

Public Opinions of Building Additional High-Voltage Electric Power Lines



A Report to the National Science Foundation and the Electric Power Research Center

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Executive Summary

This report summarizes arguments voiced in favor of and in opposition to building additional high-voltage power lines, describes a social survey used to solicit opinions about these plans, and summarizes key findings of the survey. It is hoped that this report will further inform policy makers and interested public and private sector organizations about public opinions regarding the building of new power lines to enhance their cooperative efforts at ensuring that the nation meets its electric energy requirements.

The findings reported here are based upon a 2009 social survey conducted within nine geographic regions: South Dakota, Minnesota, Iowa, and selected rural and urban areas in West Virginia, New Jersey, and Maryland. The survey findings are reported by region, whether the county contains a planned route for additional high-voltage power lines, and political party affiliation of the respondents.

These are the key findings:

- Overall, respondents voiced a moderate willingness to pay for building additional high-voltage electric transmission capacity from the Midwest to states located on the east coast. These results differed by the regions surveyed, with respondents living in South Dakota and Minnesota expressing the most support and respondents living in rural West Virginia and urban New Jersey showing the least support for plans to build additional power lines.

- Overall, respondents indicated a moderate willingness to comply with recommendations offered by representatives of federal and state governments regarding the building of additional power lines. More support was shown for recommendations offered by the respective state governments than for those offered by the federal government.
- Overall, respondents showed little trust in either the federal government or their respective state governments to decide whether or where to build additional high-voltage power lines.
- The three most important factors affecting willingness to pay for building additional high-voltage power lines were perceived energy needs, concerns about the exercise of eminent domain by federal or state governments, and concerns about being excluded from the decision making process regarding plans to build new power lines.
- Residents living in counties with planned routes for new transmission lines ("proximate counties") and those living in non-proximate counties differed little in their willingness to pay, willingness to comply with recommendations offered by federal and state governments, or their trust in federal and state government decisions regarding the expansion of electric transmission capacity.
- Respondents identifying themselves as Democrats expressed greater willingness to pay, willingness to comply with recommendations offered by federal and state governments, and trust in federal and state government decisions about building additional power lines than did respondents identifying themselves as Republicans. Respondents were informed that plans to build additional power lines have been endorsed by both the George W. Bush and Barack Obama presidential administrations.

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Introduction

Because electric energy demands and the costs of generating electricity continue to increase, the United States has aggressively explored the feasibility of using solar, geothermal, biomass, nuclear, and wind resources for producing electricity as alternatives to using traditional fuels such as coal and natural gas. Throughout the upper Midwest, generating electricity from wind power has proved to be an especially promising approach to reducing energy costs and U.S. reliance upon imported oil. Efficiently transferring wind-generated electricity to its most needed locations, however, requires significant improvements to current electric energy transmission capacity. Without such improvements much of the advantages of generating electricity from wind resources can be lost within a congested electric power grid. With these considerations in mind, the U.S. Department of Energy (DOE), in cooperation with private sector electric energy generating and distribution firms, has proposed significant advancements to the nation's ability to transport high-voltage electricity from the Midwest to states located on the east coast. Although such improvements offer the promise of reduced energy costs, less reliance upon imports of foreign oil, and less environmental degradation, they entail short- and long-term costs that must seriously be considered as part of an overall plan to coordinate energy- and environment-related needs. The financial requirements of building additional high-voltage electric transmission capacity, for example, loom large and come at a time of a highly strained national economy. Additionally, concerns exist regarding the most appropriate routing of

additional high-voltage lines, the ability of state and local groups to influence routing, the exercise of federal or state eminent domain to obtain needed lands, and public apprehensions about potential negative health effects associated with living nearby high-voltage electric lines.

To some extent, national priorities for energy production and distribution require federal mandates for taking fair and appropriate actions to meet critical societal needs. Indeed, this mandate upon federal authority with regard to building additional high-voltage power lines has been expressed by the two most recent presidential administrations. At the same time, a hallmark of American society is citizen participation in decision making. With recognition of the need for federal-level initiatives, and also in noting the nation's commitment to citizen involvement in decision making, this project sought opinions from citizens regarding plans to construct additional high-voltage power lines extending from the Midwest to the East Coast.

This report summarizes arguments voiced in favor of and in opposition to building additional high-voltage power lines, describes a social survey used to solicit opinions about these plans, and summarizes the findings of the survey. It is hoped that this report will further inform policy makers and interested public and private sector organizations about public opinions regarding the building of new power lines to enhance their cooperative efforts at ensuring that the nation meets its electric energy requirements.

Arguments Voiced in Favor of and in Opposition to Building Additional High-Voltage Electric Transmission Capacity

This section summarizes key arguments voiced in favor of and in opposition to building additional high-voltage power lines extending from the Midwest to east coast states. Because its focus is upon public responses to favorable and unfavorable arguments, the report will simply summarize these arguments without commenting upon facts that might support or refute them.

Arguments Made in Support of Building Additional High-Voltage Power Lines

The proposed benefits of building new transmission lines include, but are not limited to reducing energy usage by providing reliable, cost effective electricity, easing transmission congestion on the current power grid, and decreasing pollution and CO₂ emissions. The need for these power lines is considered crucial to providing residents and businesses the electricity they desire and essentially expect to receive. Because minimizing harm to the environment is thought of as a major concern for our nation, building additional high-voltage transmission lines is proposed as a clean approach to move a renewable form of energy across the nation.

Entities supporting the building of additional high-voltage power lines point out that although electricity demand has increased dramatically over the past 30 years, the electric transmission grid has not had a major upgrade in that time, resulting in a congested electric transmission system. The rolling blackouts experienced by residents in California or the major outages occurring in east coast states and parts of Pennsylvania represent some of the negative consequences of this congestion (Grassi 2009).

In response to this need to improve electric energy transmission capacity, private sector firms, in cooperation with federal and state regulators, have developed proposed routes for additional high-voltage power lines. A high-voltage transmission line for the Mid-Atlantic region of the United States, for example (Mid-Atlantic Power Pathway 2009), "is designed to improve electricity transmission capacity, support new power generation, enhance reliability and provide access to more distant and economical sources of electricity during peak demand. MAPP will also provide the additional infrastructure needed to support proposed clean energy projects in the Mid-Atlantic region, such as new nuclear and wind." The proposed economic benefits from building these new transmission lines might prove to be substantial. Additionally, the DOE estimates that wind energy's economic "ripple effect" will create local jobs during the construction and operational phase, which is estimated to include twenty years or more of

employment. Also, as a result of building new lines, payments will be made to landowners and money will be generated by local property tax revenue. There might also be revenues associated with licenses, motor fuel taxes, fees, and other state and local fees.

Arguments Made in Opposition to Building Additional High-Voltage Power Lines

Although the additional high-voltage power lines being proposed or under construction offer potential benefits, citizens have expressed concerns about whether additional lines are necessary, the potential for environmental degradation, the routing of lines through environmentally, economically, and culturally sensitive geographic regions, the exercise of eminent domain to claim required lands for expansion, and a lack of local input into decision making occurring at the federal and state levels. Perhaps the most noted concern stems from perceived health risks of exposure to electromagnetic fields (EMF). It is feared that EMFs emanating from the power lines may cause childhood leukemia and other forms of cancers (e.g., Ahlbom et al. 2000). Another key concern about building additional high-voltage power lines regards the large size of the transmission towers, which many people view as detrimental to scenic landscapes, and ultimately, to property values. Additionally, although extra transmission lines might generate revenue for individuals and state and local governments, questions arise regarding the fair distribution of the burden for paying for the construction and maintenance of new lines. That is, although it is anticipated that Midwestern and east coast states will benefit from additional electric energy generation, states located between these regions will share the financial and environmental costs of building new transmission lines without receiving direct benefits from the additional electricity generation. These concerns have prompted groups to actively oppose the building of new high-voltage power lines.

Description of the Study

This social survey of public opinions was sponsored by the National Science Foundation, the Electric Power Research Center located at Iowa State University (ISU), and the ISU Department of Sociology. Its objectives were to assess the extent of public concerns about building additional high-voltage power lines and to learn which of these concerns were most central to public opinion formation.

Methodology

The survey sought opinions from residents living in three Midwestern states (i.e., South Dakota, Minnesota, Iowa), who can expect to benefit from the generation of wind-powered electricity, two east coast states (Maryland, New Jersey), who can expect to benefit from receiving an additional supply of electricity, and West Virginia, whose residents must share the financial and environmental costs of building new high-voltage lines without expecting to receive direct benefits from them. The rationale for selecting these states were whether plans existed to build a significant amount of new power lines within the state and to obtain a cross-section of residents with varying vested interests in plans for building additional transmission capacity.

The Center for Survey Statistics and Methodology (CSSM), located at Iowa State University, administered the survey (Larson and Tyler 2009). The sample of 3,975 households was purchased from Survey Sampling International. Three Midwestern states—Minnesota, Iowa, and South Dakota—were sampled with 475 households each. Two samples were selected in Maryland, one consisting of 425 households located within Charles and Calvert Counties, representing "proximate" and primarily rural counties containing proposed routes for new high-voltage power lines, and a second sample consisting of 425 households located in Baltimore County, a "non-proximate" and largely urban area. Two samples were selected in New Jersey,

one consisting of 425 households located in Warren, Sessex, and Morris Counties (proximate, rural counties) and a second sample consisting of 425 households located in Essex and Union Counties (non-proximate, urban counties). Two samples were selected in West Virginia, one consisting of 425 households located in Barbour, Braxton, Calhoun, Gilmer, Grant, Hardy, Hampshire, Jackson, Jefferson, Lewis, Putnam, Randolph, Roane, Tucker, and Upshur Counties (proximate, rural counties) and a second sample consisting of 425 households located in Kanawha County (non-proximate, urban county). The households within each area were selected at random and proportionately from all counties included in the area. Survey Sampling estimated that this sample would have an 80% accurate match of name and address.

Data Collection

The questionnaire (see attachment) consisted of an 8-page booklet with approximately 90 questions and a full-color photograph of a high-voltage power line on the cover. Cover letters were drafted to explain the study to sampled respondents. Because of the complex nature of the issue, additional materials were mailed to respondents, such as information sheets tailored for specific states or groups of states, and full-color state or area maps illustrating the proposed paths of new high-voltage power lines. These informational materials also included links to six web sites specific to each area surveyed, three of which spoke favorably about plans to build additional high-voltage power lines and three of which raised concerns about these plans. The information sheets noted that plans to build additional high-voltage power lines were endorsed by both the George W. Bush and Barack Obama presidential administrations.

We applied for and received approval from the Institutional Review Board prior to the onset of data collection. CSSM arranged for the printing of all materials used in the data collection process, including the items noted above and mailing envelopes. While CSSM traditionally obtains strong response rates in Midwestern states, this is not the case in eastern states where

there is no particular connection to Iowa State University. Methodological research has shown that enclosing a small monetary gift increases responses to mail surveys significantly; so a \$2 bill was affixed to each cover letter with a small adhesive sticker so it was plainly visible and not lost in the envelope.

The first mailing was sent to 3,975 sampled households during the summer of 2009. Each packet contained a survey, a cover letter with the \$2 bill attached, an information sheet, a colored map, and a return envelope. A reminder postcard was sent to 3,564 households one week later. Three weeks later, a second complete mailing of the survey and accompanying materials, but without the \$2 incentive, was sent to 2,892 non-responders. Additional copies of the survey materials were sent by request. The survey's cover letter encouraged people to call CSSM's toll-free number if they had questions. Approximately one hundred people called; most who called were hesitant to complete the survey because they did not know much about the topic. CSSM staff encouraged them to answer the questions that they could and to explain their situation in the comment section on the back of the questionnaire.

CSSM staff monitored and recorded the receipt of completed surveys and checked the addresses of surveys returned by the US Post Office as undeliverable. The \$2 incentives were retrieved from the surveys that were returned unopened. Completed surveys were received throughout the summer and fall of 2009. Completed surveys were edited and coded by CSSM staff. Coded surveys were key entered using a double entry verification system, and the resulting data set was checked for errors and cleaned.

Survey Response Rates

The initial sample consisted of 3,975 names and addresses. As with most mail surveys, there is little information available regarding non-responders. Based upon information received by telephone or mail, 24 cases were classified as ineligible. Of these cases, 19 were deceased,

four had moved out of state, and one was a 16-year old who completed and returned the survey. This resulted in an eligible sample of 3,951. Throughout the course of the data collection, 146 surveys were returned by the US Post Office as undeliverable. Sometimes the selected person had moved with no forwarding address or with forwarding expired. Sometimes the address was undeliverable. A total of 131 people either called the toll-free number to refuse or returned their survey with a note of refusal. Ten respondents were unable to complete the survey due to health reasons, such as advanced age with poor eyesight or Alzheimer's disease. One survey was returned with "no English" written on it. There was no response from 50.7% of the eligible sample (50.4% of the original sample).

Survey response rates equal the percentage of surveys completed out of the eligible sample. The highest response rates were obtained in Iowa and Minnesota, both at 51.4%. They were followed by South Dakota with 45.0% and rural West Virginia with 43.7%. Response rates in the rural areas of Maryland and New Jersey were 40.1% and 40.8%, respectively. The lowest response rates were in the urban areas of West Virginia (36.9%), Maryland (33.8%), and New Jersey (31.4%). The overall response rate was 42.0%.

Completed surveys were received from 1,661 respondents. Of these completed surveys, 107 had a sufficient amount of missing responses to questions that they were eliminated from further study, yielding a final sample of 1,544 for statistical analysis.

Results

Social-Demographic Characteristics

Table 1 shows the social demographic characteristics of the respondents. As is typically found in social surveys, the respondents were older and more affluent than the general population. The averages for years of formal education and total household income before

taxes in 2008 were estimated from ordinal-level responses on the questionnaire. Most respondents were female (70.0%) and of European American ethnicity (73.4%). They ranged in age from 19-96. When asked which political party they typically vote for in Presidential elections, 40.4% responded Democratic, 38.4% said Republican, 5.2% said Independent, and 15.6% either said they had no typical voting pattern or chose not to respond to this question.

Table 1: Social Demographic Characteristics of the Survey Respondents.

<u>Region</u>	<u>Average Age</u>	<u>Percent Females</u>	<u>Average Years Education^a</u>	<u>Average Income^a</u>
<i>Overall</i>	59.5	69.7	14.3	\$60,000
South Dakota	59.1	71.9	13.0	\$50,000
Minnesota	57.3	69.1	13.0	\$55,000
Iowa	58.2	73.5	14.5	\$55,000
Rural West Virginia	59.1	71.1	13.0	\$45,000
Urban West Virginia	60.3	54.3	13.0	\$35,000
Rural New Jersey	59.1	73.6	15.0	\$70,000
Urban New Jersey	54.8	62.9	15.0	\$55,000
Rural Maryland	54.7	70.1	14.0	\$70,000
Urban Maryland	55.3	75.2	15.0	\$64,000

a. Averages for years of education and total household income before taxes in 2008 are estimated from ordinal-level responses on the questionnaire.

Willingness to Pay Extra for Additional High-Voltage Power Lines

A central purpose of this investigation was learning the extent to which persons express a willingness to pay for additional high-voltage electric transmission capacity. Respondents were asked to state their willingness to pay for five proposed percentage increases in their monthly electric bill (i.e., 1%, 3%, 5%, 10%, and 15%), using a scale of 0 = "not willing to pay this much more" to 6 = "very willing to pay this much more." Approximately 70% of the respondents

expressed at least some willingness to pay 1% more each month on their electric bill to erect more high-voltage power lines (Table 2). About 54% indicated at least some willingness to pay 3% more each month, and about 45% stated at least some willingness to pay an additional 5% each month for additional power lines. By "at least some" willingness to pay, we refer to those persons who answered with at least "1" on the 0-6 response scale. So, to some extent these

Table 2: Willingness to Pay for Additional High-Voltage Power Lines.

<u>Percent Increase in Monthly Electric Bill</u>	<i>Percent of Respondents Expressing a Willingness to Pay</i>		
	<u>At Least Some Willingness to Pay^a</u>	<u>Moderate to High Willingness to Pay^b</u>	<u>High Willingness to Pay^c</u>
1% More/Month	70.9%	53.2%	37.4%
3% More/Month	53.6%	38.2%	18.9%
5% More/Month	44.9%	24.0%	8.3%
10% More/Month	33.2%	9.6%	1.9%
15% More/Month	25.2%	5.3%	1.2%

- a. Respondents answered "1" or above on the 0-6 response scale.
- b. Respondents answered "3" or above on the 0-6 response scale.
- c. Respondents answered "5" or above on the 0-6 response scale.

percentages might reflect a highly reluctant willingness to pay. Therefore, we calculated percentages for those persons who expressed willingness to pay at the mid-point or above on the 0-6 response scale. In this analysis, 53.2% of respondents expressed a moderate to strong willingness to pay 1% more each month on their electric bill to build additional high-voltage power lines, 38.2% expressed moderate to strong willingness to pay 3% more and 24.0% expressed moderate to high willingness to pay 5% more each month to erect additional power lines (Table 2). Also, we calculated percentages of persons who expressed high willingness to pay. These figures show that 37.4 percent of the respondents expressed a high willingness to

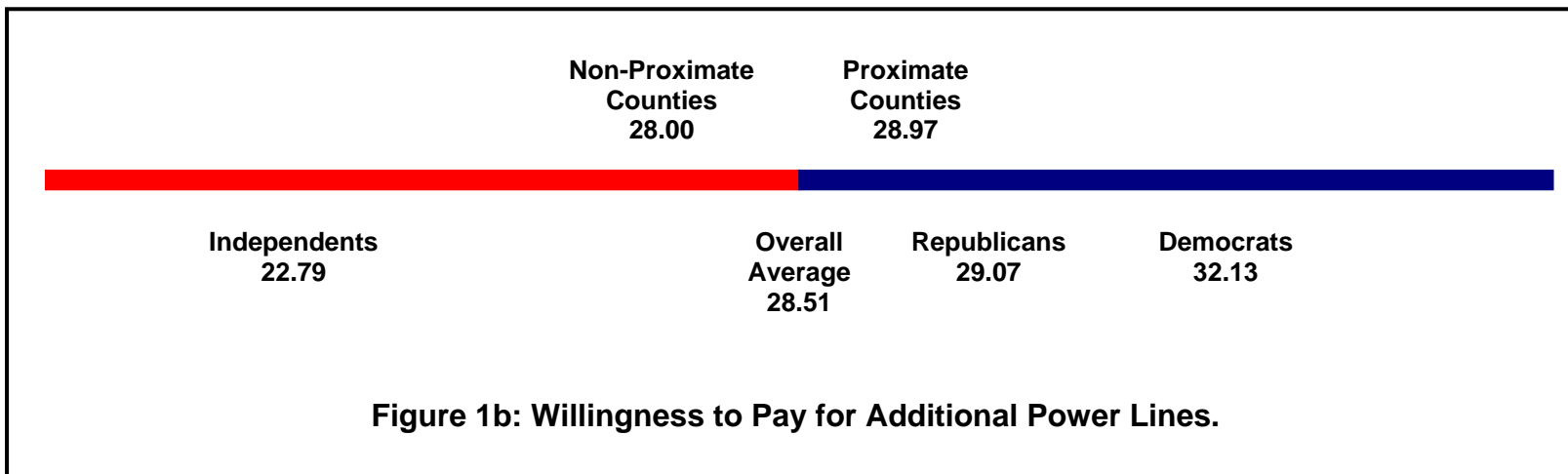
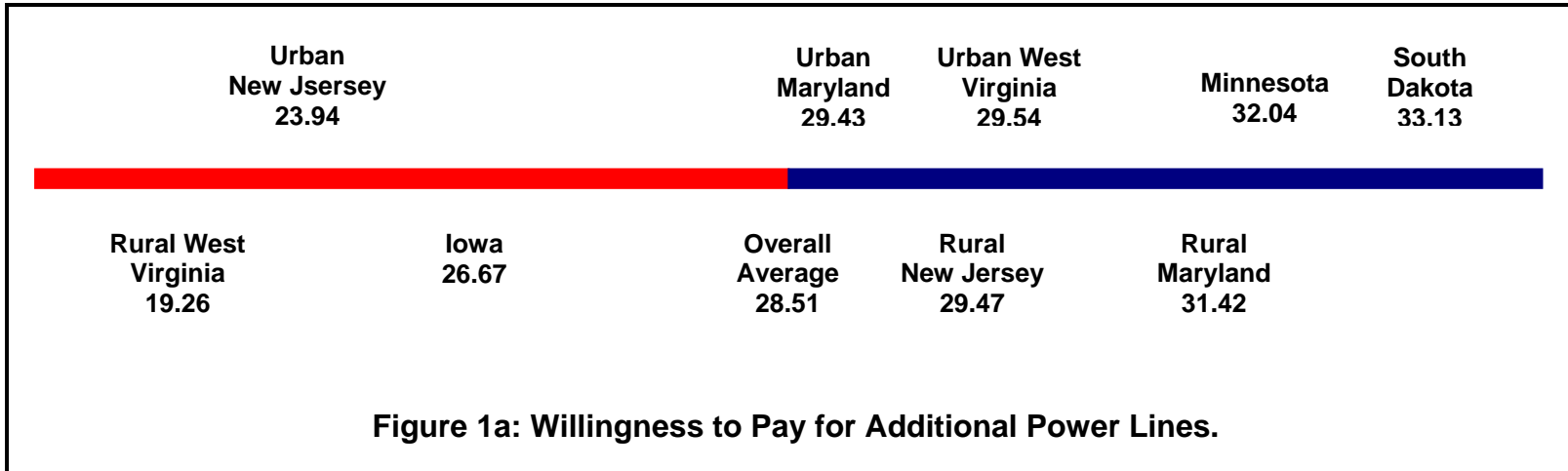
pay 1% more each month on their electric bills to support the construction of additional high-voltage power lines (Table 2).

We calculated a willingness-to-pay scale that equaled the sum of the products of expressed willingness to pay multiplied by each percent increase in the monthly electric bill. The possible values on this scale ranged from 0 to 204, and the actual responses also ranged from 0 to 204 (nine persons had a score of 204). The overall average score equaled 28.51, indicating some willingness to pay for low percentage increases in the monthly electric bill but little interest in paying more than 5% more each month.

Evaluations of average respondent scores on the willingness-to-pay scale showed that expressions of willingness-to-pay were not uniform across the nine regional areas surveyed (Figure 1a). Respondents living in South Dakota and Minnesota were significantly more willing than the overall average to pay more for additional high-voltage power lines, while respondents living in rural West Virginia and urban New Jersey expressed significantly less willingness to pay. Surprisingly, the results show that respondents living in counties that contain proposed routes for new power lines (i.e., proximate counties) were more willing to pay for additional transmission capacity than were persons living in non-proximate counties (Figure 1b), perhaps because persons living in these counties see greater potential for direct economic gain from generating electricity (i.e., rural areas in the Midwest) and the construction and maintenance of additional power lines. Democrats were more willing to pay than were Republicans (Figure 1b).

Willingness to Comply with Recommendations Offered by Federal and State Governments

Representatives of federal and state agencies likely will offer their recommendations to the public regarding the building of additional high-voltage power lines. To what extent is the public willing to comply with these recommendations, and are citizens more willing to comply with recommendations offered by the federal government or representatives at the state level? To

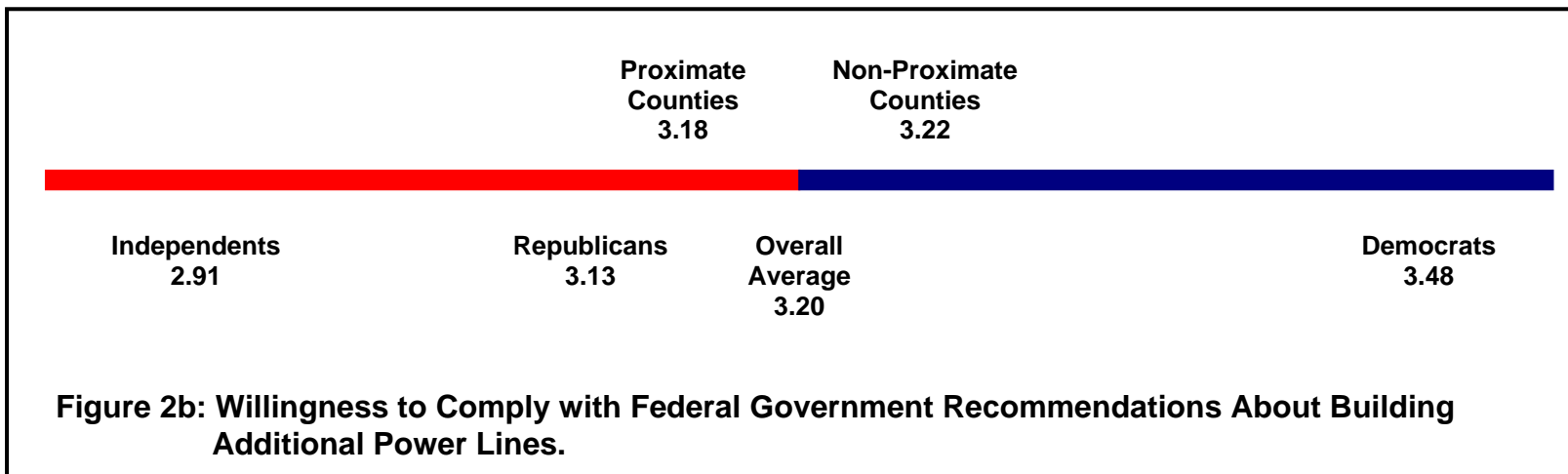
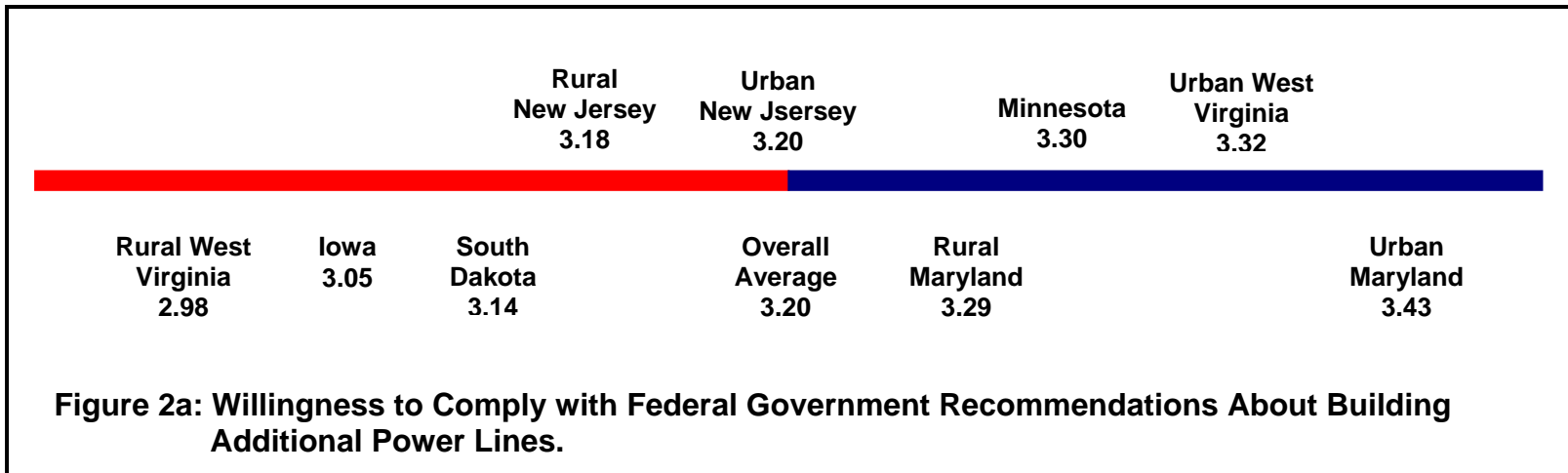


Note: The positions of the states and groups on these scales are placed in relation to one another, but not in mathematical proportion to the scale.

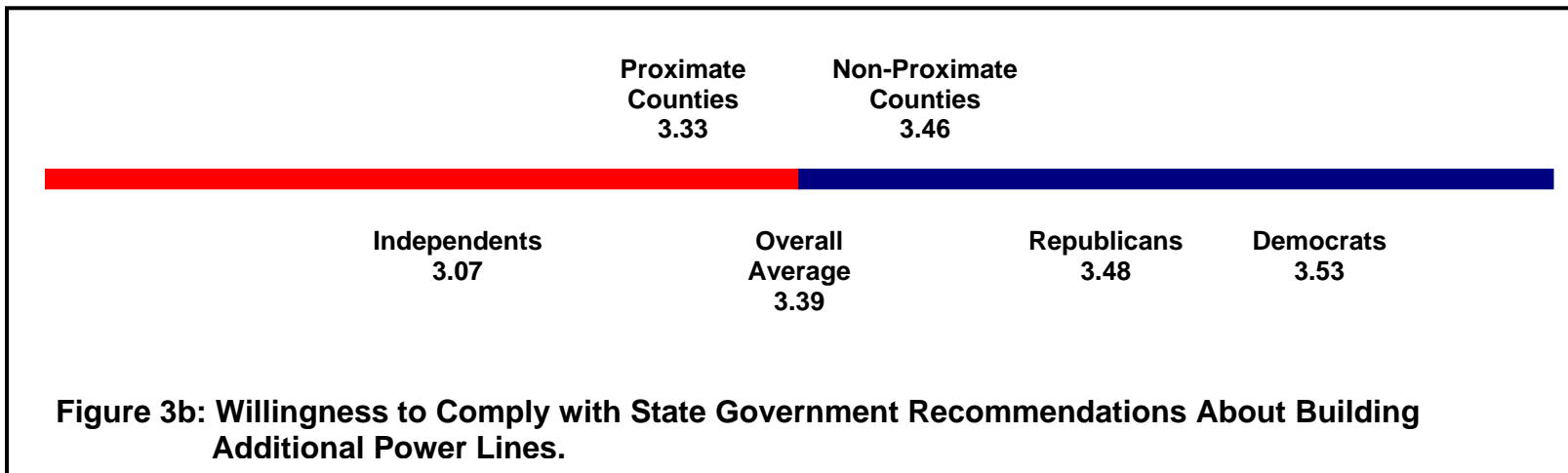
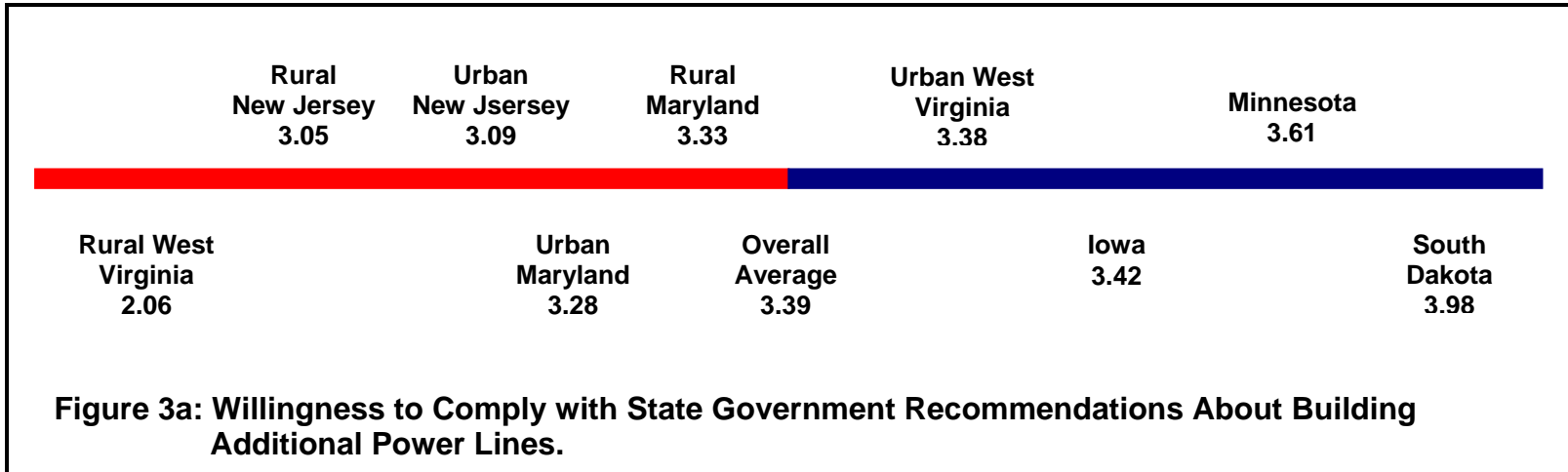
answer these questions we presented respondents with two statements for each level of government, "If [the federal/my state] government recommends building more power lines, then I can support the project," and "I am willing to follow the advice of agencies in [the federal/my state] government regarding the building of more high-voltage power lines." We asked respondents to voice their agreement to these statements on a seven-point scale (1 = "strongly disagree" to 7 = "strongly agree"). We calculated the average response to these two statements to create scales representing willingness-to-comply with federal and state government recommendations.

The overall average score on the seven-point scale for willingness to comply with recommendations offered by the federal government equaled 3.20, wherein a score of 4.00 was the mid-point of the seven-point response scale (Figure 2a), with the higher the score the greater the indication of willingness to comply. For the respective state governments, the overall average score was just slightly higher at 3.39 than that found for compliance with the federal government (Figure 3a), still less than half-way on the seven-point response scale. Overall, therefore, respondents showed a willingness to comply with recommendations offered by federal and state governments that was less than the mid-point on the seven-point scale.

These responses varied little by region (Figures 2a, 3a), proximity (Figures 2b, 3b), or political party affiliation (Figures 2b, 3b). Respondents living in the urban West Virginia and urban Maryland counties surveyed showed significantly more support for recommendations offered by representatives of the federal government than the overall average, while respondents living in rural West Virginia showed significantly less support for federal government recommendations compared with the overall average. Residents living in Minnesota and South Dakota indicated significantly more support for state recommendations than the overall average, while residents living in rural and urban New Jersey and rural West Virginia showed significantly less support for recommendations offered by their respective state governments regarding the building of additional high-voltage power lines. At both the federal



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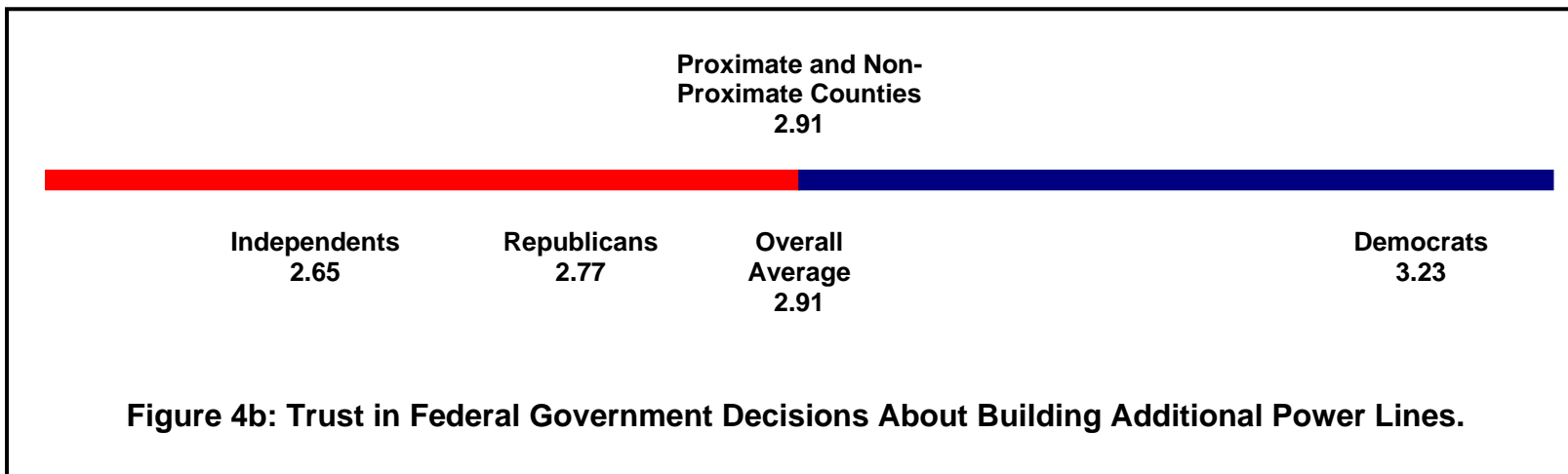
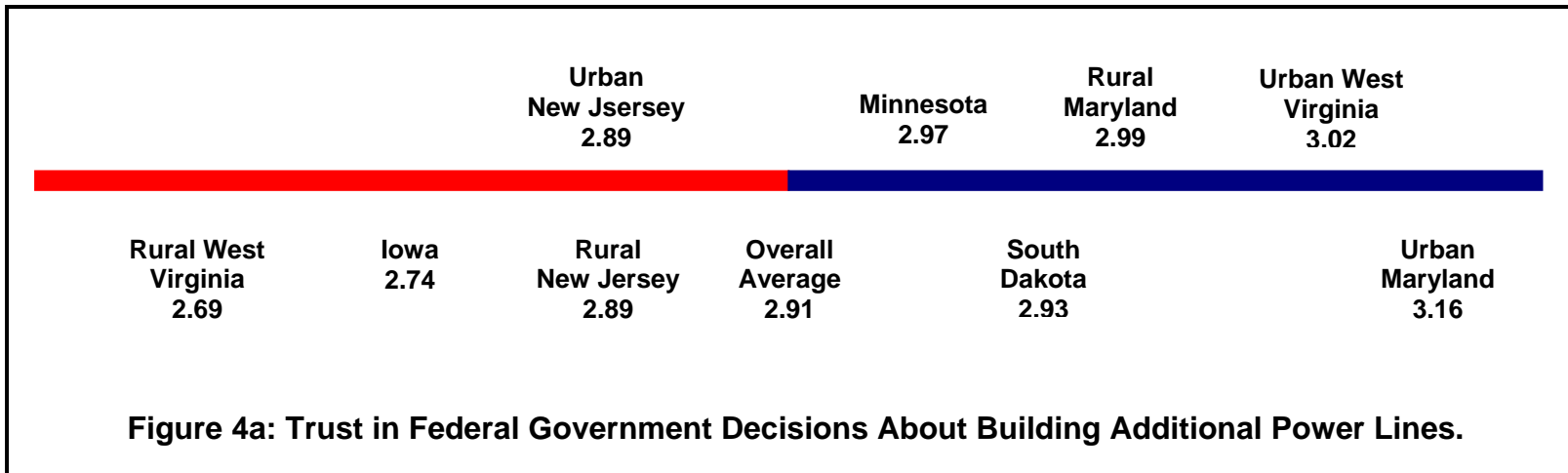
Note: The positions of the states and groups on these scales are placed in relation to one another, but not in mathematical proportion to the scale.

and state levels of government, willingness to comply did not differ to a statistically significant amount between residents living in proximate and non-proximate counties. On the other hand, at both the federal and state levels, Democrats were significantly more likely to express a willingness to comply with government recommendations than were Republicans.

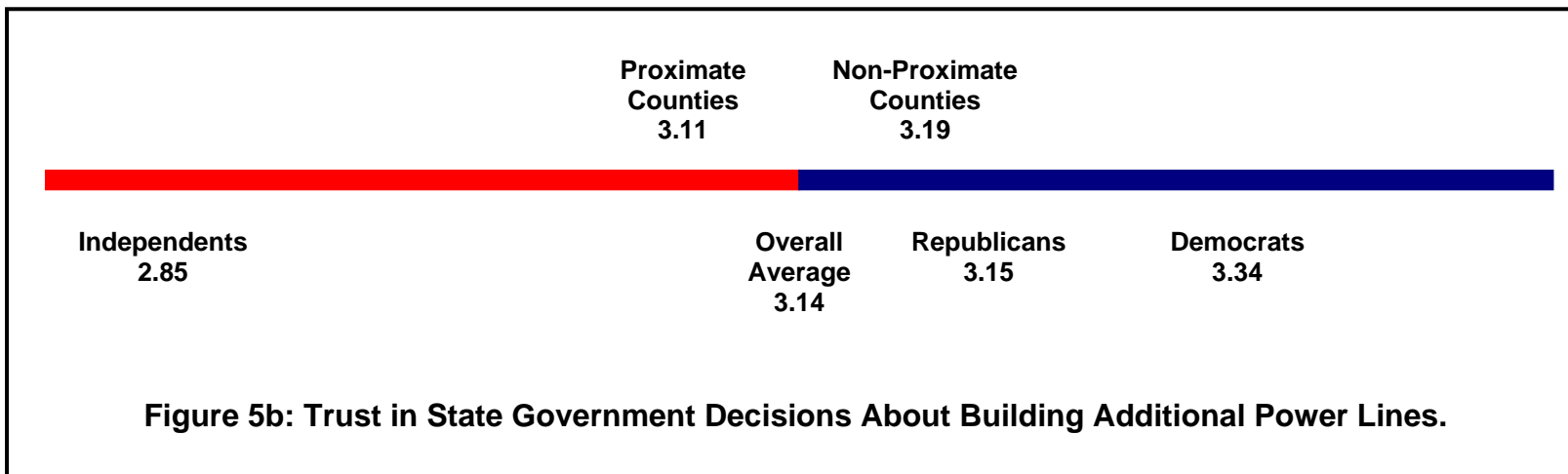
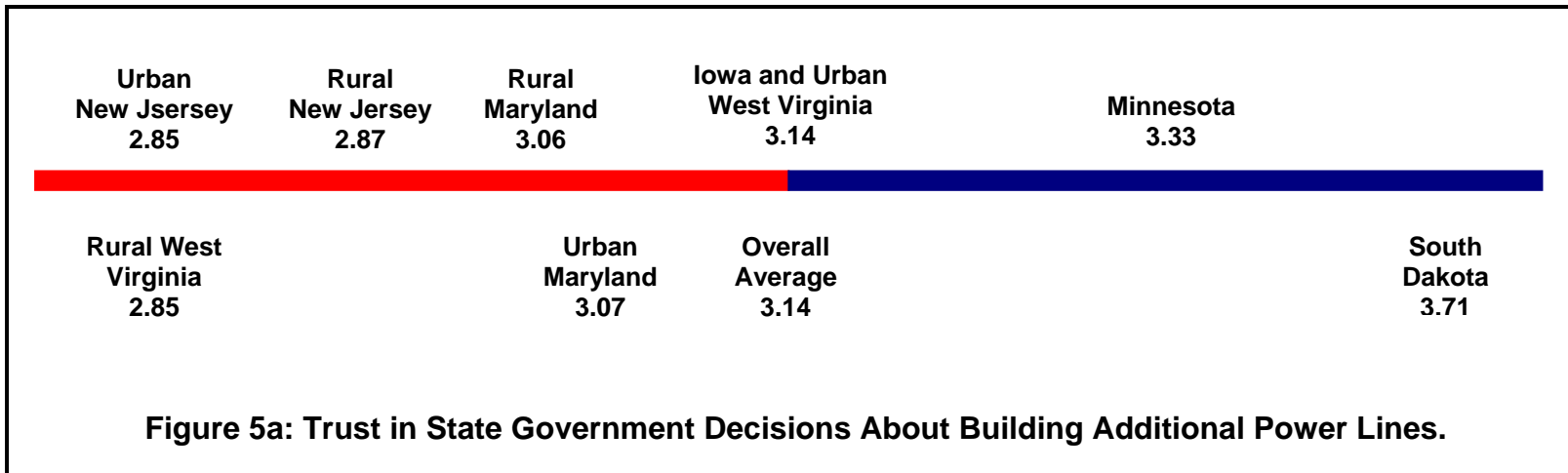
Trust in Federal and State Governments

A key indicator of the public's acceptance or rejection of plans to expand electric transmission capacity is their trust in federal and state governments to decide whether and where to build additional power lines. We asked respondents to voice their agreement (i.e., 1 = "strongly disagree" to 7 = "strongly agree") to two statements regarding trust in federal and state governments, "I trust [the federal/my state] government to decide whether to build more power lines," and "I trust [the federal/my state] government to decide where to build more power lines." The averaged responses to these statements were calculated to create scales for trust.

Overall, respondents voiced low trust in federal government decisions regarding the building of new power lines, with an average score on the 1-7 trust scale of 2.91 (Figure 4a). The overall average expression of trust in the respective state governments equaled 3.14, also lower than the mid-point of the 1-7 response scale (Figure 5a). Respondents living in the urban Maryland counties surveyed were significantly more likely to trust the federal government than the overall average, while respondents living in Iowa and the rural West Virginia counties surveyed were significantly less trusting in the federal government to make decisions about additional high-voltage power lines (Figure 4a). Among those areas surveyed, respondents living in South Dakota and Minnesota expressed significantly more trust in their state government to make decisions regarding whether and where to build additional power lines, while respondents living in the urban and rural New Jersey counties and the rural West Virginia counties were significantly less likely to trust their respective state governments to make decisions about



Note: The positions of the states and groups on these scales are placed in relation to one another, but not in mathematical proportion to the scale.



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building additional power lines (Figure 5a). There were no statistically significant differences in trust in either the federal or the respective state governments between respondents living in the proximate or non-proximate counties surveyed (Figures 4b and 5b). As was the case with expressions of willingness to comply, Democrats expressed significantly more trust than Republicans in both the federal and respective state governments to make decisions about whether and where to build more high-voltage power lines (Figures 4b and 5b).

Most Important Indicators of Willingness to Pay for Additional High-Voltage Power Lines

We wanted to learn the most important factors that affect people's willingness-to-pay for the building of additional high-voltage power lines. In addition to the effects of social demographic characteristics (i.e., age, sex, formal education, and income), we tested the extent to which ten other plausible factors might affect willingness to pay:

- Energy needs. Energy needs equaled the average response (1 = "strongly disagree; 7 = "strongly agree) to four statements, "Building more power lines will increase our use of renewable energy," "Building more power lines will help our nation transmit renewable energy," "Building more power lines will help our nation use energy more efficiently," and "It is more energy efficient to build more additional power lines than building more power plants."
- Environmental concerns. This factor equaled the average response (1 = "strongly disagree; 7 = "strongly agree) to two related statements: "Building more power lines will harm the quality of the environment," and "The balance of nature will be harmed in those areas where more power lines are built."
- Health concerns. Health concerns equaled the average response (1 = "strongly disagree; 7 = "strongly agree) to four related statements, "High-voltage power lines can create health problems for people who live near them," "High-voltage power lines can create health problems for animals who live near them," "The so-called negative health effects of living near high-voltage power lines are exaggerated," and "I think that small children should live far away from high-voltage power lines because they might experience health problems from living near them."
- Eminent domain. This factor equaled the average response (1 = "strongly disagree; 7 = "strongly agree) to three related statements, "The federal government should be allowed to use eminent domain to build more power lines," "My state government should be allowed to use eminent domain to build more power lines," and "All citizens should respect the use of eminent domain to benefit society as a whole." Eminent domain was defined on the questionnaire as: "the legal authority of the government to pay you a fair amount of money to take all or part of your property to make way for public works projects."

- Land use values. This factor equaled the response (1 = "strongly disagree; 7 = "strongly agree) to the statement, "The land should be used to serve our needs."
- Energy preference. This factor equaled a scaled calculation of support for wind power compared with support for coal power as a fuel for generating electricity.
- Inclusion in decision making. This factor equaled the response (1 = "strongly disagree; 7 = "strongly agree) to the statement, "The opinions of ordinary citizens will have little effect on where power lines are built."
- Economic benefits. This factor equaled the response (1 = "strongly disagree; 7 = "strongly agree) to the statement, "Building more power lines will provide economic benefits to our nation."
- National security. National security equaled the response (1 = "strongly disagree; 7 = "strongly agree) to the statement, "This country needs more power lines for national security reasons."
- Property values. This factor equaled the response (1 = "strongly disagree; 7 = "strongly agree) to the statement, "High-voltage power lines lower the value of nearby property."

We used multiple linear regression analysis to determine the three most important of these four social-demographic and ten attitudinal factors on willingness to pay for additional electric energy transmission capacity. Overall, the most important among these factors was perceived energy needs. The greater the perceived need to build additional high-voltage power lines to help transmit renewable energy and use energy more efficiently, the greater the willingness to pay for building additional power lines. Perceived energy needs was the most important factor affecting willingness to pay in five of the nine regions surveyed, and was the most important factor by proximity to proposed routes and for both Democrats and Republicans.

The second most important factor affecting willingness to pay for additional power lines was perceived concerns about the use of eminent domain. The greater the concern about the use of eminent domain, the less the willingness to pay for building new lines. Concern about the use of eminent domain was the most important factor affecting willingness to pay in three of the nine regions surveyed. The third most important factor affecting willingness to pay was perception about being included in decision making. The greater the perception that the opinions of ordinary citizens would have little effect on where power lines are built, the less the willingness to pay for building them.

Concern about national security was the most important factor affecting willingness to pay in Iowa, and this factor was among the three most important in proximate counties and among Republicans. Concern about negative health outcomes from living near high-voltage power lines was among the three most important factors affecting willingness to pay only in the rural New Jersey counties surveyed and in non-proximate counties as a whole.

Additional Details of the Data Analysis

Additional details about the survey results are available to the extent that resources are available to provide them. Please contact: Dr. Stephen Sapp, Department of Sociology, Iowa State University, Ames, IA. 50011. Dr. Sapp can be contacted at: (515) 294-1403, ssapp@iastate.edu. We express our appreciation to the National Science Foundation, the Electric Power Research Center, and the Iowa State University Department of Sociology for their financial support of this project.

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Public Opinions of Plans to Build Additional High-Voltage Power Lines



2009

Sponsored by:

The National Science Foundation
The Electric Power Research Center
The ISU Department of Sociology
Iowa State University, Ames, Iowa

Instructions

Please answer the enclosed questions about proposed plans to build additional high-voltage power lines in your state. Usually, you will be asked to answer questions by circling a number or filling in a blank.

Please use the postage free envelope to return this questionnaire within one week to Iowa State University.

Please circle one number below to show how much you knew about plans to build more high-voltage power lines in your state before you received this survey.

I knew nothing about them 1 2 3 4 5 6 7 I knew a lot about them

Please tell us how much you support the following methods of producing electricity.

(Circle one number for each method)

I support <u>producing electricity</u> from...	Strongly Oppose	1	2	3	4	5	6	7	Strongly Support
burning <u>coal</u>	1	2	3	4	5	6	7		
burning <u>natural gas</u>	1	2	3	4	5	6	7		
operating <u>wind turbines</u>	1	2	3	4	5	6	7		
operating <u>nuclear power plants</u>	1	2	3	4	5	6	7		

Please tell us your opinions about environmental issues, in general, and environmental issues directly related to building more high-voltage power lines.

(Please circle one number in each statement)

	Strongly Disagree	1	2	3	4	5	6	7	Strongly Agree
Humans are severely abusing the environment.....	1	2	3	4	5	6	7		
The balance of nature is strong enough to cope with the effects of modern industrial nations.....	1	2	3	4	5	6	7		
If things continue on the present course, we will soon experience a major ecological catastrophe.....	1	2	3	4	5	6	7		
The earth is like a spaceship, with only limited room and resources.....	1	2	3	4	5	6	7		
The so-called "ecological crisis" facing humans has been greatly exaggerated.....	1	2	3	4	5	6	7		
The land should be used to serve our needs.....	1	2	3	4	5	6	7		
The land should be valued as an end in itself.....	1	2	3	4	5	6	7		
Building more high-voltage power lines will harm the quality of the environment.....	1	2	3	4	5	6	7		
The balance of nature will be harmed in those areas where more power lines are built.....	1	2	3	4	5	6	7		
Views of the countryside will be destroyed in those areas where more power lines are built	1	2	3	4	5	6	7		
Environmental issues of building more power lines are complex to understand.....	1	2	3	4	5	6	7		

Eminent Domain refers to the legal authority of the government to pay you a fair amount of money to take all or part of your property to make way for public works projects.

Please tell us your opinions about the government using eminent domain to build more high-voltage power lines. (Please circle one number in each statement)

	Strongly Disagree							Strongly Agree
The federal government should be allowed to use eminent domain to build more power lines..	1	2	3	4	5	6	7	
My state government should be allowed to use eminent domain to build more power lines..	1	2	3	4	5	6	7	
Eminent domain is necessary for important public works projects.....	1	2	3	4	5	6	7	
All citizens should respect the use of eminent domain to benefit society as a whole	1	2	3	4	5	6	7	
Issues of eminent domain related to building more power lines are complex to understand....	1	2	3	4	5	6	7	

Please tell us how concerned you are about possible negative health effects related to high-voltage power lines. (Please mark your answer or circle a number in each statement)

I have heard about possible health problems associated with living near high-voltage power lines.

_____ **Yes** _____ **No**

High-voltage power lines can create health problems for people who live near them.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

High-voltage power lines can create health problems for animals that live near them.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

The so-called negative health effects of living near high-voltage power lines are exaggerated.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

I think that small children should live far away from high-voltage power lines because they might experience health problems from living near them.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

Health issues related to living near high-voltage power lines are complex to understand.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

Please tell us your opinions about building more high-voltage power lines.

(Circle one number in each statement)

	Strongly Disagree						Strongly Agree
Just those persons who directly benefit from more power lines should pay for them.....	1	2	3	4	5	6	7
I feel a personal obligation to support the building of more power lines	1	2	3	4	5	6	7
No matter what my opinion, more power lines will be built anyway	1	2	3	4	5	6	7
Building more power lines will provide economic benefits to our nation	1	2	3	4	5	6	7
I am willing to help pay for more power lines, even if they do not help me directly	1	2	3	4	5	6	7
Building more power lines will increase our use of renewable ("green") energy	1	2	3	4	5	6	7
The issues of building more power lines are complex to understand.....	1	2	3	4	5	6	7
The opinions of ordinary citizens will have little effect on where power lines are built	1	2	3	4	5	6	7
If my area has no need of more power lines, then they should not be built here.....	1	2	3	4	5	6	7
I believe I have a duty to my country to support the building of more power lines	1	2	3	4	5	6	7
High-voltage power lines lower the value of nearby property	1	2	3	4	5	6	7
Building more power lines will help our nation transmit renewable ("green") energy....	1	2	3	4	5	6	7
I will support the building of more power lines, even if I do not benefit from them	1	2	3	4	5	6	7
Building more power lines will help our nation use energy more efficiently	1	2	3	4	5	6	7

How much more each month are you willing to pay to build more high-voltage power lines?

(Circle one number in each line)

	Not Willing to Pay This Much More					Very Willing to Pay This Much More	
1% more each month on my electric bill	0	1	2	3	4	5	6
3% more each month on my electric bill	0	1	2	3	4	5	6
5% more each month on my electric bill	0	1	2	3	4	5	6
10% more each month on my electric bill	0	1	2	3	4	5	6
15% more each month on my electric bill	0	1	2	3	4	5	6

Agencies in the federal government might be responsible for making decisions about building more high-voltage power lines. (Please circle one number in each statement)

Strongly Disagree	Strongly Agree
----------------------	-------------------

The federal government has the <u>ability</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
The federal government will be <u>fair-minded</u> when making decisions about building more power lines.....	1	2	3	4	5	6	7
The federal government has the <u>experience</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
The federal government has the <u>knowledge</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
The federal government will <u>do the right thing</u> when making decisions about building more power lines.....	1	2	3	4	5	6	7
The federal government will be <u>honest</u> when telling me information about building more power lines	1	2	3	4	5	6	7
If the federal government <u>recommends</u> building more power lines, then I can support the project	1	2	3	4	5	6	7

Agencies in your state government might be responsible for making decisions about building more high-voltage power lines. (Please circle one number in each statement)

Strongly Disagree	Strongly Agree
----------------------	-------------------

My state government has the <u>ability</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
My state government will be <u>fair-minded</u> when making decisions about building more power lines.....	1	2	3	4	5	6	7
My state government has the <u>experience</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
My state government has the <u>knowledge</u> to make good decisions about building more power lines	1	2	3	4	5	6	7
My state government will <u>do the right thing</u> when making decisions about building more power lines.....	1	2	3	4	5	6	7
My state government will be <u>honest</u> when telling me information about building more power lines	1	2	3	4	5	6	7
If my state government <u>recommends</u> building more power lines, then I can support the project	1	2	3	4	5	6	7

Please tell us how much you trust the federal government or your state government to make decisions about building more high-voltage power lines.

(Circle one number in each statement)

Strongly Disagree								Strongly Agree
----------------------	--	--	--	--	--	--	--	-------------------

I trust the **federal** government to decide whether to build more power lines 1 2 3 4 5 6 7

I trust the **federal** government to decide where to build more power lines 1 2 3 4 5 6 7

I trust **my state** government to decide whether to build more power lines 1 2 3 4 5 6 7

I trust **my state** government to decide where to build more power lines 1 2 3 4 5 6 7

Please circle a number to tell us how much you agree with each statement.

This country needs more power lines to reduce the number of electric power failures.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

It is more energy efficient to build additional power lines than building new power plants.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

This country needs more power lines for national security reasons.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

Building more power lines from the Midwest to the east coast will harm further development of wind energy in the east coast states.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

I am willing to follow the advice of agencies in the **federal** government regarding the building of more high-voltage power lines.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

I am willing to allow agencies in the **federal** government to decide what is best regarding the building of more high-voltage power lines.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

I am willing to follow the advice of agencies in **my state** government regarding the building of more high-voltage power lines.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

I am willing to allow agencies in **my state** government to decide what is best regarding the building of more high-voltage power lines.

Strongly Disagree 1 2 3 4 5 6 7 **Strongly Agree**

Please tell us your opinions of groups that oppose building more high-voltage power lines.

(Circle one number in each statement)

Strongly Disagree	Strongly Agree
----------------------	-------------------

Opposition groups have the <u>ability</u> to correctly advise me about building more power lines....	1	2	3	4	5	6	7
Opposition groups will <u>do the right thing</u> in advising me about building more power lines.	1	2	3	4	5	6	7
I <u>trust</u> opposition groups to correctly advise me about building more power lines	1	2	3	4	5	6	7
I am willing to <u>follow the advice</u> of groups that oppose the building of more power lines .	1	2	3	4	5	6	7

These are questions about you and your household.

What is your age in years? _____

Are you: _____ Male _____ Female

How many adults (ages 18 and over) live in your household? _____

How many children (ages 17 and under) live in your household? _____

How much total income before taxes did your household earn in 2008? (Circle one number)

- | | |
|--------------------------|----------------------------|
| 1 = Less than \$25,000 | 5 = \$100,000 to \$124,999 |
| 2 = \$25,000 to \$49,999 | 6 = \$125,000 to \$149,999 |
| 3 = \$50,000 to \$74,999 | 7 = \$150,000 or more |
| 4 = \$75,000 to \$99,999 | 8 = Do not know |

What is the highest level of formal education you have completed? (Circle one number)

- 1 = Less than high school graduate
- 2 = High school graduate
- 3 = Vocational school/Technical school/Some college
- 4 = 4-year college degree
- 5 = Post-graduate education after college

Which of these categories represents your race/ethnic background? (Mark all that apply to you)

- | | |
|-------------------------|---------------------------------------|
| _____ African American | _____ Hispanic/Latino/Latina American |
| _____ Asian American | _____ Native American |
| _____ European American | _____ Other: _____ |

Which political party do you typically support in Presidential elections?

- | | |
|------------------|--|
| _____ Democrat | _____ None, I do not vote in Presidential elections. |
| _____ Republican | _____ Other: _____ |

Thank you very much for completing this questionnaire. Please return it in the postage-free envelope within one week to Iowa State University.

We welcome your comments:

If you have questions about this survey, please feel free to contact: **[ENTER CONTACT INFORMATION HERE]**