probabilities are proportional to population size within area codes and exchanges. Up to six calls are made to reach a sampled phone number. Cooperation rates are calculated using one of AAPOR's approved methodologies[1] and are comparable to other professional public-opinion surveys conducted using similar sampling strategies.[2] Separately, a sampling of Zogby International's online panel, which is representative of the adult population of the US, was invited to participate in the survey. Slight weights were added to education, age, race, and gender to more accurately reflect the population. The margin of error is +/- 3.5 percentage points. Margins of error are higher in sub-groups.

During the initial survey, respondents were asked whether or not they would be willing to participate in a deliberative process at The Richard Stockton College of New Jersey. 200 respondents indicated that they would be interested in deliberations. Subsequent calls were made by a William J. Hughes Center for Public Policy student worker to follow up on the initial invitation and to convert individuals that indicated they might come to the event to "yeses." These calls provided information (i.e. directions and places to park). The incentive to participate included the opportunity of having a voice in important policy issues, the opportunity of meeting other individuals from southern New Jersey, the possibility of being seen on television or mentioned in the newspaper, and an honorarium of $100. In all, 31 sample members showed at The Richard Stockton College of New Jersey for deliberations.

[1] See COOP4 (p.38) in Standard *Definitions: Final Dispositions of Case Codes and Outcome Rates of Surveys.* The American Association for Public Opinion Research, (2000).
[2] *Cooperation Tracking Study: April 2003 Update*, Jane M. Sheppard and Shelly Haas. The Council for Marketing & Opinion Research (CMOR). Cincinnati, Ohio (2003).

**The Briefing Document**

Everyone that agreed to attend the deliberations was sent balanced briefing documents laying out the major benefits and concerns on the policy issues. The documents were also sent electronically to individuals that specifically requested an electronic version.

The documents (see Appendix A) were the work of the William J. Hughes Center for Public Policy's research associate with informational support provided by Ronda Jackson (Fishermen's Energy of New Jersey), Andrew Young (Salmon Ventures, Ltd.), Dr. Patrick Hossay (The Richard Stockton College of New Jersey) and Dr. Tait Chirenje (The Richard Stockton College of New Jersey).

Some participants indicated that they did not receive the briefing materials beforehand. They were urged to attend anyway, and copies were available on-site, both for anyone who had never received one and for those who had left theirs at home.

**The Deliberative Day**

The participants arrived Saturday morning, May 2, at The Richard Stockton College of New Jersey, and left late that same afternoon. The formal on-site activities alternated between small group discussions led by trained facilitators and plenary sessions in which they put forth questions composed in the small groups to balanced panels of subject matter experts and policy makers. Appendix B gives a detailed schedule of the day.

There were four small groups averaging between 6 and 10 participants each. The participants were randomly assigned to the groups. The combination of random sampling and random assignment helped maximize the average heterogeneity of both the participants and the views expressed in each group. The purpose of the small group discussions was to give the participants the opportunity to share their views and listen to and learn from one another;

thereby, refining their own individual opinion about the issues. There was no collective decision to be reached, requirement or expectation of their reaching consensus. No votes were taken, and a showing of hands was discouraged.

The facilitators were selected for their ability to be neutral and their skill at leading small group discussions. Facilitators that were chosen were individuals that did not seem too committed to one perspective or another on the policy issues, were not experts on the topics discussed, and were not too experienced with leading group discussions aimed at achieving consensus. Their purpose was to keep the discussion flowing, encourage everyone to participate, keep any one individual from monopolizing the discussions, keep the discussions balanced and civil, and to make sure that all of the major issues covered in the briefing documents were considered.

The facilitators were trained, in two separate hour sessions on April 30 and May 1, by Sharon Schulman of the William J. Hughes Center for Public Policy, Dr. James Avery of The Richard Stockton College of New Jersey, and Jason D. Rivera of the William J. Hughes Center for Public Policy. Among several items covered, the facilitators were trained to make sure everyone contributed to the discussions, that no one be allowed to dominate the discussions, that everyone should respect others' opinions, and try to get participants to think clearly about the issues. The facilitators were also told to refrain from giving any of their opinions.

The plenary sessions were moderated by Sharon Schulman of the William J. Hughes Center for Public Policy, who kept each of the comments by the subject matter experts and policy makers as to the point as possible in the interest of allowing as many questions as possible to be asked and as much opportunity as possible for probing questions and follow-ups to be addressed. Each panel had two panelists, representing varying interests and views. A list of the

subject matter experts and policy makers, in addition to their short biographies, can be seen in Appendix C.

**Measurements**

The survey included questions asking residents to rank the importance of various "values" related to energy and the importance of using various alternative energy sources. They were also asked how willing they would be to pay for increased use of various energy sources and which energy sources posed the greatest threat to the environment. Finally, they were also asked whether they would prefer any new nuclear power plant be built by the government or by a private firm. Several demographic characteristics were also collected.

One survey was given at two different times throughout the entire Deliberative Polling® process. The initial survey that was administered by Zogby International was pre-deliberation, and the second survey, post-deliberations. A copy of the survey instrument can be seen in Appendix D. While the first survey was administered by an interviewer over the telephone, the second survey was self-completed, filled in by the respondents using pen. The questions were constructed to work equally well in both the telephone and paper formats.

**The Participants**

Overall, 31 individuals showed up for the deliberations. One individual, not counted in the total, was a representative of *The Press of Atlantic City* who silently observed the day's activities to provide transparency to the public. Of the 31 sample members, only one left early prior to the policy makers' plenary session; however, this individual completed the second survey before leaving.

The 31 individuals were a reasonably representative cross-section of the southern New Jersey region. The information in Appendix E illustrates the preferences of all the 818 initial

interviewees by demographics. Comparisons between the initial and second survey are confined to those questions which there is data on the 31 deliberation participants. Although there were changes that occurred in reference to several questions between the pre- and post-deliberation surveys, the following is a description of some of the points of interest observed from the Deliberative Polling® process. All of the comparisons from the pre- and post-deliberation survey can be viewed in Appendix F.

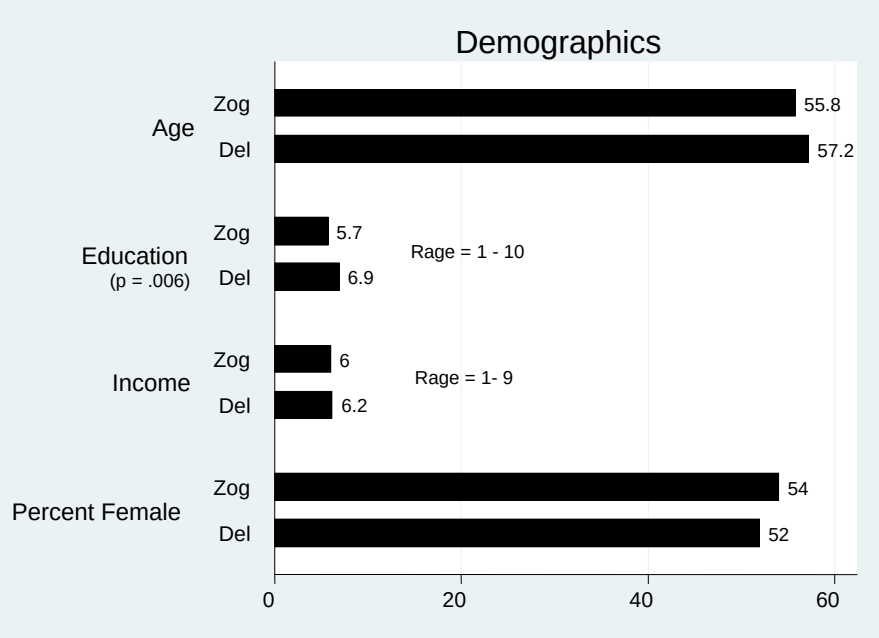
## Overview of Results

For the perceptions of individuals, empirical premises, and values, two aspects of the results are important: were the participants stimulated (the post-deliberation distribution of opinion) and how/if they changed their opinions (the difference between the pre- and post-deliberation distributions). The first is important because it represents the best estimate of what a more deliberative public – more informed, thoughtful, having talked about the issues with a wider variety of fellow citizens, and having considered a wider variety of perspectives – would think. This is important even if no one changed their mind, if deliberations just re-enforced people's thinking without changing their opinions. The second is important because it estimates deliberation's effects: how higher consideration of opinions differs from those people inherently hold. Changes that are observed may be underestimated, but may suggest the directions in which further deliberation could be expected to move opinions further.

### Points of Interest from the Deliberative Process

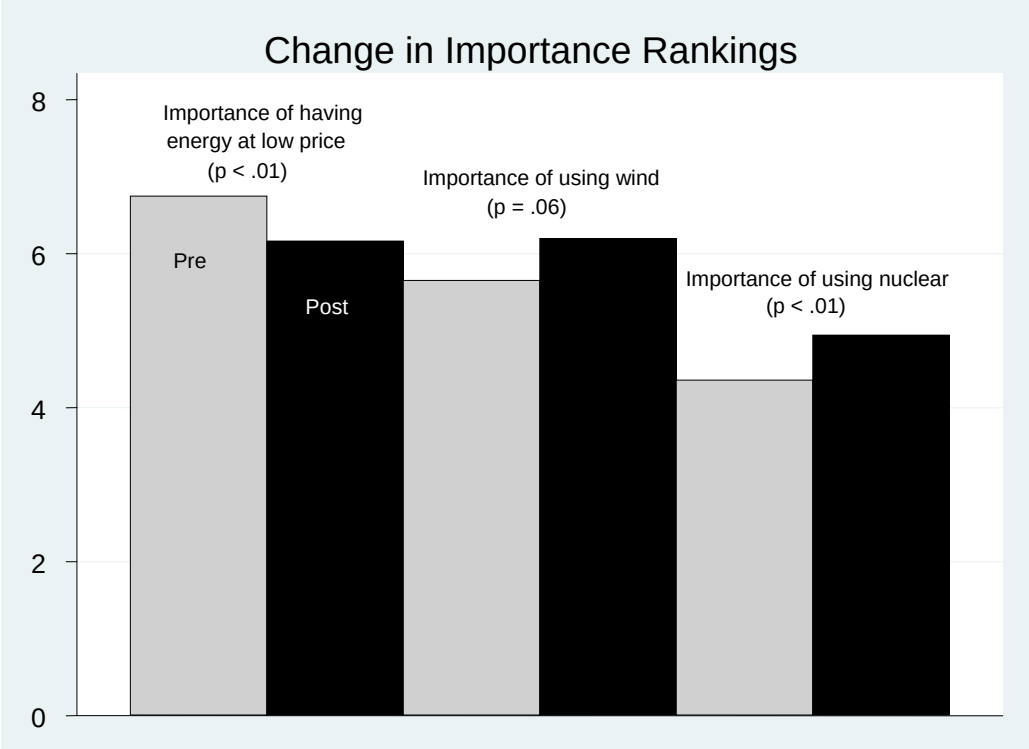
In reference to demographics, only one characteristic was statistically significant when comparing respondents from the first and second survey. On average, those that volunteered to deliberate were proportionately of a higher education level than those that participated in the first survey administered by Zogby International (Figure 1).

**Figure 1: Comparison of Zogby and Deliberation Participants**




When comparing the responses of those individuals that took the initial and post-deliberation surveys, there were changes at the aggregate level in reference to what respondents believed was more important. In both surveys, respondents were asked to rank the importance of (1) having affordable electric and gas, (2) having enough electricity to meet our needs in New Jersey, (3) having reliable electric, (4) protecting the environment when creating energy, (5) ensuring that producing energy will not pose a threat to safety, and (6) producing electricity in ways that will help the state's economy. They were also asked to rank the importance of using nuclear power, wind power, and teaching customers ways to save energy. The rankings were made on seven-point scales. Of these questions, only three statistically significant changes are observed. We see a decrease in the importance placed on having energy at a low price following deliberations, but an increase in the importance placed on using wind and nuclear power.

**Figure 2: Changes in the Aggregate, Importance Rankings**




Following the initial six importance rankings (see Figure 2), respondents were asked to choose which of these six is most important. Below (Table 1) we see some changes, two of which are most noteworthy. First, half (3) of the respondents that initially showed the greatest concern for receiving energy at low prices changed their opinion to other categories. Second, we see that five of the eight who ranked a threat to safety as most important moved to other categories

**Table 1: Individual Changes in Beliefs about what is Most Important**

| | | Pre | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Electric and Gas at Low Price | Enough to Meet Needs | Reliable Electric | Protect Environment | No Threat to Safety | Help State Economy | Total |
| Post | Electric and Gas at Low Price | 3 | 0 | 0 | 0 | 1 | 1 | 5 |
| | Enough to Meet Needs | 1 | 5 | 1 | 0 | 1 | 0 | 8 |
| | Reliable Electric | 0 | 0 | 1 | 0 | 3 | 0 | 4 |
| | Protect Environment | 0 | 0 | 0 | 5 | 1 | 1 | 7 |
| | No Threat to Safety | 1 | 0 | 2 | 0 | 1 | 0 | 2 |
| | Help State Economy | 1 | 0 | 0 | 1 | 1 | 0 | 3 |
| | Total | 6 | 5 | 4 | 6 | 8 | 2 | 29 |

Chi-square statistic: 44, $p = .009$

After being asked to rank the importance of three energy alternatives, respondents were then asked to choose which is most important. Below (Table 2) the change in preferences can be observed. We find the largest switch from a preference for wind power to nuclear power and encouraging energy conservation. Among the fourteen that initially favored wind, three switched to a preference for nuclear and five switched to preference for saving energy. The only other change is that one person changed from a preference for nuclear to a preference for saving energy.

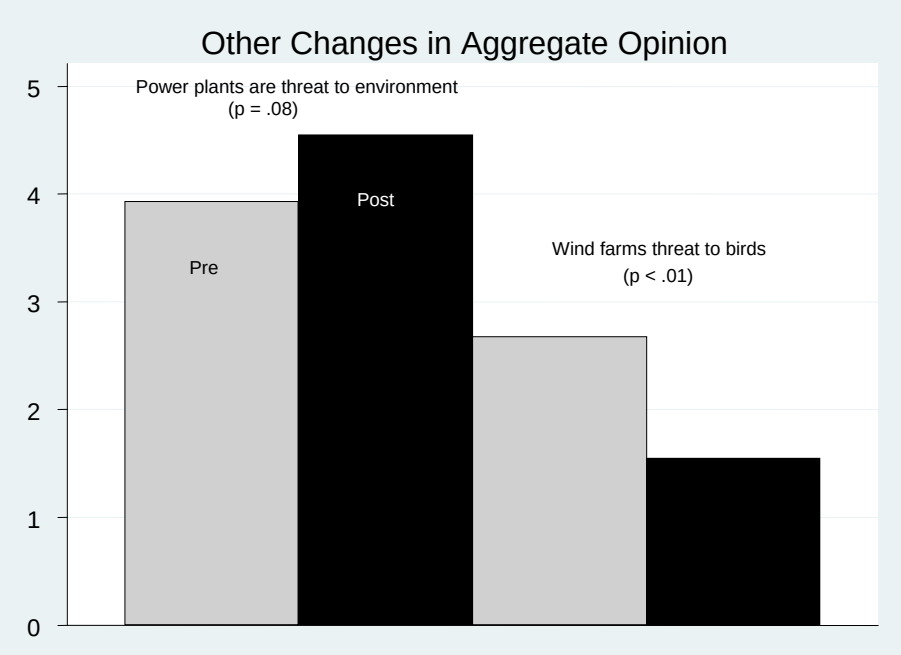
**Table 2: Individual Changes in Beliefs about what is Most Important**

| | | Pre | | | |
|---|---|---|---|---|---|
| | | Wind | Nuclear | Save Energy | Total |
| **Post** | Wind | 6 | 0 | 0 | 6 |
| | Nuclear | 3 | 4 | 0 | 7 |
| | Save Energy | 5 | 1 | 10 | 16 |
| | Total | 14 | 5 | 10 | 29 |

Chi-square statistic: 21, $p = .000$

Changes in aggregate opinions were also observed with a significant increase in the belief that nuclear power plants are a threat to the environment following deliberations, and a decrease in the belief that wind farms pose a threat to birds (see Figure 3). The latter finding is not surprising considering the policy experts' emphasis on this in their discussion of wind farms. Moreover, respondents were also asked whether they believed wind farms would detract from the beauty of southern New Jersey, but we found no significant change in these beliefs.

**Figure 3: Changes in Aggregate, Nuclear Power Plant Threat & Wind Farm Threat to Birds**




Respondents were then asked about their willingness to pay more for nuclear and wind power. Looking first at nuclear power (Table 3), we see that most respondents were unwilling to pay more initially, and only three of respondents changed their minds following deliberations. Also of note is that four respondents became less willing to pay more; one moving from a willingness to pay more than ten dollars to between four and six dollars, and one becoming less willing to pay seven to ten dollars. Thus, at the aggregate level, we find more respondents willing to pay more than zero, but a few less willing to pay a great deal more (i.e., more than ten dollars).

**Table 3: Change in Individuals' Willingness to Pay More for More Nuclear Power**

| | | Pre | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0 | $1 to $3 | $4 to $6 | $7 to $10 | $10 + | Total |
| Post | 0 | 15 | 0 | 0 | 0 | 0 | 15 |
| | $1 to $3 | 1 | 5 | 0 | 1 | 0 | 7 |
| | $4 to $6 | 2 | 0 | 2 | 2 | 1 | 7 |
| | $7 to $10 | 0 | 0 | 0 | 1 | 0 | 1 |
| | $10 + | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total | 18 | 5 | 2 | 4 | 1 | 30 |

Chi-square statistic: 43, $p = .000$

In reference to a willingness to pay more for wind power (Table 4), we find a large number of respondents (six of eleven) who were initially unwilling to pay one to three dollars more for wind power willing to do so after deliberations, and one willing to pay between four and six dollars more. However, we also find a number of respondents less willing to pay between seven and ten dollars more following deliberations. Of the ten who initially were willing to pay this much more, five were only willing to pay between four and six dollars more and one only willing to pay between one and three dollars more following deliberations. Finally, we also find two of the seven initially willing to pay between four and six dollars more only willing to pay between one and three dollars more following deliberations, but one willing to pay between seven and ten dollars more.

**Table 4: Change in Individuals' Willingness to Pay More for More Wind Power**

| | | Pre | | | | |
|---|---|---|---|---|---|---|
| | | 0 | $1 to $3 | $4 to $6 | $7 to $10 | Total |
| Post | 0 | 4 | 0 | 0 | 0 | 4 |
| | $1 to $3 | 6 | 2 | 2 | 1 | 11 |
| | $4 to $6 | 1 | 0 | 4 | 5 | 10 |
| | $7 to $10 | 0 | 0 | 1 | 4 | 5 |
| | Total | 11 | 2 | 7 | 10 | 30 |

Chi-square statistic: 22, $p = .008$

Respondents were then asked whether they preferred the government or a private firm own a new nuclear power plant. We do not find a great deal of change here. However, of the three who initially preferred government ownership, two preferred private following deliberations. Likewise, three of the twenty-five who initially preferred private ownership changed to a preference for government ownership; therefore, at the aggregate level, we find little change in opinion. Also of note is that among the three that preferred neither or had no opinion initially, two preferred government ownership and one private ownership following deliberations (Table 5).

**Table 5: Change in Individuals' Preferences for Government vs. Private Ownership of New Nuclear Plant**

| | | Pre | | | |
|---|---|---|---|---|---|
| | | Government | Private | Neither/DK | Total |
| **Post** | Government | 1 | 3 | 2 | 6 |
| | Private | 2 | 22 | 1 | 25 |
| | Neither/DK | 0 | 0 | 0 | 0 |
| | Total | 3 | 25 | 3 | 31 |

Chi-square statistic: 5.5, $p = .063$

Below (Table 6) we observe a good deal of change in beliefs about which alternatives would cost the most. Most noteworthy is an increase in the belief that nuclear power will cost the most. Three of the eight that believed that increased use of coal and natural gas would cost most switched to nuclear following deliberations. Likewise, two of the nine that believed wind power would cost most switched to nuclear, while one of the four believing teaching energy conservation would cost most switched to nuclear. We also see a large number of those initially believing that wind energy would cost more changed their opinions following deliberations, with three of nine switching to energy conservation, two switching to nuclear and one switching to coal and natural gas. An important item to note is that during deliberations, the notion of cost was not confined to monetary costs but also environmental and social costs.

**Table 6: Change in Individuals' Belief about Which Alternatives Would Cost Most**

| | | Pre | | | | |
|---|---|---|---|---|---|---|
| | | Coal & Nat. Gas | Nuclear | Wind | Energy Conservation | Total |
| Post | Coal & N.G. | 5 | 2 | 1 | 1 | 9 |
| | Nuclear | 3 | 4 | 2 | 1 | 10 |
| | Wind | 0 | 1 | 3 | 0 | 4 |
| | Energy Conservation | 0 | 0 | 3 | 2 | 5 |
| | Total | 8 | 7 | 9 | 4 | 28 |

Chi-square statistic: 15, $p = .083$

In reference to a threat to the environment, on the whole, only four of thirty respondents changed their opinions (Table 7). Two switched from believing that coal and natural gas posed the greatest threat to believing that nuclear does, and one switched from coal and natural gas to energy conservation. We also observe that two switched from energy conservation to coal and natural gas. The clearest finding here is that deliberations had little influence on changing opinion in reference to beliefs about threats to the environment; most respondents believe that coal and natural gas pose the greatest threat to the environment with nuclear a distant second.

**Table 7: Change in Individuals' Belief about Which Alternatives Would Pose Greatest Threat to Environment**

| | | Pre | | | |
|---|---|---|---|---|---|
| | | Coal & Nat. Gas | Nuclear | Energy Conservation | Total |
| **Post** | Coal & N.G. | 18 | 6 | 2 | 26 |
| | Nuclear | 2 | 0 | 0 | 2 |
| | Energy Conservation | 1 | 0 | 1 | 2 |
| | Total | 21 | 6 | 3 | 30 |

Chi-square statistic: 4.8, $p = .31$

We also observed little change in opinions about which alternatives pose the greatest threat to safety (Table 8). Two changed from coal and natural gas to nuclear following deliberations, while another two switched from nuclear to coal and natural gas. We also observed one switched from energy conservation to coal and natural gas and two switched from energy conservation to nuclear. According to this data, fewer people believed that energy conservation poses the greatest threat to safety following deliberations.

**Table 8: Change in Individuals' Belief about Which Alternatives Would Post Greats Threat to Safety**

| | | Pre | | | | |
|---|---|---|---|---|---|---|
| | | Coal & Nat. Gas | Nuclear | Wind | Energy Conservation | Total |
| Post | Coal & N.G. | 6 | 2 | 1 | 1 | 10 |
| | Nuclear | 2 | 12 | 0 | 2 | 16 |
| | Wind | 0 | 0 | 0 | 0 | 0 |
| | Energy Conservation | 0 | 0 | 0 | 1 | 1 |
| | Total | 8 | 14 | 1 | 4 | 27 |

Chi-square statistic: 16, $p = .014$

## Experience of the Process

In line with prior deliberative polling experiences,[3] participants left empowered and enthusiastic. Moreover, participants were grateful for being able to participate in the event, and asked to be invited to future events of this kind. Although no official evaluation tool was used to gauge the participants' experience, participants positively commented throughout the day on the event's ability to help clarify their positions on issues, the participants' opportunity to have questions answered by subject matter experts and policy makers, and the need to have similar events of this kind on different policy issues in the future.

[3] See Luskin, Robert C., David B. Crow, James S. Fishkin, Will Guild, and Dennis Thomas. (2007). *Report on the Deliberative Poll® on "Vermont's Energy Future."* Center for Deliberative Opinion Research, University of Texas at Austin.

## Appendix A: Briefing Documents

# Nuclear Power

*Information compiled by the William J. Hughes Center for Public Policy at The Richard Stockton College of New Jersey*

## Introduction

New Jersey generates about 75% of its electricity instate but imports the rest from surrounding states. Attempts to import more electricity increase greenhouse gas emissions and other air pollution. Additionally, electricity shortages in New York City and Long Island have forced these areas to get portions of their electricity from and through New Jersey, heightening New Jersey's electricity demands.[i]

Over the last nine years, electricity demand has grown by approximately 2.9% per year in New Jersey. At this pace, the demand will be 44% higher in 2019 than it is in 2009. New Jersey must produce 24% more electricity to meet our needs in 2019 than at present.[ii] When energy demand exceeds production, prices tend to rise and the energy supply becomes less reliable.

The informational materials and surveys included in this mailing look at alternatives to the current means of energy production within the state. More importantly, New Jersey decision makers need to know how residents feel about alternative forms of energy once they understand the issues that are associated with them.

## Nuclear Power in New Jersey

Currently, nuclear energy accounts for a little more than 50% of New Jersey's in-state electricity production. There are four commercially operating nuclear power plants in New Jersey: Oyster Creek (in Lacey Township), Salem 1, Salem 2, and Hope Creek (all located in Lower Alloways Creek). Oyster Creek is the oldest operating nuclear power plant in the United States.

Many nuclear facilities do not have cooling towers; however, the one at Hope Creek does. Neither of the two Salem plants, located on the same site, has any. Cooling towers are also located at fossil fuel plants. Some are located at chemical plants. But the role of cooling towers at nuclear power plants differs from their purpose at other facilities.

According to the Environmental Protection Agency, *"A cooling tower is designed to remove heat by pumping water up into the tower and allowing it to fall down inside the tower. Air comes in from the sides of the tower and passes by the falling water. As the air passes the water, it exchanges some of the heat and evaporates some of the water. This heat and evaporated water flowing out the top of the tower is in the form of a fine cloud-like mist. The cooled water is collected at the bottom of the tower and pumped back into the plant for reuse. Cooling towers are used where land and (or) water are expensive, or where State of Federal regulations make alternatives impractical."*

The vapor rising from the cooling tower is steam with no radiation, not smoke. Although nuclear power plants in New Jersey and other States are free of harmful emissions, cooling towers are not without controversy. Some cooling towers rely on water drawn from natural waterways. New Jersey regulators contend that relying on natural waterways at Hope Creek and Oyster Creek has killed fish. [iii]

**Environmental Issues**

Generating nuclear electricity prevents the emission of pollutants like sulfur dioxide, nitrogen oxide and greenhouse gasses such as carbon dioxide associated with burning fossil fuels. By using nuclear power plants, New Jersey avoided emitting 186,800 tons of sulfur dioxide, 50,000 tons of nitrogen oxide, and 29.7 million metric tons of carbon dioxide during 2007. Sulfur dioxide emission leads to the formation of acid rain, which damages bodies of water, trees and accelerates the decay of building materials and paint. Nitrogen oxide is a key producer of smog. Carbon dioxide contributes to the increase of greenhouse gasses, which do not allow heat to escape from the atmosphere. Without escaping the atmosphere, heat increases the Earth's temperature, also called global warming. To put these numbers in perspective, the amount of nitrogen oxide that is not emitted into the atmosphere through the use of nuclear power is the same as the amount emitted by 2.6 million cars per year. In New Jersey, there are 3.7 million registered cars.[iv]

Coolant water discharges have the potential to possibly affect the temperature conditions of neighboring bodies of water. Discharges similar to these are called thermal pollution. This type of pollution generally raises the temperature of the water. Raising the temperature of the water limits the amount of oxygen in the water, which can kill some animals. However, these

changes are not necessarily always negative.[v] For example, in Florida the raised temperatures in waterways surrounding nuclear plants have become a viable habitat for alligators.

The most important environmental concern is the storage and removal of used fuel. Every 18 to 24 months, a plant is shut down and about one-third of the fuel, is removed and replaced. Used nuclear fuel is in solid form. A typical 1,000-megawatt nuclear plant generates about 20 metric tons or 40,000 pounds of used fuel each year. Used fuel is stored at plant sites, either in enclosed, steel-lined vaults with water known as used fuel pools or basins, or in steel-and-concrete containers. Commercial reactors have the ability to build additional steel-and-concrete containers, which are licensed for both onsite storage and transportation. Eventually, used fuel is moved from plant sites to centralized storage facilities, recycling facilities, or a repository. The age of the used fuel and the location of nuclear plants determines whether the materials can be recycled; however, nationally there is no good long-term solution to disposing of used fuel.[vi]

**Safety and Risk**

To date, there have been very few accidents associated with commercial nuclear reactor sites. Of note, there have only been two worldwide: Three Mile Island in Pennsylvania and Chernobyl in the Ukraine. All of these incidents occurred more than ten years ago, and were mainly due to mechanical failure, or, in the case of Chernobyl, lack of safety protocols.

***Three Mile Island***[vii]

Three Mile Island Unit 2 (TMI-2), a nuclear power plant near Middletown, Pennsylvania, was the most serious accident to occur in the United States to date. The event occurred on March 28, 1979, it led to no deaths or injuries to workers or members of the nearby community; although, it was the most serious accident.

It is not known what specifically caused the accident. Technological failures and human error on the behalf of plant operators, due to bad judgment and lack of experience, lead to improper actions to deal with the event. It is believed that the incident started because of a mechanical or electric failure, which prevented generators from removing heat.

As a result the TMI-2 plant suffered a severe core meltdown, which is the most dangerous kind of nuclear power accident. In a worse case situation during an accident like this, the melting of nuclear fuel would lead to a breach of the walls of the containment building and release massive quantities of radiation into the environment. But this did not occur during the TMI-2 accident because operators were able to use emergency water supplies to cool the system before too much radiation was released into the environment.[viii]

Because of the accident it was estimated that the 2 million people in the area were exposed to only 1 millirem of radiation. To put this into context, exposure to radiation from a full set of chest x-rays is about 6 millirem. Moreover, people are exposed to about 100-125 millirem per year in the area from just natural-background radioactivity, making the TMI-2 radiation exposure insignificant.

***Chernobyl***[ix]

The Chernobyl accident occurred in April 1986 in the Ukraine, and was due to flawed Soviet reactor design and human errors, due to poor training. This accident is unique in that it is the only accident in the history of commercial nuclear power where radiation-related fatalities occurred.

The accident occurred during a test to determine how long turbines would spin and supply power following a loss of main electrical power. Because of a series of operator errors, one of which was the disabling of automatic shutdown mechanisms, the flow of coolant water diminished and power output increased. When operators attempted to shut down the reactor, flaws in the design of the reactor caused a dramatic power surge. As a result, fuel elements ruptured and the explosive force of steam lifted the cover of the reactor plate, releasing radioactive products into the atmosphere. A second explosion caused graphite to burn for nine days, causing the main release of radioactive materials into the environment.

Most of the released materials were deposited close by the facility in the form of dust and debris, but lighter materials were carried by the wind over the Ukraine, Belarus, Russia, and other parts of Europe and Scandinavia. The accident destroyed the Chernobyl-4 reactor and killed 30 people, including 28 from radiation exposure. An additional 209 people on site and involved in the clean-up were treated for acute radiation poisoning and among these, 134 recovered, but 19 subsequently died from effects directly attributed to the accident.

As a result of both of these accidents, changes in the ways commercial nuclear power plants are operated and the technology used have improved. The Three Mile Island accident resulted in 1) the

upgrading and strengthening of plant design and equipment, 2) identifying human performance as a critical part of plant safety, 3) improved instruction to avoid confusing signals that plagued operations during the accident, 4) the establishment of a program to integrate Nuclear Regulatory Commission observations, findings, and conclusions about licensee performance and management effectiveness into periodic, and public reports. Additionally, there were a number of other changes aimed at personnel effectiveness/competence and technological enhancements to avoid future accidents.

The Chernobyl accident resulted in reactor design modifications that 1) make them more stable at low power levels, 2) make automatic shut-down mechanism operate faster, and 3) the installment of automated inspection equipment in order to significantly decrease the possibility of a similar accident occurring like this in the future.

**Cost of Nuclear Power**

Although nuclear power plants are the most expensive to build and keep available, once in place they also generate electricity more cheaply than any other non-renewable technology. In New Jersey, any new nuclear facility would be funded by the private sector. In December 2008, the CEO of Exelon Generation (which operates the Oyster Creek Generating Station) told the World Affairs Congress that the latest estimates were $4,000/per kilowatt or $4 billion to $6 billion per unit. In 2007, the operational and maintenance cost of operating one of Exelon's nuclear facilities was 1.29 cents/kWh.

Consumer's monthly energy bill would be minimally affected by the private funding of a new nuclear plant because the multiple shareholders absorb the cost of the investment whether it is successful or not. These corporations are big enough, and there are enough investors involved, that they already possess the necessary funds without hiking up energy costs. Property taxes would only be affected in the municipality in which a new facility is built. Because of the significant sum of operational, use and property taxes that a nuclear facility is required to pay to the municipality it is located in, local property taxes would either remain level or decrease.


**Economics of Nuclear Power**

The construction of nuclear power plants usually creates an average of 1,400 to 1,800 jobs. After construction is finished, approximately 700 permanent jobs are made available. The permanent jobs that are created by nuclear power plants tend to pay 35% more than the average salary in the local area. In addition to the permanent jobs created by the nuclear facility, on average an equivalent number of additional jobs develop in the local area to provide the goods and services necessary to support the nuclear power plant workforce (i.e. car deals, dry cleaners, food service, etc.).

On average, a nuclear plant generates about $430 million a year in total output to the local community, with nearly $40 million per year in total labor income. According to the Nuclear Energy Institute, for every dollar spent by the average nuclear facility there is an economic value to the local community of $1.07. State wide, average nuclear power plants contribute about $20 million per year in state and local taxes, which are used to support schools, roads, and other infrastructure. Moreover, the average nuclear plant contributes about $75 million per year in federal tax payments.

| Summary of Nuclear Power | |
|---|---|
| **Pros** | **Cons** |
| • Releases very little pollution into the atmosphere<br>• Nuclear facilities create local and regional employment opportunities<br>• Nuclear facilities minimally affect consumers' monthly power bills<br>• Nuclear facilities pay taxes to the state and local governments for infrastructure support | • Coolant discharges can alter the temperature of bodies of water<br>• No finite national solution to used fuel storage<br>• Potential high-risk safety issues |

[i] Information retrieved from the New Jersey Energy Master Plan. http://nj.gov/emp/docs/pdf/081022_emp.pdf
[ii] Information retrieved from the Nuclear Energy Institute. http://www.nei.org/resourcesandstats/documentlibrary/protectingtheenvironment/whitepaper/reducingco2emissionsinnewjersey/

[iii] Information retrieved from the energy Information Administration.
http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/states/statesnj.html
[iv] Information retrieved from the Nuclear Energy Institute.
http://www.nei.org/filefolder/New_Jersey_Fact_Sheet.pdf
[v] Information retrieved from Energy Information Administration.
http://www.eia.doe.gov/cneaf/nuclear/page/nuclearenvissues.html
[vi] Information retrieved from the Nuclear Energy Institute.
http://www.nei.org/resourcesandstats/documentlibrary/nuclearwastedisposal/factsheet/safelymanagingusednuclearfuel/
[vii] Information was retrieved from the United States Nuclear Regulatory Commission. http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html.
[viii] Information retrieved from the World Nuclear Association. http://www.world-nuclear.org/info/inf36.html
[ix] Information was retrieved from the World Nuclear Association. www.world-nuclear.org/info/chernobyl/info07.html.

# Wind Power

*Information compiled by the William J. Hughes Center for Public Policy at The Richard Stockton College of New Jersey*

**Introduction**

New Jersey generates about 75% of its electricity in-state, but the rest is imported from surrounding states. Current attempts to import electricity are likely to increase greenhouse gas emissions and other air pollution. Additionally, because of electricity shortages in New York City and Long Island, these two areas have entered into contracts that have allowed them to import electricity from and through New Jersey, heightening the state's electricity demands.[1]

Over the last nine years, electricity demand has grown by about 2.9% per year in New Jersey. At this pace, the demand will be 44% higher in 2019 than it is today. At this rate, this would require the production of 24% more electricity to meet our needs in 2019 than now.[2] When the growth in energy production does not keep up with the growth in demand, prices tend to rise and the supply of energy become less reliable.

According to the New Jersey Energy Master Plan, the State is planning efforts to support 200 megawatts of on-shore and 3000 megawatts of off-shore wind energy. The combined energy production of the State's plans would generate 13% of its energy needs by 2020. Currently, New Jersey has installed 11 on-shore wind turbines since 2001.

The informational materials and surveys included in this mailing look at alternatives to the current means of energy production within the state. More importantly, New Jersey decision makers need know how residents feel about alternative forms of energy once they understand the issues that are associated with them.

## Wind Power

Wind power has the potential to reduce the State's reliance on fossil fuels for electricity production. It is estimated that New Jersey's on-shore wind farm in Atlantic City produces the same amount of energy generated by 23,613 barrels of crude oil per year.[3] The average person uses approximately 60 barrels of oil a year, which converts to 10,000 watts of energy. Wind power is one of the lowest-priced renewable energy technologies available today, costing between 4 and 6 cents per kilowatt-hour. Wind power is a form of renewable energy, which is energy that comes from resources that will never run out. Wind and solar energy are the most predominant and accessible renewable resources available.

Wind energy can substitute the use of large amounts of coal-fired electricity generation. In the future, wind energy is likely to offset more coal by reducing the need to build new coal plants. Regardless of the actual fuel substituted, more electricity generated from wind turbines means that other nonrenewable, fossil-based fuels are not being used. Compared to conventional fossil fuel energy sources, wind energy generation does not degrade the quality of our air and water. In addition, it avoids environmental effects from the mining, drilling, and hazardous waste storage associated with using fossil fuels.

Wind turbines, which are currently being deployed around the world, have three-bladed rotors with diameters of about 229 ft to 262 ft mounted on top of 195 ft to 8262 ft towers. Typically installed in arrays of 30 to 150 machines, the average turbine installed in the United States in 2006 can produce approximately 1.6 megawatts (MW) of electrical power, which can power about 500 homes.[4]

For most coastal states, offshore wind resources are the only energy sources capable of making a significant renewable energy contribution. In many developed and energy-constrained regions, such as metropolitan areas, offshore wind plants might be necessary to supplement growing demand and dwindling fossil supplies. In the United States, nine offshore project proposals in state and federal waters are in various stages of development. [5]

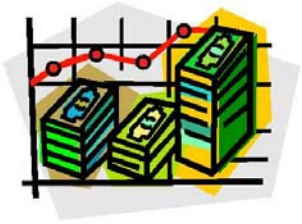
## Environmental Issues

Although wind energy may be able to coexist with land uses such as farming, ranching, and forestry, wind energy development might not be desirable in areas where there are housing developments, airport approaches, some radar installations, and low-level military flight training routes. Wind turbines are tall structures that require an undisturbed airspace around them.

Wildlife—and birds in particular–are threatened by numerous human activities, including effects from climate change. Relative to other human causes of bird deaths, wind energy's impacts are quite small. Currently, it is estimated that for every 10,000 birds killed by all humans, less than one death is caused by wind turbines. In fact, a recent National Research Council[6] study concluded that current wind energy generation is responsible for 0.003% of human-caused bird deaths. Even with 20% wind energy, turbines are not expected to be the cause of a significant percentage of bird deaths as long as proper precautions are taken in their situation and design.

To date, no site or cumulative impacts on bird or bat populations have been documented in the United States or Europe. But that does not mean that impacts do not occur. This is a particular worry with bats because they are relatively long-lived mammals with low reproduction rates, according to a peer- reviewed study.[7] The British Wind Energy Association is currently conducting the necessary research to understand the risks to bats.

The United States does not yet have any commercial-scale offshore wind power sites, and proposals for developing them are still limited. Therefore, studies on their environmental impact are few. To date, Denmark has conducted the most extensive before- after-control-impact study in the world. The most recent environmental monitoring program from this study, spanning more than five years, concluded that none of the potential ecological risks appear to have long-term or large-scale impacts.[8] Denmark intends to do further research, however, to assess the effects over time of multiple projects within the same region. The United States needs to develop an ambitious and well-managed environmental research and siting program.[9]



**Costs and Economics of Wind Power**

The costs associated with wind power energy can differ on the amount of energy generated by each wind turbine. When broken down, for every kilowatt generated there is an estimated $1,775 associated with capital costs (i.e. turbines, towers, foundations, instillation, profit and interconnection fees).[10] By comparison, the costs to construct these, as compared to gas is $780 per kilowatt, $2,750 per kilowatt for coal, and $3,260 per kilowatt for nuclear power.[11] Once constructed, wind power can cost the consumer 4 to 6 cents per kilowatt hour in comparison to nuclear power that can cost 1.64 cents per kilowatt hour. Although, it may appear that wind power would cost less than nuclear power when looking at capital costs, the economic impact of wind power on local and regional economies is less.

In the short-term, there will be about 1,000 jobs created in reference to the construction of each wind farm. In the long-term, however, there will only be about 125 permanent jobs associated with each wind farm, as compared to 700 permanent jobs created by the development of a nuclear power plant.

Additionally, because there is a lack of information, the effects that the construction of wind farms will have on manufacturing, shipbuilding, and port industries are difficult to determine. In the future, economic studies will have to be done in order to determine the overall economic impact that wind farms have on local and regional economies.

**Summary of Wind Power**

| Pros | Cons |
|---|---|
| • Has the ability to be located offshore to avoid using up large amounts of land<br>• Generates energy from wind, which never gets used up<br>• Saves people from using up fossil fuels<br>• Limited negative impact on the environment | • Requires a large area and airspace to be constructed<br>• All environmental effects have not been determined by the U.S. government<br>• All economic effects have not been determined because they are relatively new in the U.S. |

[1] Information retrieved from the New Jersey Energy Master Plan. http://nj.gov/emp/docs/pdf/081022_emp.pdf

[2] Information retrieved from the Nuclear Energy Institute. http://www.nei.org/resourcesandstats/documentlibrary/protectingtheenvironment/whitepaper/reducingco2emissionsinnewjersey/

[3] Information retrieved from the Atlantic County Utilities Authority. http://www.acua.com/acua/uploadedFiles/Home/ACUA_Information/Files/Fact_Sheets/jerseyatlanticwindfarm.pdf

[4] U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 25. http://www1.eere.energy.gov/windandhydro/pdfs/41869.pdf. Retrieved 3/11/09.

[5] Ibid. pg. 48-49.

[6] Arnett, E., W. Erickson, J. Horn, and J. Kerns. (2005). Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Bat and Wind Energy Cooperative. http://www.batcon.org/wind/BWEC2004Reportsummary.pdf as cited in U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 112.

[7] National Research Council (NRC). (2007). Environmental Impacts of Wind-Energy Projects. Washington, DC: NAP. http://dels.nas.edu/dels/reportDetail.php?link_id=4185 as cited in U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 113-114.

[8] Danish Energy Authority (DEA). (2006). Danish Offshore Wind – Key Environmental Issues. Stockholm, Sweden: DONG Energy.

http://www.ens.dk/graphics/Publikationer/Havvindmoeller/danish_offshore_wind.pdf. as cited in U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 124.

[9] U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 124-126.

[10] U.S. Department of Energy. (2008). 20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply. pg. 185.

[11] Black & Veatch. (2007). 20 % Wind Energy Penetration in the United States: A Technical Analysis of the Energy Resource. Walnut Creek, CA.

## Appendix B: Schedule of Deliberation Day

## D-Day Agenda

9:00 – 9:15 a.m. Welcome and Day's Events

9:15 – 10:30 a.m. Nuke Plant Deliberations

10:45 – 11:45 a.m. Plenary with SME's

11:45 – 12:30 p.m. Lunch Break

12:45 – 1:30 p.m. Wind Farms Deliberations

1:45 – 2:45 p.m. Plenary with SME's

3:00 – 3:15 p.m. Deliberations for Policy Makers

3:30 – 4:15 p.m. Plenary with Policy Makers

4:15 – 5:00 p.m. Polling and Payment

5:00 – 5:30 p.m. Networking Reception

## Appendix C: Subject Matter Experts and Policy Maker Biographies

## Subject Matter Experts

**Dr. Tait Chirenje** is an environmental chemist who is currently an Associate Professor of Environmental Science and Geology at the Richard Stockton College of New Jersey. He holds a B.S. (Honors) from the University of Zimbabwe, an M.S. in Environmental Earth Science from the University of Guelph in Canada and a Ph.D. in Trace Metal Geochemistry from the University of Florida. He teaches various courses including Global Environmental Issues, Environmental Citizenship, Water Chemistry, Environmental Pollution and Regulation, Environmental Toxicology, and Remediation and Biotechnology.

His research interests include (1) geochemical characterization of water bodies (lakes and rivers), (2) Brownfields assessments and (3) urban geochemistry. He has published extensively in the areas of trace metal and urban geochemistry, and has recently worked on NJDEP and Philadelphia Water Department grants assessing water quality in Hammonton Lake and the Tacony-Frankford Watershed and NJDCA grants assessing brownfields in South Jersey municipalities.

Dr. Chirenje works with various faculty from different schools and campus and off-campus groups on issues relating to Sustainability and Water Quality, and is currently active in the American Democracy Project. He is a team co-leader of the Sustainability and Environmental Policy track and the Campus Sustainability Initiative at Stockton College, and a member of the American Geophysical Union, the American Chemical Society and the Geological Society of America.

**Dr. Patrick Hossay** teaches courses in Environmental Politics, Sustainable Development, Municipal Environmental Policy, and International Relations. He is an Associate Professor of Political Science and the co-coordinator of the curriculum in Sustainability and Environmental Policy. He holds a Ph.D. from the New School for Social Research, and a M.A. in international relations from San Francisco State University, and a B.S. from San Jose State University's School of Engineering.

Dr. Hossay has a long record of community environmental leadership. He directed and advised sustainable development projects and community conservation initiatives in various communities in the Caribbean Basin. He currently advises community energy and municipal sustainability projects throughout New Jersey, and leads the Stockton Campus Sustainability Initiative. He leads the Stockton wind energy project and anemometer loan program. And he is the author of Unsustainable: A Primer for Global Environmental Justice (Zed Books, 2006).

Dr. Hossay maintains a strong interest in municipal planning and sustainability, alternative energy, and green design. His own home is a model for green design, producing nearly as much energy as it uses. He lives in New Jersey horse country with his wife Sheri, a cluster of oversized dogs, and a cat with an attitude.

## Policy Makers

**Jeff Van Drew** is an American Democratic Party politician who has served in the New Jersey Senate since 2008, where he represents the 1st legislative district. From 2002-2008, Van Drew served in the General Assembly.

Van Drew serves in the Senate on the Environment Committee (as Vice-Chair), the Community and Urban Affairs Committee and the Transportation Committee. In the Assembly, Van Drew was a prime sponsor of the Fair Market Drug Pricing Act to provide reduced prescription drugs to eligible low-income consumers.

He has also sponsored legislation to address New Jersey's nursing shortage. Among his other legislative achievements are prohibiting unwanted telemarketing calls, controlling prescription drug errors, enforcing the ban on self-service gasoline stations, protections against predatory lending and tougher penalties for those who use the Internet to prey on children.

Van Drew served on the Dennis Township Committee in 1991, and as Mayor from 1997-2003 and from 1994-1995. Van Drew served on the Cape May County Board of Chosen Freeholders from 1994-1997. He was the Dennis Township Fire Commissioner from 1983-1986. Van Drew has served as president of the New Jersey Dental Society and a board expert of the New Jersey Board of Dentistry. As a Cape May County Freeholder, Van Drew campaigned for an Atlantic Cape Community College campus in Cape May County, a goal that was realized with a groundbreaking ceremony for the campus in late 2002.

Van Drew graduated with a B.S. from Rutgers University and was awarded a D.D.S. degree from Fairleigh Dickinson University.

**Jeanne M. Fox** is President of the New Jersey Board of Public Utilities (NJBPU) and serves as a member of the Governor's Cabinet. Ms. Fox was appointed to the NJBPU on January 15, 2002. The NJBPU has regulatory jurisdiction over telephone, electric, gas, water, wastewater and cable television companies and works to ensure that consumers have access to safe, reliable services at reasonable rates.

Ms. Fox is the chair of New Jersey's Energy Master Plan Committee, the interagency committee tasked by the Governor to update the state's Energy Master Plan. The plan is designed to ensure a reliable supply of energy while also achieving Governor Corzine's goal of reducing greenhouse gas emissions 20% by 2020 and placing the state on the path to reducing greenhouse gas emissions 80% by 2050.

Ms. Fox is a member of the National Association of Regulatory Utility Commissioners (NARUC). She sits on NARUC's Board of Directors; is Vice Chair of the Committee on Energy Resources and the Environment; is a member of the Committee on Critical Infrastructure and the Task Force on Climate Policy. She is also a member of the Executive Committee and immediate past President of the Mid-Atlantic Conference of Regulatory Utilities Commissioner. She serves on the Harvard Electricity Policy Group, and the Advisory Council to the Board of Directors and the Executive Committee of the Electric Power Research Institute. She also served on the

National Academy of Science Panel on Public Participation in Environmental Assessment and Decision Making, She is Chair of the National Council on Electricity Policy, a consortium of the National Governors' Association, National Council of State Legislatures, National Association of State Energy Officials, the U.S. Department of Energy, and U.S. Environmental Protection Agency. She was also appointed by U.S. Department of Energy Secretary Bodman to the department's Electricity Advisory Committee to provide senior-level counsel to him and to the department's Office of Electricity Delivery and Energy Reliability.

Under President Fox's leadership NJBPU has become a leader among states in developing clean energy policies, and promoting renewable energy and energy efficiency. Some of the accolades President Fox and the Board have received are the Golden Meter Award for Best Statewide Net Metering Program in the U.S., the New Jersey Chapter of Sierra Club's Outstanding Achievement Award, the Solar Energy Industries Association's Solar Champion 2005, AARP New Jersey's Leadership on Utility Consumer Issues Award, and the National Solar Industry Association's Award for Outstanding Leadership in Policy Development for Clean Energy.

Prior to her appointment to the board, Ms. Fox served as a Regional Administrator of the United States Environmental Protection Agency, and as Commissioner and Deputy Commissioner of the New Jersey Department of Environmental Protection and Energy.

Ms. Fox received a Bachelor's Degree from Douglass College, Rutgers and a Juris Doctor from the Rutgers University School of Law.

## Appendix D: Survey Instrument

# Survey Questions

Thank you. **If you come to a question you don't have much opinion about, just say so and we will move on to the next one.**

---

**[Opinion Questions]**

Let's begin with some questions about your opinions on energy.
Using a scale from 1 to 7, where 7 is extremely important and 1 is not important at all. How important is…

1. Receiving electric and gas at the lowest possible cost.
2. Making sure we have enough electricity to meet our needs in the future.
3. Having reliable electric.
4. Protecting the environment when creating energy.
5. Ensuring that producing energy will not pose a threat to peoples' safety
6. Producing electricity in ways that help the state's economy.

---

7. Which of these do you think is most important? Receiving electric and gas at the lowest possible cost, making sure we have enough electricity to meet our needs, having reliable electric, protecting the environment when creating energy, ensuring that producing energy will not pose a threat to peoples' safety, or producing electricity in ways that help the state's economy.

---

8. For our area of New Jersey, there are several ways to ensure we have enough energy in the future. One alternative is the use of renewable energy from wind mills in the ocean and bay. Using a scale from 1 to 7, where 7 is extremely important and 1 is not important at all, where would you rank the importance of using renewable energy from wind mills?

9. A second way to ensure we have enough energy in the future is to use more nuclear power. Using the same scale where 7 is extremely important and 1 is not important at all, where would you rank the importance of using more nuclear power?

10. Finally, a third possibility is to teach consumers to conserve energy so our needs are less. Using the same scale where 7 is extremely important and 1 is not important at all, where would you rank the importance of teaching customers ways to save energy so less is needed?

---

11. Which of these do you think is most important? Use of renewable energy from wind mills, use of more nuclear power, or teaching customers ways to save energy so less energy is needed?

12. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you that _____ is most important?

---

Some of these options are more expensive and others less expensive. So that we can determine how strongly you value each option, please tell us how much more than your current monthly bill you are willing to pay for each option. Your choices are $1 to $3 per month, $4 to $6 per month, or $7 to $10 per month. If you are unwilling to pay any more than you currently do, just say "0."

13. Additional energy using nuclear power.

14. Additional energy using wind power.

---

15. Some have proposed building another nuclear power plant in Southern New Jersey. If this is done, one possibility is to have the State government build and own the nuclear plant and the cost will be paid by all NJ taxpayers. Another is to have a private company build the plant and the customers will pay this cost over 40 or 50 years. If a new nuclear power plant is built, which would you prefer, that the government builds the plant and all taxpayers pay or that a private company build the plant and customers pay?

16. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you of your opinion on this?

---

17. On a scale from 1 to 7 with 1 being no environmental problems and 7 being serious environmental problems, to what extent do you think our power plants are a threat to the health of the environment in your area?

---

18. Some have proposed building wind farms off the coast of Southern New Jersey. Some are concerned that doing so would detract from the beauty of Southern New Jersey. On a scale from 1 to 7 with 1 being no concern and 7 being great concern, how concerned are you that wind farms would detract from the beauty of Southern New Jersey?

19. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you of your opinion on this?

---

20. Some are concerned that building wind farms would pose a threat to birds who might fly into the windmills. On a scale from 1 to 7 with 1 being no concern and 7 being great concern, how concerned are you wind farms would pose a threat to birds?

21. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you of your opinion on this?

---

*Knowledge questions*

22. Some alternatives for ensuring New Jersey residents have enough energy in the future may cost more than others. Which alternative do you believe will cost the most, increased use of coal and natural gas, increased use of nuclear power, wind power, or government efforts to encourage energy conservation?

23. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you that _____ would be the most costly energy option?

---

24. Some alternatives for ensuring New Jersey residents have enough energy in the future may be more harmful to the environment than others. Which alternative do you believe will be the most harmful to the environment, increased use of coal and natural gas, increased use of nuclear power, wind power, or government efforts to encourage energy conservation?

25. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain are you that _____ would be the most environmentally harmful energy option?

---

26. Some alternatives for ensuring New Jersey residents have enough energy in the future may pose greater threats to safety than others. Which alternative do you believe will pose the greatest threat to safety, increased use of coal and natural gas, increased use of nuclear power, wind power, or government efforts to encourage energy conservation?

27. On a scale from 1 to 7, where 7 is extremely certain and 1 is extremely uncertain, how certain that _____ would pose the greatest threat to safety?

---

28. As far as you can recall, how many accidents at nuclear power plants in the United States have posed a serious threat to the safety of the surrounding community?

---

*Sociodemographic questions.*

29. What is your gender? Male Female

30. What is your age? _____

31. With what race do you identify? (Verbatim)

32. With what ethnicity do you identify? (Verbatim)

33. What is the last grade or class you completed in school?

Grade eight or lower
Some high school, no diploma
High school diploma or equivalent
Technical or vocational school after high school
Some college, no degree
Associate's or two-year college degree
Four-year college degree
Graduate or professional school after college, no degree
Graduate or professional degree

34. Last year, what was your total household income before taxes? Just stop me when I get to the right category.

Less than $10K,
10K - 15K,
15K - 25K,
25K - 35K,
35K - 50K,
50K - 75K,
75K - 100K,
100K - 150K,
150K or more.

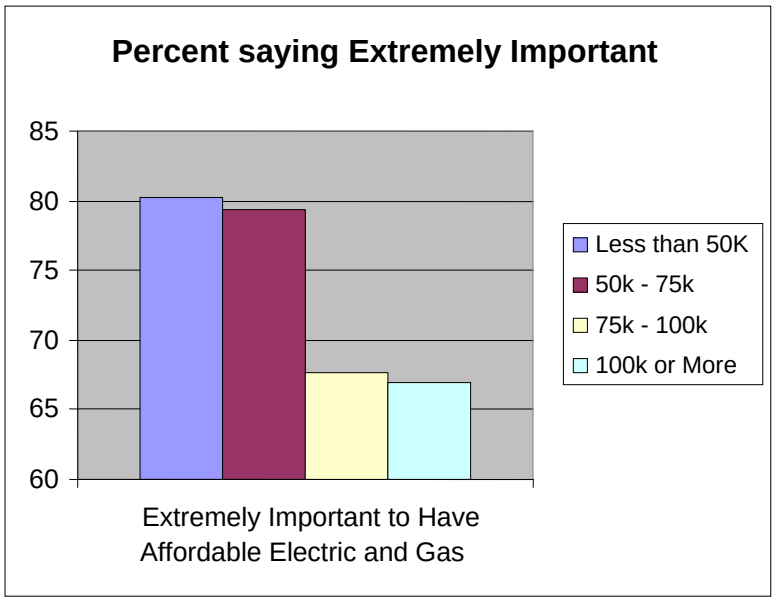
## Appendix E: Analysis of First Survey by Demographics

## Summary of Demographics

We first turn to an examination of the relationship between demographic factors and residents' beliefs and opinions regarding alternative energy. We present the relationships that we believe are substantively large enough to be of interest. We include hypotheses as to why these relationships might exist for some of them, but cannot offer hypotheses for the relationships in some cases.

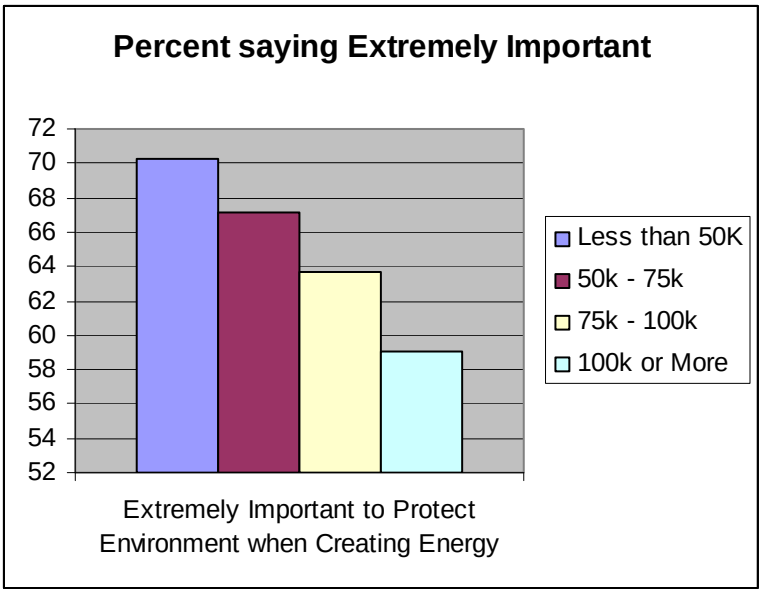
Income Differences in Opinion

Those with lower incomes are more likely to say that it is extremely important to have affordable electric and gas. This finding is consistent with theories in economics and political science (e.g., pocketbook voting) suggesting that people consider instrumental costs when forming opinions.[4]

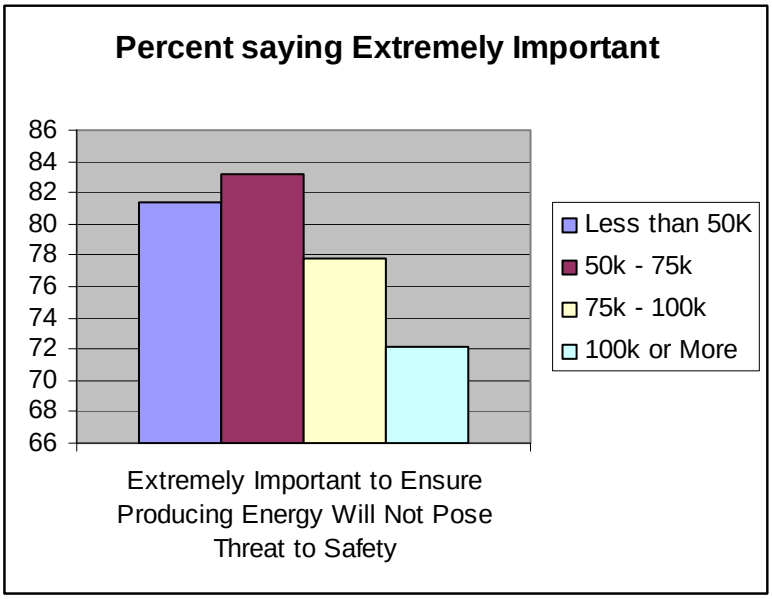



[4] See Gomez, Brad T. and J. Matthew Wilson. (2001). "Political Sophistication and Economic Voting in the American Electorate: A Theory of Heterogeneous Attribution." *American Journal of Political Science*. 45(4). 899-914.

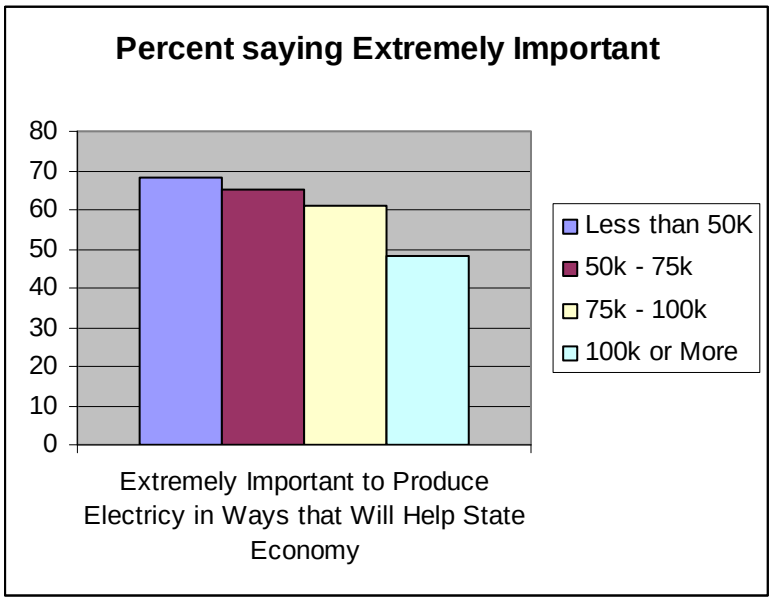
Those with lower incomes are also more likely to say it is extremely important to protect the environment when creating energy. This may also be evidence of people considering instrumental costs. It may be that those with more money, who also pay more in taxes, see efforts by the government to promote environmentally friendly policies as a waist of their tax dollars.



Those with higher incomes are less likely to say it is extremely important to ensure producing energy will not pose a threat to safety. We can think of two competing explanations for this relationship: 1) it is possible that wealthier people are more willing to take risks, which is what has led them to have higher incomes and 2) it may be that wealthier people have become wealthy because they are a bit more individually focused and care less about others,[5] including others' safety.

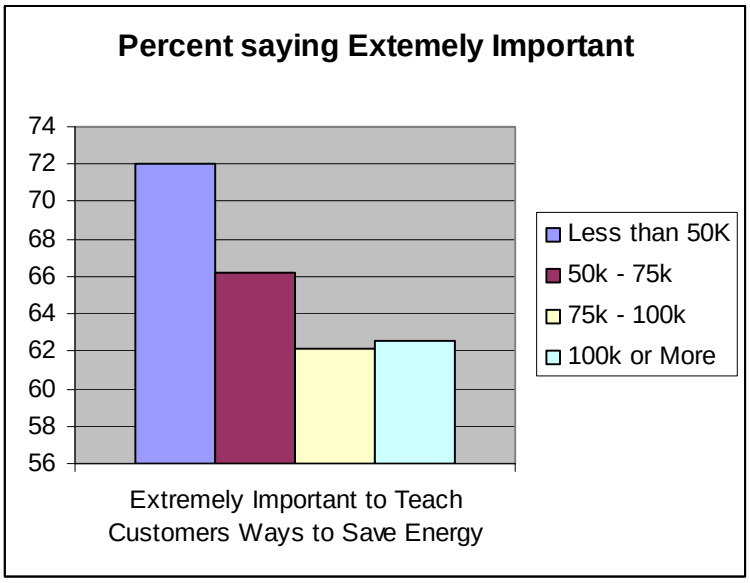



Those with higher incomes are less likely to say it is extremely important to produce electricity in ways that will help the state economy. Again, this may reflect self interest: wealthy people may have greater aversion to a state government that taxes them.

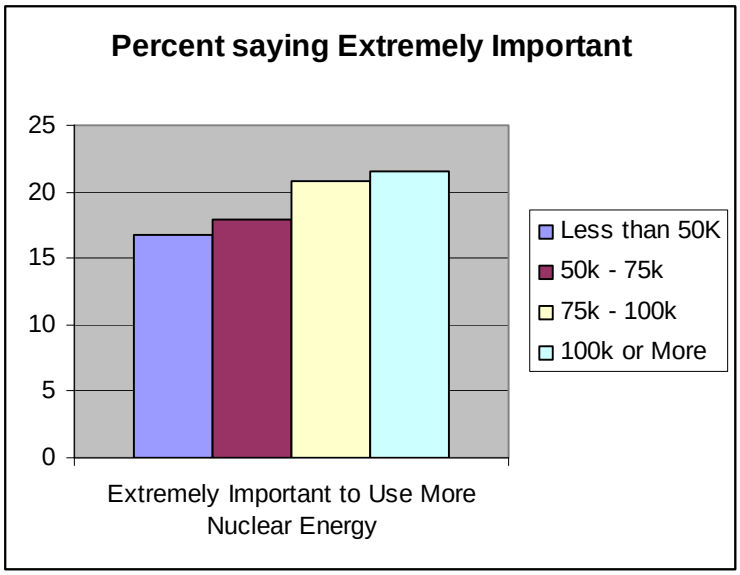



[5] See Lin, N. (2001). *Social Capital: A Theory of Social Structure and Action*. Cambridge, UK: Cambridge University Press

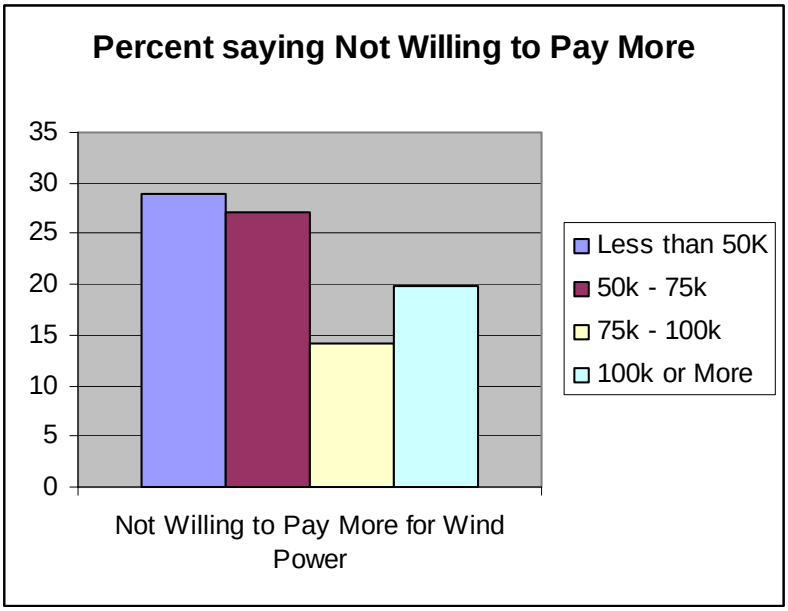
Those with lower incomes are more likely to say it is extremely important to teach customers ways to save energy.



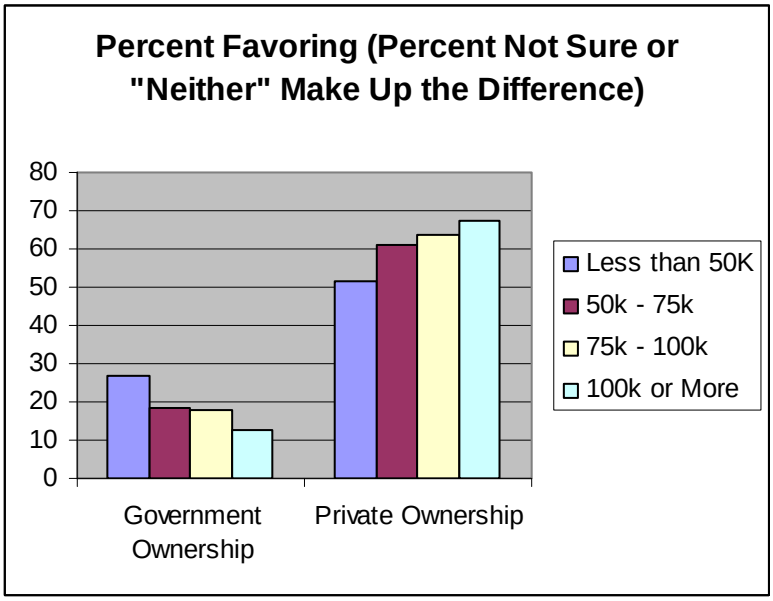

Those with higher incomes are more likely to say it is extremely important to use more nuclear energy.



Those with lower incomes are less willing to pay more for wind power. Again, evidence in support of theories arguing that economic position influences support for opinions on how much people will pay for something.[6]



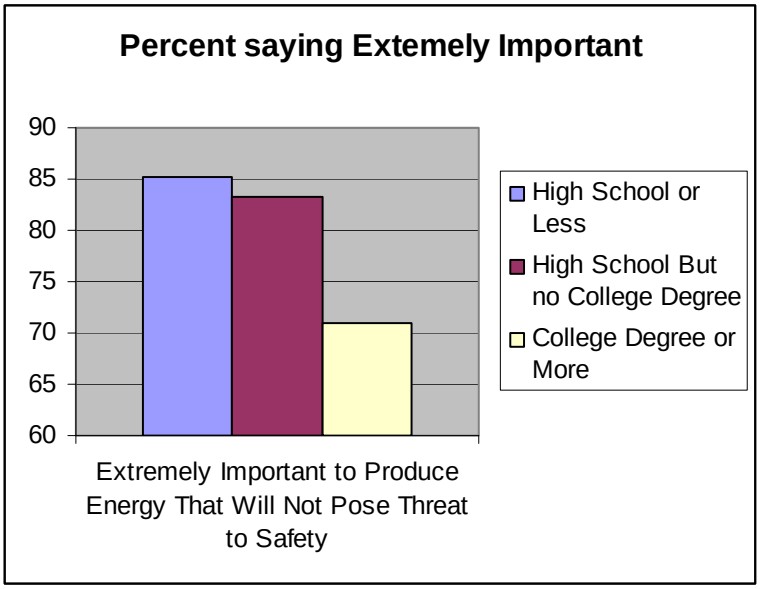

Those with lower incomes are more likely to support government ownership of a new nuclear power plant, while those with higher incomes are more likely to support private ownership.



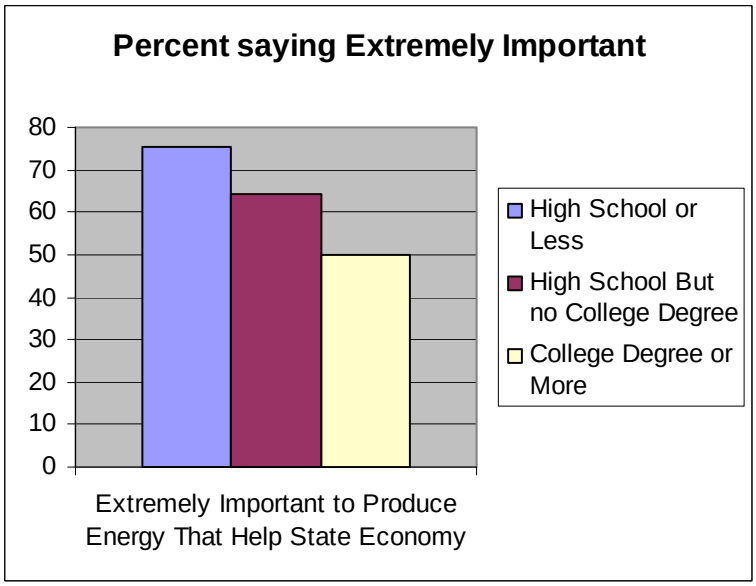

[6] See Gomez and Wilson. (2001). "Political Sophistication and Economic Voting in the American Electorate: A Theory of Heterogeneous Attribution."

Educational Differences in Opinion

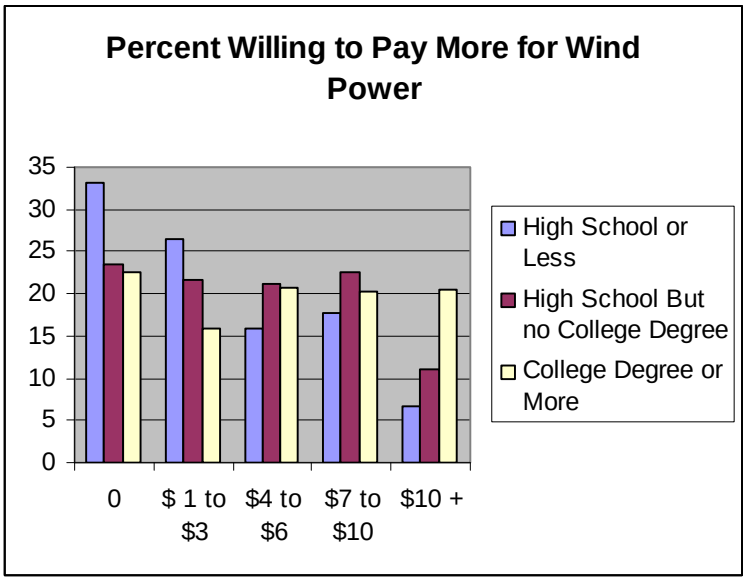
Those with higher levels of education are less likely to say it is extremely important to produce energy that will not pose a threat to safety. The influence of education here may be a function of the strong positive correlation between education and income. That is, this may simply be reflecting the same relationship we found between income and this question.



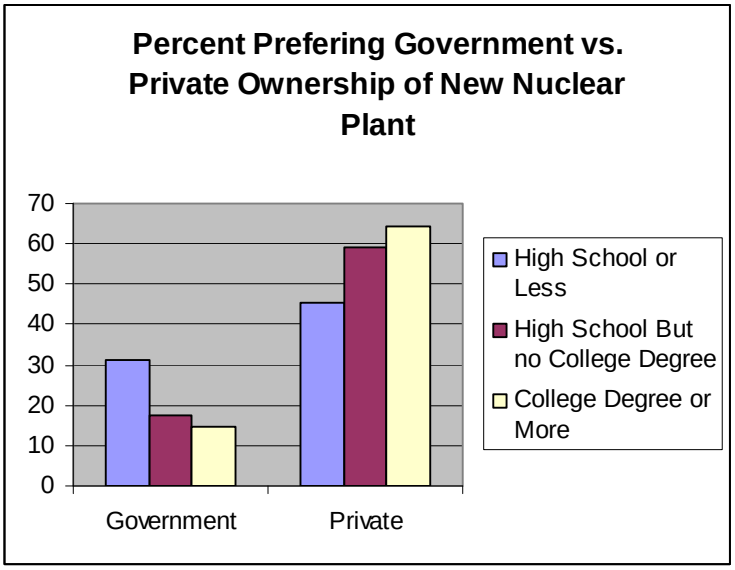

Those with higher levels of education are less likely to say it is extremely important to produce energy that helps the state economy.



Those with lower levels of education are less willing to pay more for wind power. Again, probably a function of differences in income across levels of education.

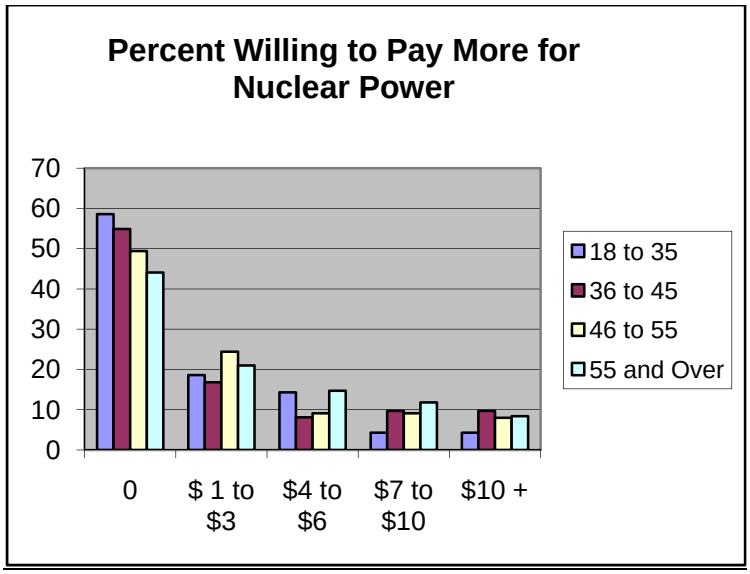



Those with lower levels of education are more willing to support government ownership of a new nuclear power plant, while those with higher levels of education are more willing to support private ownership. This again may be a function of income.

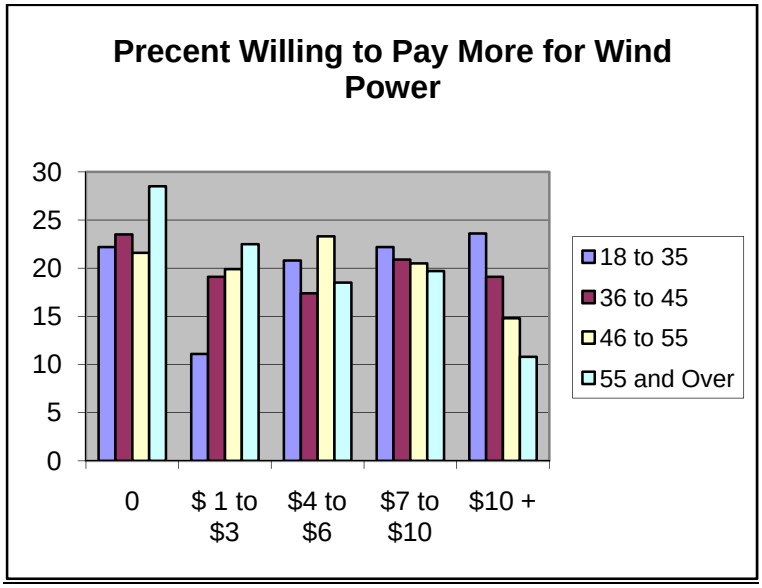


Age Differences in Opinion

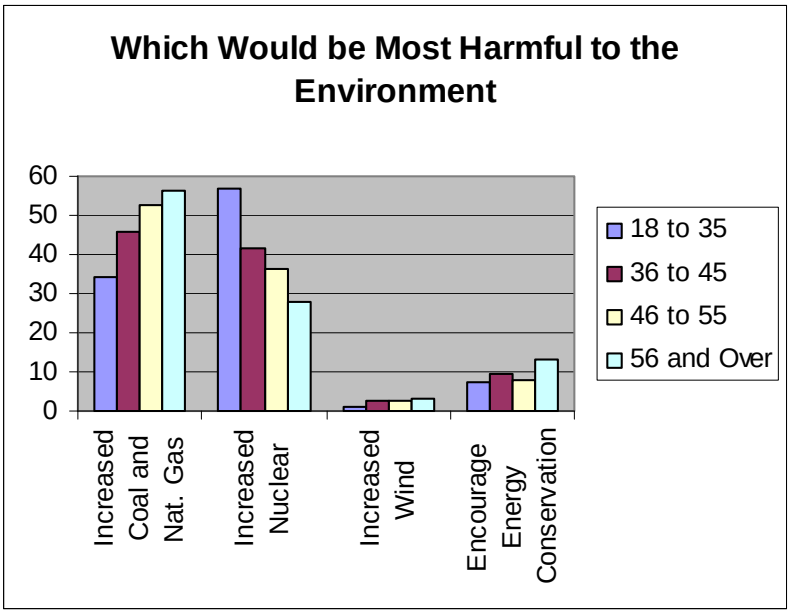
Younger citizens are less willing to pay more for increased nuclear power. This perhaps this reflects ideological differences across age.




Younger respondents are more willing to pay ten dollars or more for increased use of wind power, while older respondents are less willing to pay anything more for the same. This may be evidence that younger people are more liberal when it comes to environmentally friendly energy and thus more willing to bear costs of producing it.

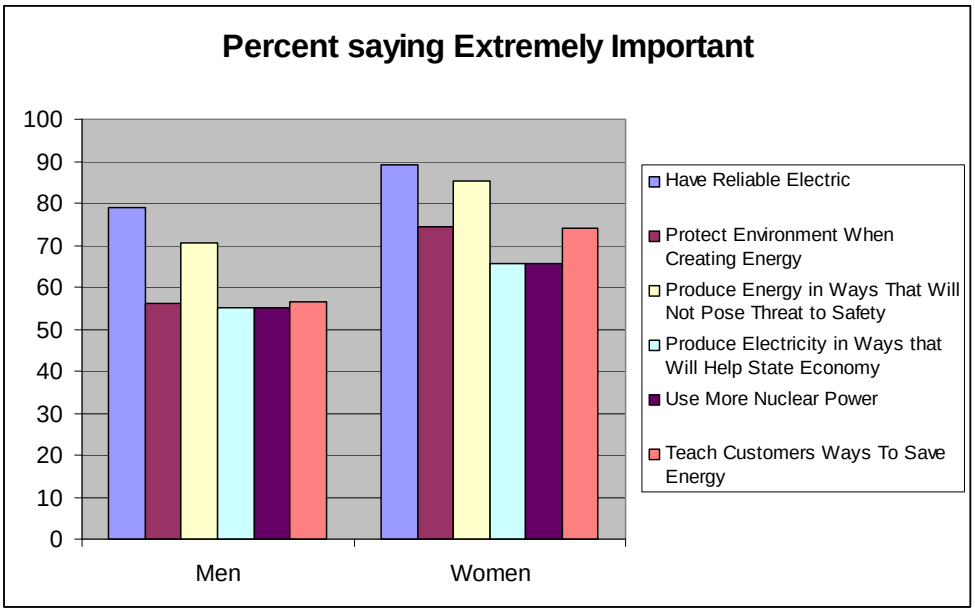


Older respondents are more likely to think that increased use of coal and natural gas will be most harmful to the environment, while younger respondents are more likely to think that increased use of nuclear power will be most harmful.

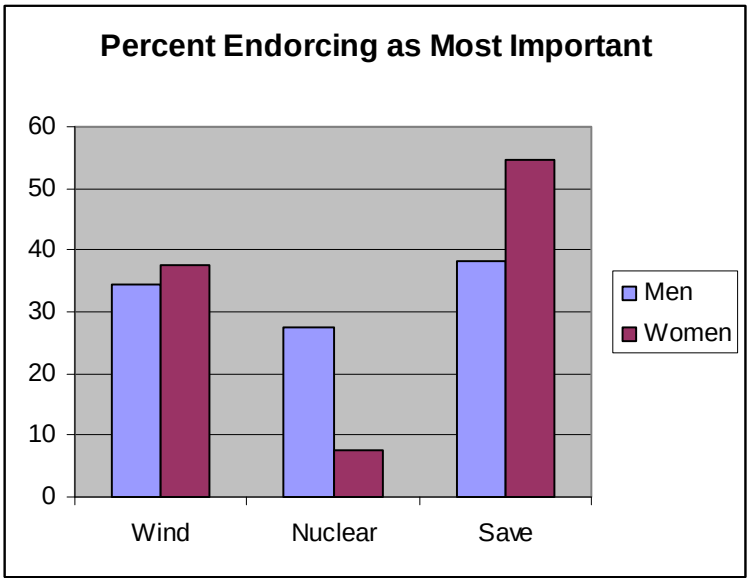



Gender Differences in Opinion

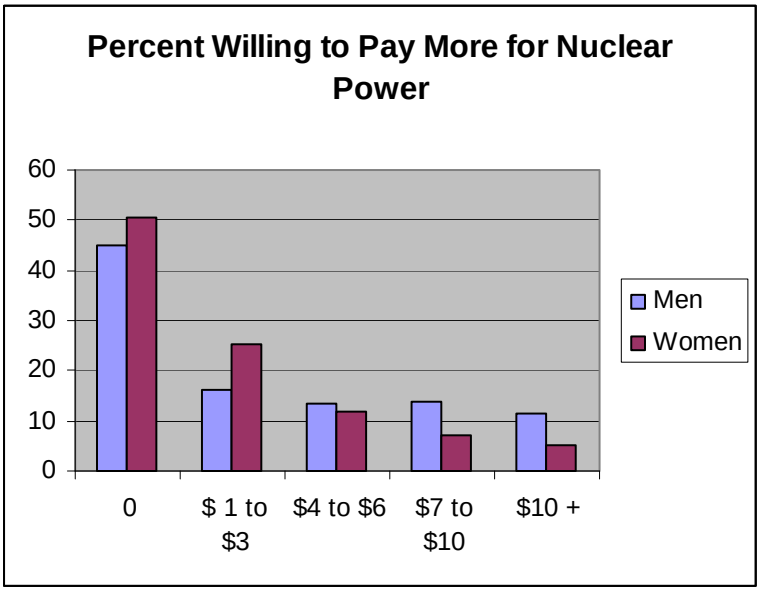
Women are more likely to say it is extremely important to (1) have more reliable electric, (2) protect the environment when creating energy, (3) produce energy in ways that will not pose a threat to safety, (4) produce electricity in ways that will help the state economy, (5) use more nuclear power, and (6) teach customers ways to save energy. Overall, it appears that women are more concerned about energy policy than men.



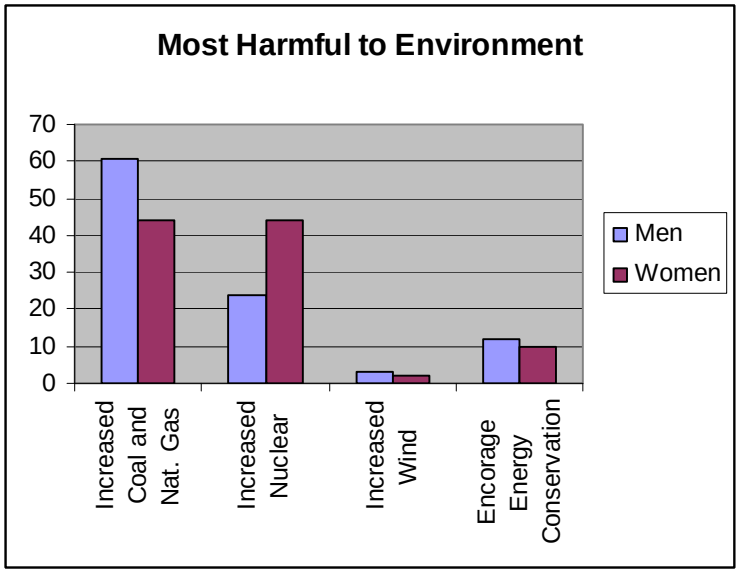
Women are more likely than men to say that teaching customers to save energy is the most important of these alternatives, while men are more likely than women to say that greater use of nuclear power is most important.




Women are less willing to pay more for more nuclear power than men, despite them being more likely than men to say greater use of nuclear power is extremely important (see above).

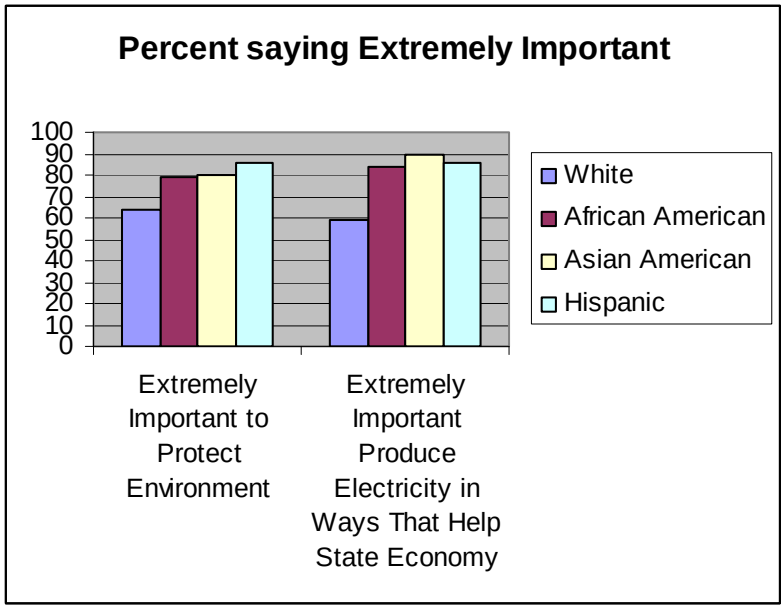


Men are more likely to say that increased use of coal and natural gas will be most harmful to the environment, while women are more likely to say that increased use of nuclear power will be most harmful. Despite thinking greater use of nuclear power is extremely important than men, women seem to have a greater aversion to nuclear power.

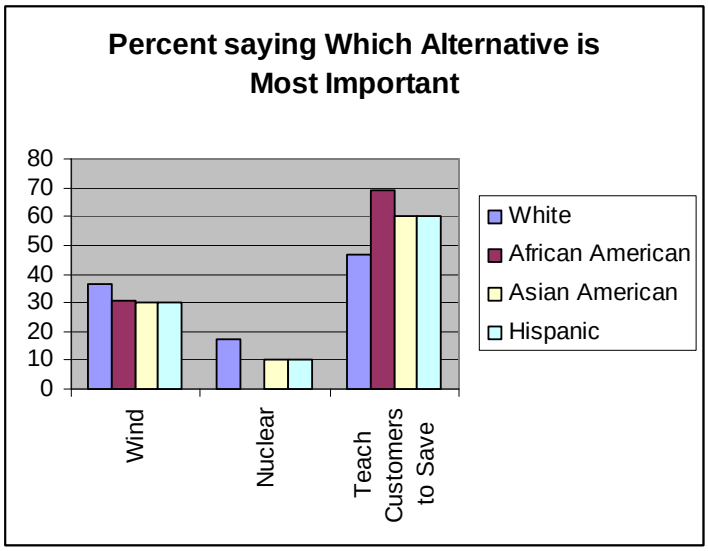



Racial Differences in Opinion

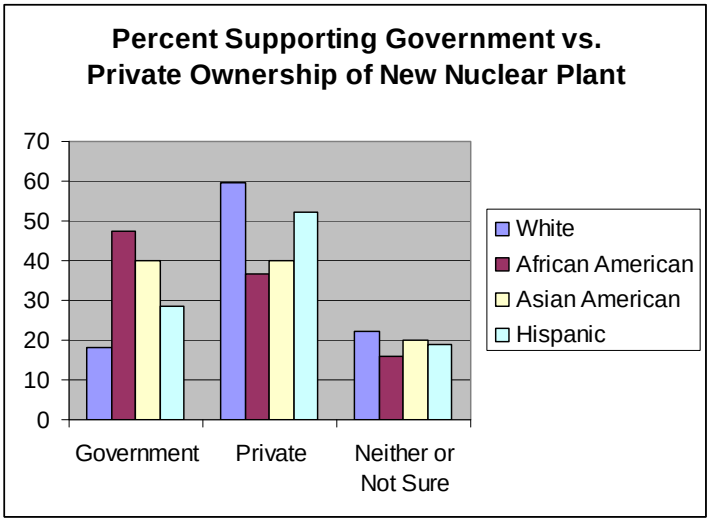
Whites are less likely than others to say that it is extremely important to make sure that energy production is done in ways that protect the environment and that it is extremely important to produce electricity in ways that help the state economy. These racial differences may be explained by differences in ideology and/or income across groups.



African Americans are more likely than whites to say that teaching customers ways to save energy is the most important alternative, while whites are more likely than African Americans to say that increased use of nuclear power is the most important alternative.

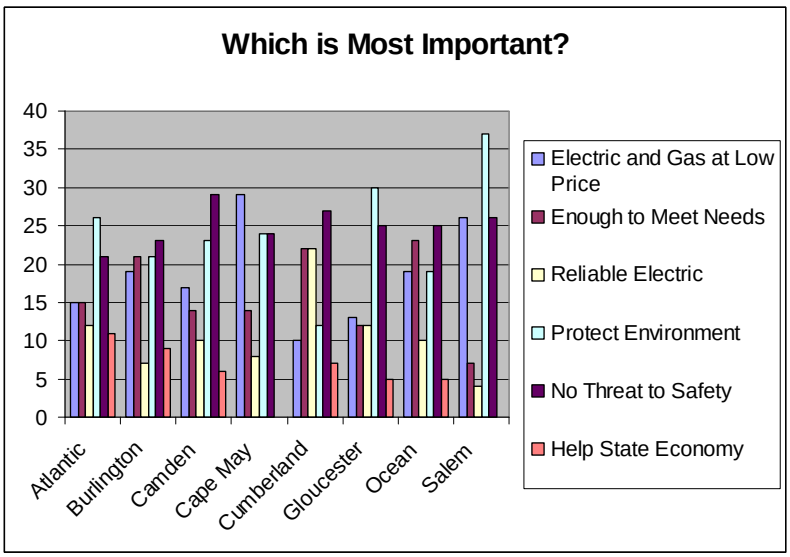



Whites are least supportive of government ownership of a new nuclear power plant, and most supportive of private ownership. Again, this may reflect ideological and/or income differences across groups.

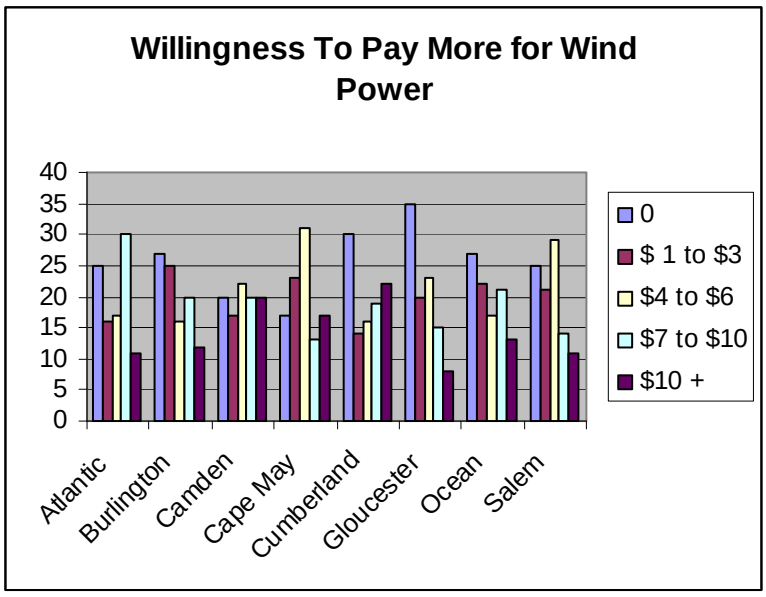


County Differences in Opinion

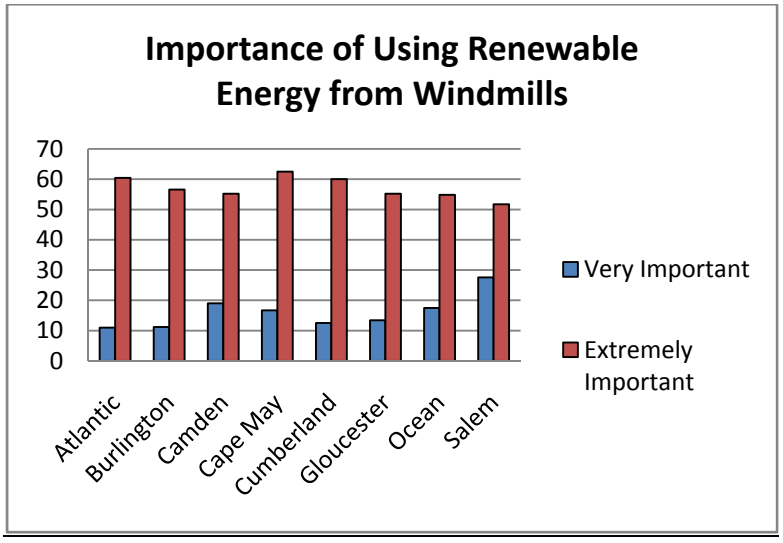
Residents of Cumberland and Gloucester Counties are less likely to say that receiving electric and gas power at a low price is most important. Salem County is the outlier when asked how important it is to have electric and gas at low prices. While all county respondents felt it very or extremely important, Salem had 20.69% that felt it was important, but did not rise to the level of very or extremely. Residents of Salem County are less likely than others to say that ensuring we get enough energy to meet our needs is most important. Residents of Cumberland County are more likely than others to say receiving reliable electric power is most important. When asked about protecting the environment, in Salem County 20.69% said it is important. They were consistent when asked which of the attributes were most important. Salem's biggest concern is protecting the environment which is indicated at 37.04%, which may be explained by residents being educated about nuclear plants and the environment for more than 20 years. Residents of Salem County are more likely to say that ensuring that we produce energy that protects the environment is most important, while residents of Cumberland County are least likely to say the same. There are no significant differences across counties in the percent saying that ensuring safety in producing energy is most important or in the percent saying that helping the state economy is most important.



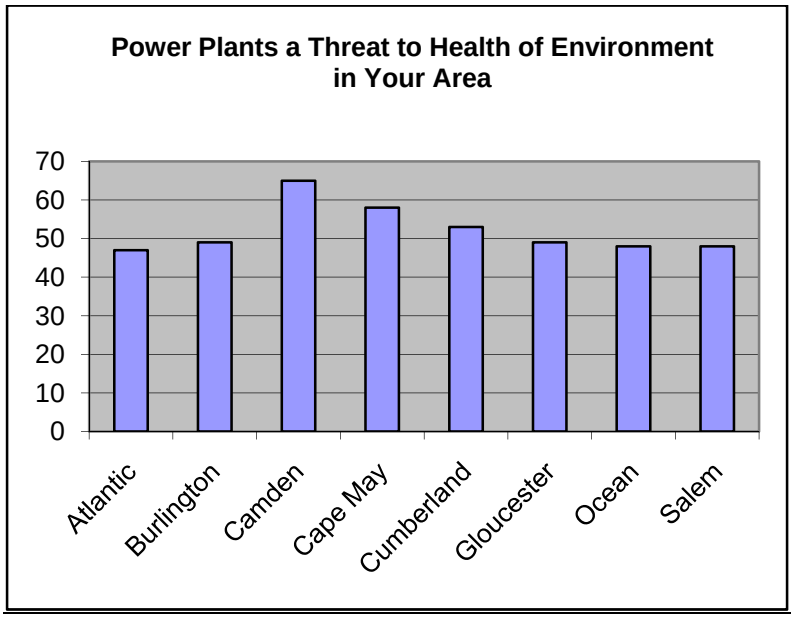
Residents of Cumberland and Gloucester Counties are least willing to pay more for wind power. Cape May (31.25%) and Salem (28.57%) were the highest in the $4-$6 range. Other shore counties were willing to pay even more at $7-$10 per month with Atlantic at 29.89% and Ocean at 20.59%. But these counties also had a high per cent unwilling to pay anything more for wind power with Atlantic at 25.29% and Ocean at 27.45%. Gloucester County had the highest resistance to paying anything more for wind power at 34.85%. This may be attributed to their geographic location, which means they would have the least opportunity for wind power.



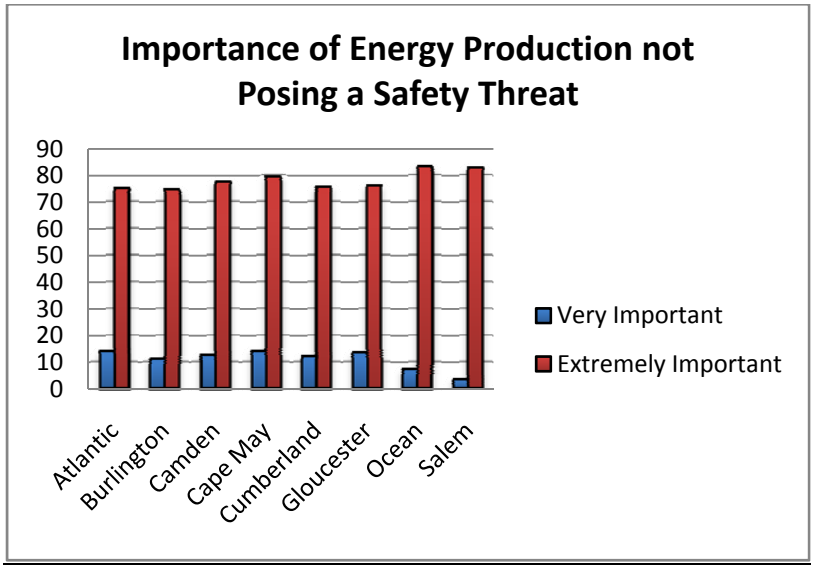

When asked about the importance of using renewable energy from windmills, it is no surprise that Cape May at 78% and Salem at 87% found this to be very or extremely important. Cape May is to be the site of the first offshore wind mills in NJ and Salem is across the bay from the Delaware wind mill farm.



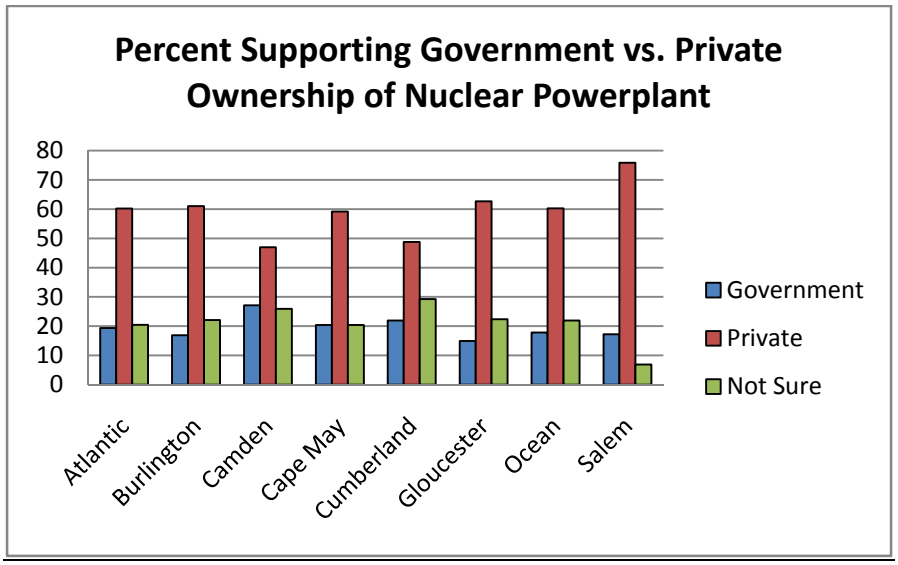
Residents of Camden and Cape May Counties are more likely than others to say that power plants are a threat to the health of their environment.



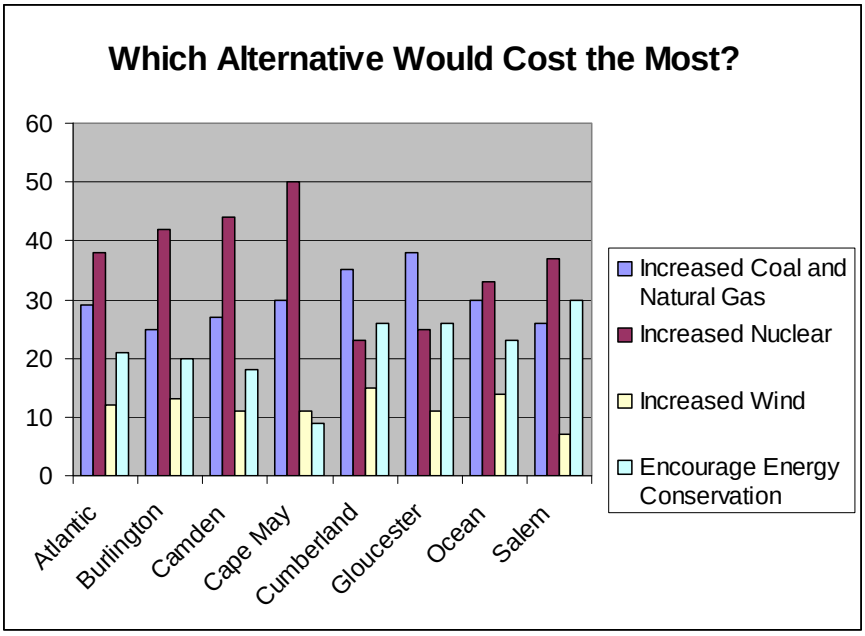

The shore counties had the highest concern when asked how important it is to ensuring producing energy will not pose a threat to safety. Atlantic, Cape May and Ocean Counties all were over 90% finding it very or extremely important.



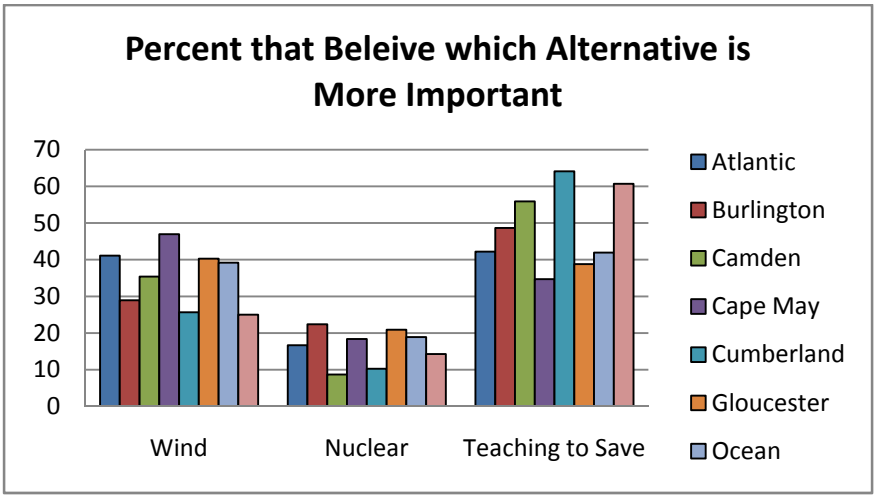
When asked whether the government or a private company should build a new nuclear plant, Salem overwhelmingly said private (75.86%). Their three nuclear power plants are all privately owned. Camden (46.99%) and Cumberland (48.78%) were the least likely to want private ownership. All counties prefer private to government ownership by large margins.



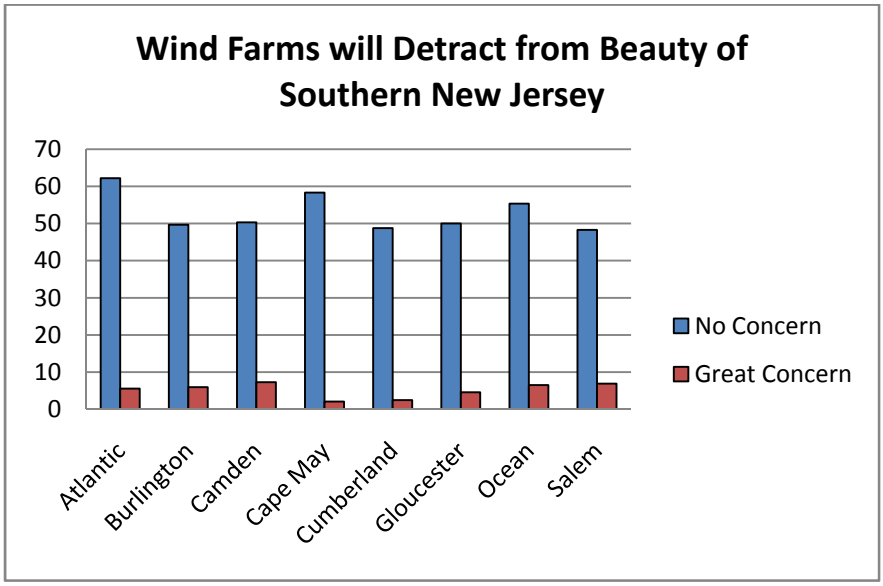

Residents of Cumberland and Gloucester Counties are more likely to say that increased use of coal and natural gas will cost the most of these alternatives. Residents of Burlington, Camden, and Cape May Counties are more likely to say that increased use of nuclear power will cost the most. Residents of Cape May County are less likely than others to say that encouraging energy conservation will cost the most. Residents of Salem County are less likely than others to say that increased use of wind power will cost the most.



When asked which is most important: wind, nuclear, or teaching people to save energy, it appears that the poorer counties are more heavily in favor of teaching people to save energy. Both Cumberland and Salem Counties were over 60% and Camden County was over 55%. The other counties were in the 30's and 40's. Cape May followed its pattern on wind being the most important at 46.94%, This one may make an interesting graph.




When asked if they were concerned that wind farms detract from the beauty of southern NJ, the response from the shore communities was overwhelmingly with no concern in Atlantic County the highest at 62.22% followed by Cape May at 58.33% and Ocean at 55.35%. All other counties ranged from 48.88% to 50.30%. Less than 7.27% had any great concerns at all.



## Appendix F: Changes in Opinion between the First and Second Survey

For all below tables, the first reports the findings from the first poll, the second are from the poll taken after the day of deliberations. These are just frequency distributions with no tests for statistical significance.

1. Increased belief that having enough energy to meet the needs of New Jersey residents is most important of alternatives: 17% before, 29% after. Decreased belief that safety is most important: 28% before, 10% after.

   Which of these do you think is most important? Circle the letter associated with your response.

   A. Receiving electric and gas at the lowest possible cost.
   B. Making sure we have enough electricity to meet our needs.
   C. Having reliable electric service.
   D. Protecting the environment when creating energy.
   E. Ensuring that producing energy will not pose a threat to our safety.
   F. Producing electricity in ways that help the state's economy.

```
. tab most_imp1

         which of |
   following most |
        important |      Freq.     Percent        Cum.
------------------+-----------------------------------
elec&gas_lowprice |          6       20.69       20.69
 enough_meetneeds |          5       17.24       37.93
    reliable_elec |          2        6.90       44.83
      protect_env |          6       20.69       65.52
 no_threat_safety |          8       27.59       93.10
   help_stateecon |          2        6.90      100.00
------------------+-----------------------------------
            Total |         29      100.00

tab most_imp12

         which of |
   following most |
        important |      Freq.     Percent        Cum.
------------------+-----------------------------------
elec&gas_lowprice |          5       16.13       16.13
 enough_meetneeds |          9       29.03       45.16
    reliable_elec |          4       12.90       58.06
      protect_env |          7       22.58       80.65
 no_threat_safety |          3        9.68       90.32
   help_stateecon |          3        9.68      100.00
------------------+-----------------------------------
            Total |         31      100.00
```

2. Increased belief that teaching customers ways to save energy is most important alternative: 34% before, 55% after. Decreased belief that use of renewable energy from wind mills is most important of alternatives: 48% before, 23% after.

   Which of these is most important? Circle the letter associated with your response.

   A. Use of renewable energy from windmills.
   B. Use of more nuclear power.
   C. Teaching customers ways to save energy so less energy is needed.

```
tab most_imp2

   which is |
       most |
  important |      Freq.     Percent        Cum.
------------+-----------------------------------
       wind |         14       48.28       48.28
    nuclear |          5       17.24       65.52
       save |         10       34.48      100.00
------------+-----------------------------------
      Total |         29      100.00

. tab most_imp22

   which is |
       most |
  important |      Freq.     Percent        Cum.
------------+-----------------------------------
       wind |          7       22.58       22.58
    nuclear |          7       22.58       45.16
       save |         17       54.84      100.00
------------+-----------------------------------
      Total |         31      100.00
```

3. Increased willingness to pay more for nuclear power (numbers below).

Some of these options are more expensive and others less expensive. So that we can determine how strongly you value each option, please tell us how much more than your current monthly bill you are willing to pay for each option below. Circle the letter associated with your response.

```
tab nuclear_morepay

how much more |
   willing to |
     pay more |
nuclear power |      Freq.     Percent        Cum.
--------------+-----------------------------------
            0 |         18       60.00       60.00
     $1 to $3 |          5       16.67       76.67
     $4 to $6 |          2        6.67       83.33
    $7 to $10 |          4       13.33       96.67
more than $10 |          1        3.33      100.00
--------------+-----------------------------------
        Total |         30      100.00

. tab nuclear_morepay2

how much more |
   willing to |
     pay more |
nuclear power |      Freq.     Percent        Cum.
--------------+-----------------------------------
            0 |         15       48.39       48.39
     $1 to $3 |          7       22.58       70.97
     $4 to $6 |          7       22.58       93.55
    $7 to $10 |          2        6.45      100.00
--------------+-----------------------------------
        Total |         31      100.00
```

4. Increased willingness to pay more for power from wind mills: 37% not willing to pay more initially, only 13% after. However, we also see a decrease in the number willing to pay $7 to $10 more: 33% before, 16% after.

```
. tab wind_morepay

how much more |
   willing to |
pay more wind |
        power |      Freq.     Percent        Cum.
--------------+-----------------------------------
            0 |         11       36.67       36.67
     $1 to $3 |          2        6.67       43.33
     $4 to $6 |          7       23.33       66.67
    $7 to $10 |         10       33.33      100.00
--------------+-----------------------------------
        Total |         30      100.00

. tab wind_morepay2

how much more |
   willing to |
pay more wind |
        power |      Freq.     Percent        Cum.
--------------+-----------------------------------
            0 |          4       12.90       12.90
     $1 to $3 |         11       35.48       48.39
     $4 to $6 |         11       35.48       83.87
    $7 to $10 |          5       16.13      100.00
--------------+-----------------------------------
        Total |         31      100.00
```

5. No aggregate change in preferences for who should build a nuclear plant, though more people are sure of their preferences: 10% not sure originally, everyone sure after.

Some have proposed building another nuclear power plant in southern New Jersey. If this is done, one possibility is to have the state government build and own the nuclear plant, and the cost will be paid by all NJ taxpayers. Another is to have a private company build the plant, and the customers will pay this cost over 40 or 50 years. If a new nuclear power plant is built, which would you prefer?

```
tab gov_vs_private

  gov or private |
       build new |
   nuclear plant |      Freq.     Percent        Cum.
-----------------+-----------------------------------
      government |          3        9.68        9.68
         private |         25       80.65       90.32
neither/not sure |          3        9.68      100.00
-----------------+-----------------------------------
           Total |         31      100.00

. tab gov_vs_private2

  gov or private |
       build new |
   nuclear plant |      Freq.     Percent        Cum.
-----------------+-----------------------------------
      government |          6       19.35       19.35
         private |         25       80.65      100.00
-----------------+-----------------------------------
           Total |         31      100.00
```

6. Increased concern about the threat of power plants to the environment: 41% on the "no environmental problems" side of the seven-point scale before, only 23% after. However, there is a decrease in the percent saying it is a very serious problem (value of 7), with more giving a value of 6.

On a scale from 1 to 7 with 1 being no environmental problems and 7 being serious environmental problems, to what extent do you think our power plants are a threat to the health of the environment in your area?

```
tab threat_env

 power plants threat |
        to health of |
 environment in your |
                area |      Freq.     Percent        Cum.
---------------------+-----------------------------------
     no env problems |          3       10.34       10.34
                   2 |          6       20.69       31.03
                   3 |          3       10.34       41.38
                   4 |          6       20.69       62.07
                   5 |          5       17.24       79.31
                   6 |          1        3.45       82.76
serious env problems |          5       17.24      100.00
---------------------+-----------------------------------
               Total |         29      100.00

. tab threat_env2

 power plants threat |
        to health of |
 environment in your |
                area |      Freq.     Percent        Cum.
---------------------+-----------------------------------
                   2 |          4       12.90       12.90
                   3 |          3        9.68       22.58
                   4 |          8       25.81       48.39
                   5 |          6       19.35       67.74
                   6 |          8       25.81       93.55
serious env problems |          2        6.45      100.00
---------------------+-----------------------------------
               Total |         31      100.00
```

7. Decrease in concern about wind farms detracting from the beauty of southern New Jersey: 48% not at all concerned before (value of 1), 61% after.

Some have proposed building wind farms off the coast of southern New Jersey. Some are concerned that doing so would detract from the beauty of southern New Jersey. On a scale from 1 to 7 with 1 being no concern and 7 being great concern, how concerned are you that wind farms would detract from the beauty of southern New Jersey?

```
tab wind_beauty

    concerned |
   wind farms |
 detract from |
    beauty of |
  Southern NJ |      Freq.     Percent        Cum.
--------------+-----------------------------------
   no concern |         15       48.39       48.39
            2 |          9       29.03       77.42
            3 |          3        9.68       87.10
            4 |          2        6.45       93.55
            6 |          1        3.23       96.77
great concern |          1        3.23      100.00
--------------+-----------------------------------
        Total |         31      100.00

. tab wind_beauty2

    concerned |
   wind farms |
 detract from |
    beauty of |
  Southern NJ |      Freq.     Percent        Cum.
--------------+-----------------------------------
   no concern |         19       61.29       61.29
            2 |          6       19.35       80.65
            3 |          3        9.68       90.32
            4 |          1        3.23       93.55
            5 |          1        3.23       96.77
            6 |          1        3.23      100.00
--------------+-----------------------------------
        Total |         31      100.00
```

8. Large decrease in concern about wind farms threatening birds: 74% on the no concern end of the scale before, 94% after. 16% with values of 6 or 7 (great concern) before, 0 after.

Some are concerned that building wind farms would pose a threat to birds who might fly into the windmills. On a scale from 1 to 7 with 1 being no concern and 7 being great concern, how concerned are you wind farms would pose a threat to birds?

```
. tab wind_birds

    concerned |
   wind farms |
        would |
     threaten |
        birds |      Freq.     Percent        Cum.
--------------+-----------------------------------
   no concern |         12       38.71       38.71
            2 |          7       22.58       61.29
            3 |          4       12.90       74.19
            4 |          2        6.45       80.65
            5 |          1        3.23       83.87
            6 |          3        9.68       93.55
great concern |          2        6.45      100.00
--------------+-----------------------------------
        Total |         31      100.00

. tab wind_birds2

    concerned |
   wind farms |
        would |
     threaten |
        birds |      Freq.     Percent        Cum.
--------------+-----------------------------------
   no concern |         19       61.29       61.29
            2 |         10       32.26       93.55
            4 |          1        3.23       96.77
            5 |          1        3.23      100.00
--------------+-----------------------------------
        Total |         31      100.00
```

9. Increased belief that nuclear will be the most costly solution to energy needs: 25% before, 39% after. Decreased belief that wind power will be most costly: 32% before, 13% after.

Some alternatives for ensuring New Jersey residents have enough energy in the future may cost more than others. Which alternative do you believe will cost the most? Circle the letter associated with your response.

```
. tab costmost

which would cost the most |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |          8       28.57       28.57
        increased unclear |          7       25.00       53.57
              wind power |          9       32.14       85.71
    encourage energy cons |          4       14.29      100.00
--------------------------+-----------------------------------
                    Total |         28      100.00

. tab costmost2

which would cost the most |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |          9       29.03       29.03
        increased unclear |         12       38.71       67.74
              wind power |          4       12.90       80.65
    encourage energy cons |          6       19.35      100.00
--------------------------+-----------------------------------
                    Total |         31      100.00
```

10. Increased belief that increased use of coal and natural gas will be most harmful to the environment: 70% before, 87% after. Decreased belief that nuclear will be most harmful: 20% before, 6% after.

Some alternatives for ensuring New Jersey residents have enough energy in the future may be more harmful to the environment than others. Which alternative do you believe will be the most harmful to the environment? Circle the letter associated with your response.

```
. tab harmfulmost_env

      which would be most |
   harmful to environment |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |         21       70.00       70.00
        increased nuclear |          6       20.00       90.00
    encourage energy cons |          3       10.00      100.00
--------------------------+-----------------------------------
                    Total |         30      100.00

. tab harmfulmost_env2
variable harmfulmost_env2 not found
r(111);

. tab harmfulmost2

      which would be most |
   harmful to environment |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |         27       87.10       87.10
        increased nuclear |          2        6.45       93.55
    encourage energy cons |          2        6.45      100.00
--------------------------+-----------------------------------
                    Total |         31      100.00
```

11. Small, not statistically significant increase in belief that nuclear and coal and natural gas will pose the greatest threat to safety.

Some alternatives for ensuring New Jersey residents have enough energy in the future may pose greater threats to safety than others. Which alternative do you believe will pose the greatest threat to safety? Circle the letter associated with your response.

```
tab threatmost_safety

which would pose greatest |
         threat to safety |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |          8       29.63       29.63
        increased nuclear |         14       51.85       81.48
              wind power |          1        3.70       85.19
    encourage energy cons |          4       14.81      100.00
--------------------------+-----------------------------------
                    Total |         27      100.00

. tab threatmost_safety2

which would pose greatest |
         threat to safety |      Freq.     Percent        Cum.
--------------------------+-----------------------------------
increased coal and natgas |         11       35.48       35.48
        increased nuclear |         17       54.84       90.32
              wind power |          1        3.23       93.55
    encourage energy cons |          2        6.45      100.00
--------------------------+-----------------------------------
                    Total |         31      100.00
```

12. Increase in correct belief that there has been one nuclear accident in US: 45% before, 58% after. However, also an increase in belief that there have been no accidents: 3% before, 35% after.

As far as you can recall, how many accidents at nuclear power plants in the United States have posed a serious threat to the safety of the surrounding community? Write your answer in the blank spot below.

```
. tab num_nuclear_accidents

   how many |
  accidents |
 at nuclear |
  plants in |
   US posed |
    serious |
   theat to |
     safety |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |          1        3.23        3.23
          1 |         14       45.16       48.39
          2 |          7       22.58       70.97
          3 |          2        6.45       77.42
          4 |          1        3.23       80.65
          5 |          1        3.23       83.87
         10 |          1        3.23       87.10
         50 |          1        3.23       90.32
      10004 |          3        9.68      100.00
------------+-----------------------------------
      Total |         31      100.00

. tab num_nuclear_accidents2

   how many |
  accidents |
 at nuclear |
  plants in |
   US posed |
    serious |
   theat to |
     safety |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |         11       35.48       35.48
          1 |         18       58.06       93.55
          2 |          2        6.45      100.00
------------+-----------------------------------
      Total |         31      100.00
```