FUTURE ENERGY INFRASTRUCTURES:

Engagements with the Atlantic Coast Pipeline

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FUTURE ENERGY INFRASTRUCTURES:
ENGAGEMENTS WITH THE ATLANTIC COAST PIPELINE
A RESEARCH REPORT

by

Rider W. Foley[1*]
Elise Barrella[2]
Heather Kirkvold[2]
Rodney Wilkins[1]
Aaron Sloss[2]
Elise Mazur[2]
Jacob Rogerson[1]
Claire Trevisan[1]
Daniel Katleman[2]
Caroline Mohan[2]
Victoria Lindsey[1]
Farrah Dang[1]
Andres Clarens[1]

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Author Affiliation

[1] School of Engineering and Applied Science, University of Virginia
[2] College of Integrated Science and Engineering, James Madison University

[*] Corresponding Author: Rider W. Foley, rider@virginia.edu

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1.0 INTRODUCTION

The United States is in the midst of a transition in the production and distribution of energy. This transition was, in part, instigated by technological advancements and policy mechanisms that allowed for the recovery of unconventional fossil fuels from shale formations. In parallel, renewable energy sources such as wind and solar are becoming increasingly competitive with fossil fuels. Furthermore, the nation's population is moving away from the Northeast and Midwest regions to southeastern and western states. These changes are straining the nation's aging energy transportation infrastructure and revealing system vulnerabilities, while also inviting questions about the long-term economic and environmental implications of reliance upon the existing energy infrastructure.

Public perception of risks associated with energy generation and transportation is a critical aspect of this challenge (Slovic, Fischhoff, & Lichtenstein, 1982). An illustration of the trade-offs and system vulnerability includes the rise of fatal freight rail incidents in the US, which have quadrupled as more oil is transported by rail (Figure 1).

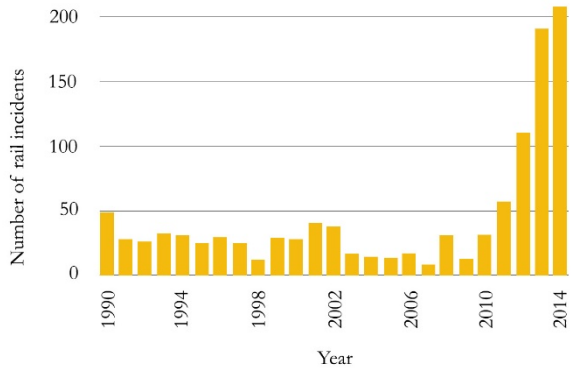

Figure 1. Rail incidents. Incidents from rail transport of oil over 25 years (Authors' analysis of PHMSA data).

Past efforts to plan energy infrastructure did not anticipate the US being a net exporter of fossil fuels, which has led to redesigns that are piecemeal (Bier, Ferson, Haimes, Lambert, & Small, 2003). Such vulnerabilities are creating pressures to alleviate the strain on rail and redesign future energy infrastructures while also highlighting a critical need for integrated, national conversations that rethink how energy infrastructure will transition over the next 20-30 years (Cash, et al., 2003). Planning is essentially a future-oriented exercise that confronts immediate values and needs with long-term uncertainty (Barben, Fisher, Selin, & Guston, 2008).

The U.S. pipeline network was originally designed to handle oil imports and transport moderate amounts of natural gas produced in specific regions; historically, these regions were primarily the Persian Gulf States. The new extractions of oil and natural gas from shale formations in North Dakota, western Pennsylvania, and West Virginia is motivating energy companies to consider how to move oil and gas from places that have historically lacked large-scale investments in energy infrastructure. Thus, current pipelines are unable to handle the transportation of new oil and gas reserves to existing production facilities, which is necessitating large-scale investments (from the perspective of energy companies) in pipeline infrastructure.

Assessing the social concerns and the design of pipeline architectures from a holistic and national perspective is something that individual pipeline operators do not do, but such an assessment will have important implications for energy security and environmental sustainability (Howarth, Santoro, & Ingraffea, 2011). *The*

goal of this 4-VA project was to study a critical aspect of the energy-transportation challenge—namely, the relationship between public perception and pipeline architecture, cost, and risk. The Atlantic Coast Pipeline (ACP) was used as a case study to reveal risk perceptions, values, and route preferences between social groups.

This project takes a step toward supporting indicators for route preference, social acceptability, and perceived safety and health issues of proposed energy infrastructure projects. There is a need for a more thorough understanding of how energy production and dedicated pipeline infrastructure are interdependent with multi-commodity transportation networks and how the two are sensitive to changes in location, quantity, risk, and social concerns (Dammel, Bielicki, Pollak, & Wilson, 2011). Resilience to future global environmental risks may *not* be embedded within present investment decisions that focus on areas of production (Fischoff, Bostrom, & Quadrell, 1993).

ACP research brought together a team of engineers and social scientists to study perception and decision-making as it relates to pipeline network development and energy systems optimization. The 4-VA research team contends that it is possible to have more socially acceptable and cost effective approaches to energy infrastructure planning than the status quo processes. There is a need to analyze energy infrastructure investments based on location, environmental uncertainties, risk perceptions, and potential impacts of incidents. If interdependent energy and transportation infrastructures are considered alongside social concerns, then energy production and security may be balanced with environmental and social costs, and negative impacts and incidents might be avoided and land owners compensated fairly.

The goal of this project is not to answer the question of whether the pipeline should be constructed. Rather, it directly addresses issues of procedural justice, transparency, and societal values. It explores alternative forums for deliberative, democratic processes regarding the future of this nation's energy infrastructure.

A key finding from this report is that *current policies for proposing and approving energy infrastructure in the U.S. inherently instigate conflict.* The process pits supporters and the opposition against one another in political battles that affect all parties in a negative manner. If the U.S. wants to transform its energy infrastructure to address critical vulnerabilities, then the very processes and procedures that underlie those decisions must also be rebuilt.

2.0 RESEARCH DESIGN AND QUESTIONS

Debates about energy security, climate change, and environmental and societal risk are playing out across the U.S. in regards to energy infrastructure. For example, the Keystone XL and Dakota Access pipelines have faced opposition that has caught the attention of national media organizations (Levenson, 2017; Medina, 2016; Smith, 2017). The Atlantic Coast Pipeline as a case study offers a sound opportunity to understand the issues facing future energy infrastructure investments.

The Atlantic Coast Pipeline LLC is a consortium of energy companies that formed a limited liability corporation, thereafter proposing a pipeline for the transportation of natural gas from the Marcellus Shale formations in western Pennsylvania and West Virginia to consumer populations in Virginia and North Carolina; see Section 3.0 Case Brief: Atlantic Coast Pipeline.

Some community members and organizations located in or near the 594-mile pipeline stand

in opposition to the project in general, while others oppose specific aspects. This research considers aspects of this case in an integrated manner to better understand how the nation can plan for its energy infrastructure in a socially and environmentally just manner.

The near-term research objective was to analyze the values and priorities of a cross-section of community members living directly along the proposed route. Geographically, we focused on Nelson and Augusta Counties in Virginia, which are in the pathway of the proposed pipeline. The primary research question is: How can energy infrastructure investments balance requirements for reliable and affordable energy with broader societal and environmental considerations?

This question was broken down into a series of secondary questions:

1. How is pipeline infrastructure planned in the U.S. and what geographic characteristics are common along pipeline corridors?
2. How do stakeholders view an increase in domestic natural gas production in light of the economic and environmental impacts?
3. How do members of the public understand the risks and benefits (direct and indirect) associated with large-scale pipeline projects?
4. Do historical debates regarding decision-making authority, eminent domain, and environmental preservation inform community members' perspectives?
5. Do local community members change their perceptions when confronted with trade-offs among energy sources or routes?
6. Are there demographics and community characteristics (including income, education, land ownership, housing type, levels of activism and population density) that influence preferences for and against the pipeline?

These questions are critically important as the knowledge gained from this research may help in the exploration of alternative public policy processes that can account for the technical, societal, and environmental dimensions of future energy infrastructure investments. The data gathered and analyzed in this report will carefully and critically interrogate the pipeline planning processes and the roles and responsibilities of the stakeholders involved. A mixed-methods approach, detailed below, that gathers data from public documents, surveys, and workshops will be used to answer these research questions.

2.1 Research Methods

The research design utilized Yin's case study methods (Yin, 2013) and Scholz and Tietje's embedded case study methods (Scholz & Tietje, 2002). Data was gathered, analyzed, and used to interpret stakeholder preferences about the ACP within a six-month period – April to September 2016. This research method included five overlapping activities that were intended to be iterative. Data collected in one activity served to inform and enhance other research activities.

2.1.1 Activity 1: Background Materials Synthesis and Fieldwork Preparation

Undergraduate researchers guided by faculty in weekly meetings worked to synthesize information pertinent to the case study from existing sources including, but not limited to: Websites, documentary films, environmental regulations, zoning ordinances governing land development, building codes for pipeline construction, information pamphlets, court rulings, maps, and television, online, and print media. Data was cataloged and organized following Yin's (2013) methods for background materials in a case study.

Researchers gathered media and resources on the ACP project's milestones from databases including: Google Trends, Access World News by NewsBank, Dominion's website, and non-profit organizations' websites (e.g. Friends of Nelson). Government sources were also important for understanding formal processes because utility companies (including energy generators and distributors) propose future projects and apply for permission from the Federal Energy Regulatory Commission (FERC) for major infrastructure investments, including the ACP project. The approval process is complicated and this research required synthesizing information from FERC's website (Federal Energy Regulatory Commission, 2017), the Energy Information Administration (EIA) website (EIA, 2017), and Dominion Energy's website (Dominion Energy, 2017) in order to understand how the approval process has been applied for the ACP. The planning and permitting process, as outlined in Section 4.2: Planning, application, and construction, describes the steps administered by FERC that utilities follow prior to submitting a formal application and starting the construction of natural gas pipeline projects.

Research conducted by undergraduate students at the University of Virginia in Fall 2015 offered the research team background information on the involved stakeholders and their particular roles. The organizations identified were validated with secondary sources to inform the stakeholder mapping (see Section 4.5: Stakeholder constellation).

2.1.2 Activity 2: Assembling and Visualizing Geographic Attributes

Geographic data was created with ArcMap, a software program that was used to analyze key environmental and social variables in the proposed route for the ACP. The first map series shows two demographics—age and income in Virginia's Shenandoah Valley—affected by the proposed ACP route. The 2016 route proposed for the ACP is overlaid with the data from the U.S. Census Bureau on income and age. The second map series shows the natural springs located near the proposed ACP route. To create the maps, the geographical coordinates of the springs in the area were found on the National Oceanic and Atmospheric Administration (NOAA) website and were plotted using ArcMap's "Display X/Y Data" function. The ACP route was then overlaid to display the interaction between these natural water sources and the pipeline. The second map in this series includes data from the U.S. Fish and Wildlife Service on wetlands, an overlay of the ACP's proposed route, and highlights of the interactions between the two. The third map series highlights rugged terrain along the route which could create challenges for trench construction and may require alternative construction methods and further environmental investigation. To put the ACP in context, other pipelines and their environmental and social effects were researched and other pipelines were identified via the FERC database on pre-filed, applied, or approved projects. This report includes a map of two pipeline projects in Ohio.

2.1.3 Activity 3. Survey Data Collection and Analysis

A written questionnaire (or survey) was created that combined elements from socio-demographic data following Creswell's (2013) methodology and captures data on route preferences for new infrastructure (Hoogendoorn & Bovy, 2004). Questions posed in prior surveys regarded the following:

i. Decision making
ii. Hazards and risks
iii. Safety and pipeline construction

iv. Civic and political activity
v. Recreation
vi. Legal and economic factors
vii. Employment status
viii. Demographics
ix. Route preference

The survey instrument consisted of 18 questions centered on values and preferences: 15 socio-demographic questions, one question to rank preferences for proposed ACP routes, and one free response question at the end. The survey was pre-tested with select stakeholders and undergraduate researchers; those pre-tests are not included in the data and results in this report.

Responses to the written survey were collected in person in Nelson and Augusta Counties as well as in the cities of Staunton and Waynesboro between May 19, 2016 and July 23, 2016. A total of 35 survey sites were visited and 272 out of an estimated 830 persons approached offered responses (a response rate of 33%). On average, the survey took participants between 15 to 20 minutes to complete. For a list of the survey sites, the date they were visited, and the number of respondents (N) at each site, see Appendix A.

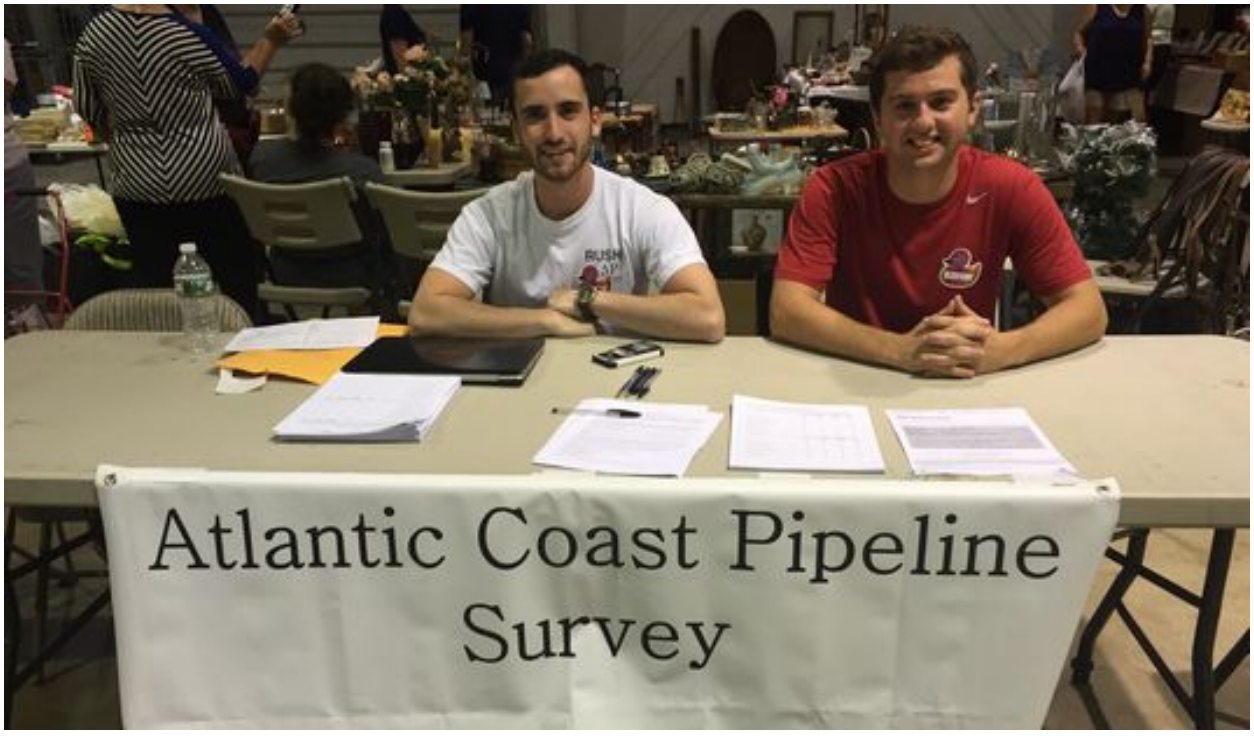

Figure 2. Survey Data Collection. Undergraduate researchers conducted surveys at the Augusta Expo in June 2016. (Image source: News Leader, 2016)

In order to collect survey data, undergraduate research assistants traveled into the field in teams of at least two persons. At each site, a table with chairs and a banner stating "Atlantic Coast Pipeline Survey" was set up to attract participants and offer a space to take the survey (see Figure **2**). Any person who approached the table was recruited and each participant was first given an Informed Consent form to read

and keep before completing the survey. Persons under 18 years of age were not permitted to complete the survey because they are not legally able to give consent. The survey had to be completed in person, no questions were mandatory to answer, and respondents could end their participation at any time.

2.1.4 Activity 4. Workshop Recruitment and Planned Activities

Three workshops were planned and completed between June 15, 2016 and July 30, 2016. The workshops included a panel presentation by field experts, an interactive strategy building session, and a self-guided tour of the proposed route. The workshops were designed to engage with community members in Nelson and Augusta Counties in distinctly different ways from informational to strategic to exploratory. Each workshop's theme and planned activities are shared in Section 4.8: Workshops, and the workshop agendas are in Appendix B. Written and verbal reflection during workshops helped the research team assess whether stakeholders changed their ideas when they were given new information about different aspects of energy infrastructure. Participants received a gift card for attending the workshop.

Workshop A: Speaker Panel

The first workshop aimed to recruit 20-26 participants out of the 125 persons that had completed the survey by June 7, 2016. Each participant that completed the survey was invited to attend the workshop. The workshop was designed to offer participants "new" information from experts and allow them to deliberate the current planning and construction processes. The research team invited representatives of government agencies to discuss energy and infrastructure, and then invited participants to engage the experts in question-and-answer style discussion.

Workshop B: Engaging Future Energy

The second workshop was publicized with flyers at local venues and by invitations to survey participants between June 23 and June 30. The workshop was designed to allow participants to first consider alternative energy sources and explore the trade-offs among different variables and then complete an activity to construct a map that identified future energy sources for Augusta County, VA.

Workshop C: Guided Community Tour

The third workshop guided participants along a small section of the ACP route within Augusta County to engage in discussions at different locations, shown in **Figure 3**. This activity was adapted from a novel research approach to assessing technologies while walking through an urban environment to driving through a rural community (Foley, Wiek, & Kay, 2017).

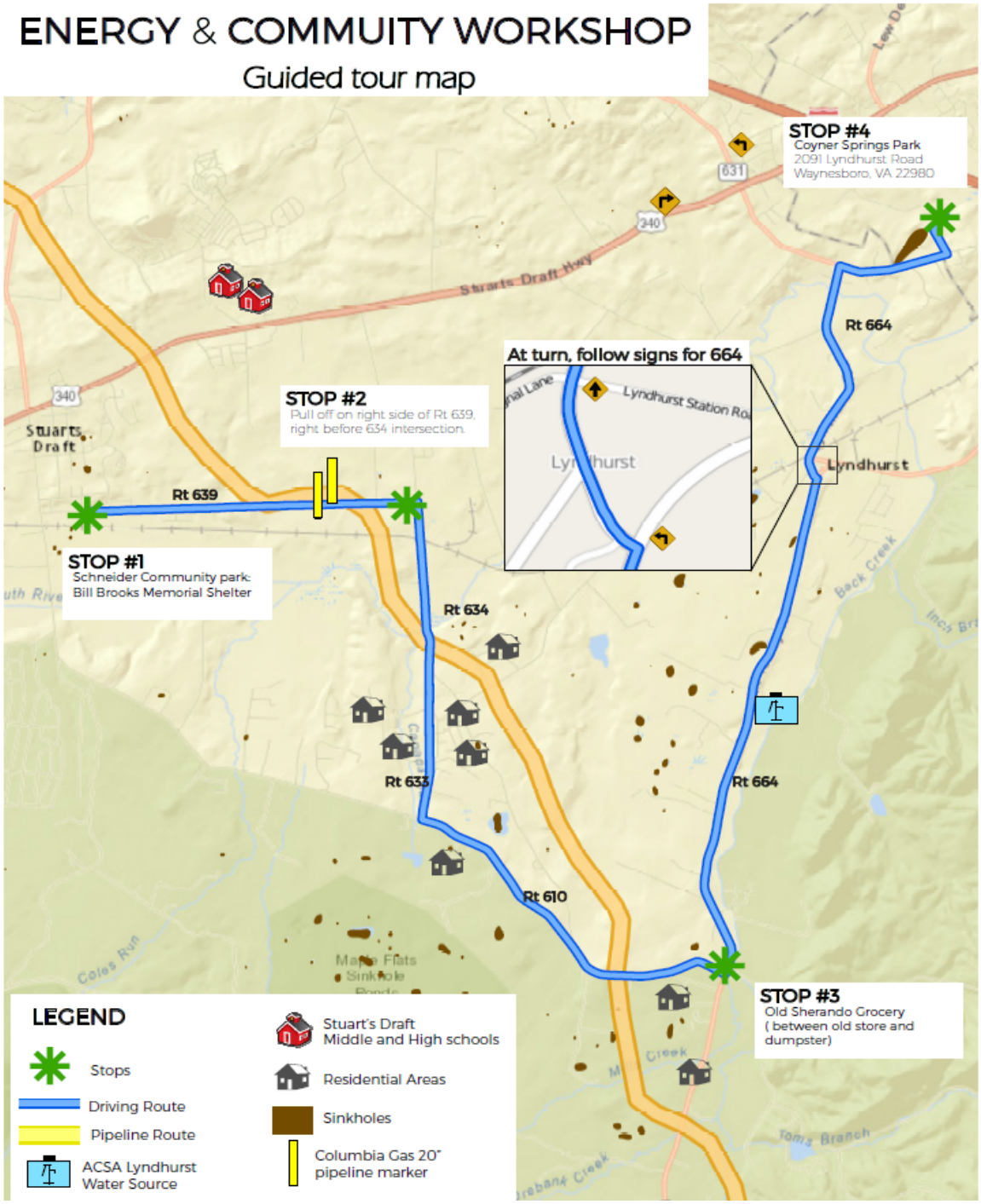

Figure 3. Map given to participants, with stops and key features noted in legend.

3.0 CASE BRIEF: ATLANTIC COAST PIPELINE

The Atlantic Coast Pipeline (ACP) is a natural gas pipeline designed to transport natural gas from the Marcellus and Utica shale formations in Ohio, West Virginia, and Pennsylvania through West Virginia and Virginia into North Carolina. An additional eastern lateral will extend from Northampton County, North Carolina to Hampton Roads, Virginia.

The ACP has received considerable public opposition within the Commonwealth, and the lessons learned may be generalizable to other regions of the country facing similar challenges. The ACP is routed to traverse the Appalachian Mountain range and its foothills where resistance opposing the pipeline originated from local community members and organizations (Allegheny-Blue Ridge Alliance, 2017). A section of the ACP is planned to transect Augusta and Nelson counties (see Figure 4 and Figure 5) and pass near the independent cities of Staunton and Waynesboro (combined population: ~136,000).

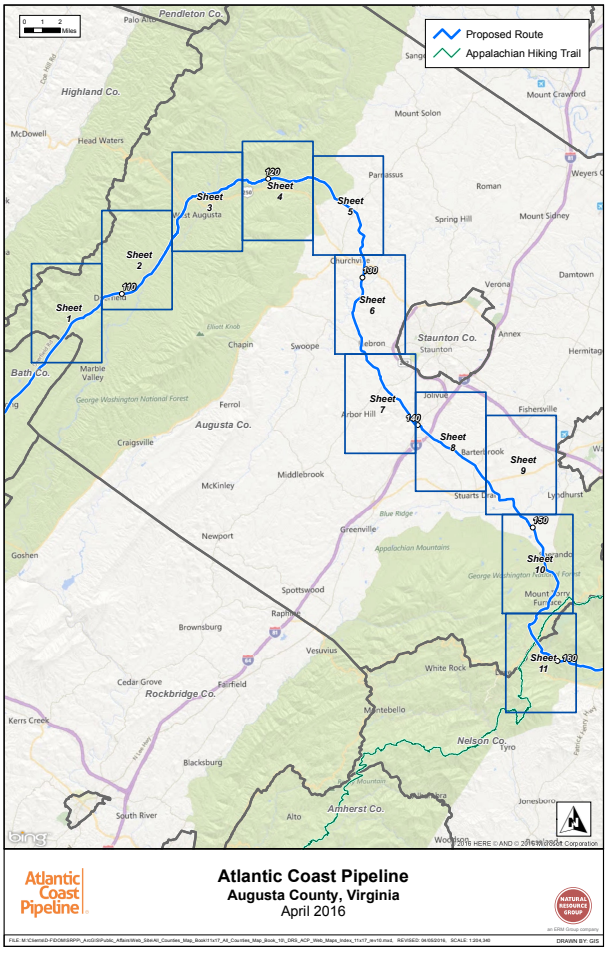

Figure 4. Map of Proposed Pipeline Route in Augusta County.

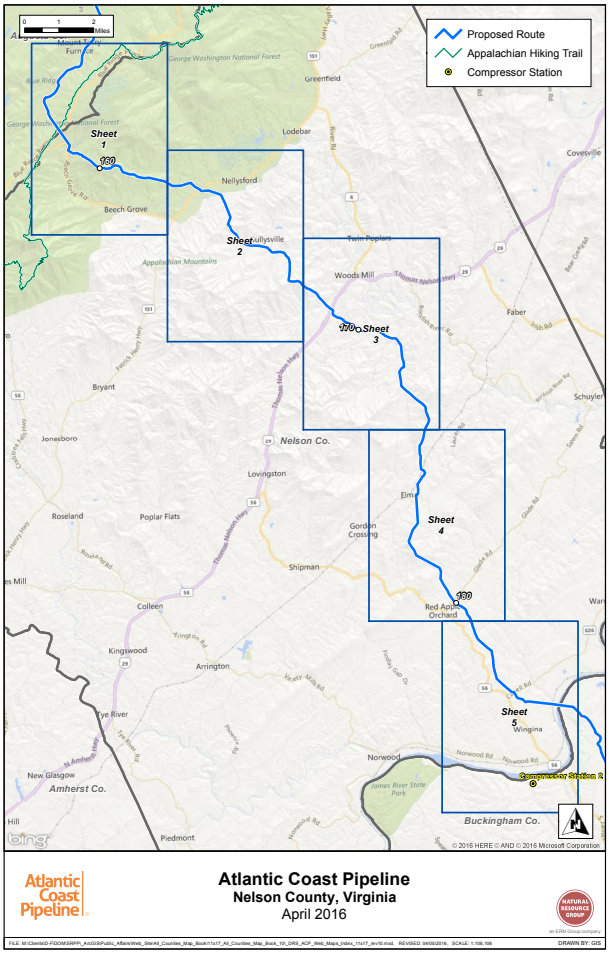

Figure 5. Map of Proposed Pipeline Route in Nelson County.

https://www.dom.com/about-us/news-center/natural-gas-projects-and-initiatives/atlantic-coast-pipeline/maps

There is a need on behalf of those communities for decision makers to evaluate the implications of this project for risk, resilience, economic impact, and environmental health, so as not to erode public health, safety, and trust in infrastructure planning and construction. The ACP is a compelling case study that is geographically situated for repeat interactions between researchers and community members.

3.1 ACP Permitting and Approval Process

The ACP is proposed by the Atlantic Coast Pipeline, LLC, a consortium of four major U.S. energy companies: Dominion Energy, Duke Energy, Piedmont Natural Gas, and Southern Company Gas (Atlantic, 2017). The consortium sent a Pre-Filing Request to FERC in October 2014. The filing reported that 96% of the pipeline's capacity is subscribed, in justification for the demand for additional supply capacity. Opposition groups contend this is a false claim, since consortium members that own the pipeline account for the purchase agreements. For instance, Dominion entered into a purchasing agreement with the consortium while owning 45% control of the ACP (Philips et al 2015). If the proposal is approved by FERC, then the Pipeline Hazardous Materials & Safety Administration (PHMSA) holds authority to approve construction and the Virginia Corporation Commission performs inspection and construction oversight (SCC, n.d.). Worker safety for construction and pipeline maintenance are regulated by the Occupational Safety and Health Administration and the Pipeline Safety Improvement Act of 2002, commonly called "The Pipeline Safety Act" (49 U.S.C. § 60129). Some state-level politicians, including Virginia's Governor McAuliffe, publicly support the ACP, citing economic growth prospects. There is no established county-level regulatory approval; however, county officials delayed site surveyors working in Nelson County and Augusta County and deliberated on enacting county-wide regulations to disrupt surveying operations (Associated Press, 2017; Adams, 2016). Land acquisition will take the form of "Right of Way" easements established through direct contractual agreements with landowners or through leveraging eminent domain. A detailed review of the permitting process is in Section 4.2: Planning, application and construction.

3.2 Economic Considerations

The consortium of four companies maintain ownership of the ACP with no party holding majority ownership; Dominion owns 45%, Duke Energy 40%, Piedmont 10%, and AGL Resources 5%. The ACP is designed to transport 1.5 billion cubic feet of natural gas per day. The Chmura Report commissioned by Dominion states that construction costs will be approximately $4.5 - $5 billion, and once complete the ACP will generate $456.3 million per year in North Carolina, Virginia, and West Virginia combined in economic impact (Chmura Economics & Analytics, 2014). The Chmura report estimated that 2,873 construction jobs will be created between 2014 and 2019, and an additional 2,200 jobs are expected in industries consuming the natural gas. Opposition reports issued by Philips et al (2016) and Stanton et al (2015) contend that counties in western Virginia including Augusta, Buckingham, Highland, and Nelson counties will realize $3.2 million in tax revenue. The opposition reports contend that local contractors do not have the equipment or expertise to play a significant role in the construction and that no long-term jobs will be positioned in this region. They argue that the economic benefits will largely bypass

many of the regions affected by the planned route.

3.3 Environmental Considerations

The ACP will affect land-use along the 594-mile long corridor with a 75' to 125' wide buffer. Surface water impacts are likely to increase during construction and may be sustained long term as vegetative changes to riparian zones may result in increased total suspended solids and lower dissolved oxygen levels following deforestation. One initial route proposed took the ACP directly through the George Washington National Forest, potentially impacting threatened and endangered species that are endemic to Virginia (meaning the species are only found in that specific area). Opposition to the planned ACP route by officials in the Forest Service led to an alternative route issued by Dominion (Goldberg, 2016). The full extent of the environmental impacts are uncertain, yet a range of negative impacts are recorded in the three volumes issued by FERC as the draft Environmental Impact Statement (volumes I – III) in the 2,500 page reports (Office of Energy Projects, 2016). While land-use changes and ground water impacts will occur as a result of construction, the risk of catastrophic threats to human health, air, soil and subsurface waters also increase with the new potential for failure of the pipeline's integrity. PHMSA recognizes this in its classification of the ACP as a low probability/high risk infrastructure. The recent pipelines ruptures, such as the Colonial Pipeline leak in Sept. 2016 (Pillion, 2016) and the pipeline explosions in Mississippi in 2015 (Breslin, 2015), serve to fuel local opposition. Those events also bring into question the risk classification by PHMSA versus the risk perceptions of those living in the areas that would be directly affected by leaks and explosions.

3.4 Upstream and Downstream Considerations

Opposition groups contend that creating additional capacity for transportation of natural gas will motivate efforts to increase natural gas recovery in the Marcellus Shale region and will serve to expand non-traditional gas exploration in the region with upstream effects in Western Pennsylvania and West Virginia. Downstream impacts include the release of both fugitive methane and carbon dioxide emissions (leaks and other unintended or irregular releases of gases) that will directly result from the increased consumption of natural gas equivalent to twenty new coal-fired power plants or approximately 67,000,000 metric tons of carbon dioxide emissions per year (Oil Change International; Bold Alliance, 2017). In this way, opposition groups believe the ACP stands in direct competition with investments in renewable energy sources such as solar and wind which are being developed in Virginia (Philips et al., 2016; Stanton et al., 2015).

4.0 FINDINGS

The societal and environmental concerns highlighted in the evidence gathered during this research suggest that the proposed ACP is a complex and multifaceted issue. The evidence in each of the following sections offers insights from different perspectives, including: Media representation, maps and geographical, political processes, and survey and workshop results. The ACP remains a regional issue not well understood outside the immediate area in the pathway. Yet within that region there is contention about who will benefit and who will be burdened with long-term risks. The preference for constructing pipelines in rural areas will yield negative outcomes for a rural population that is growing older and earns less income than the residents in urban and suburban areas.

Furthermore, it is clear that the process for proposing and approving energy infrastructure is unable to facilitate genuine consensus. Rather, it fosters divisive political discourse about energy. At least five core issues underlie the opposition to the proposed ACP:

1. Eminent Domain and land use preferences
2. Localized risk to community members coupled with indirect benefits
3. Disagreement about energy sources (renewable versus fossil fuels)
4. Natural resource conservation and protection of parks and recreational areas
5. Lack of decision-making power among local officials and landowners

4.1 Media Representation: The ACP is a Public Issue of Concern

The ACP first grabbed the attention of community members and the media in the middle of 2014. This attention can be seen in the number of hits for the search terms "Atlantic Coast Pipeline" on Google Trends® in the summer of 2014 (see Figure 6). This means that a few months before the pre-filing notification to FERC, there was an initial awareness of the pending plans. Since those initial searches, the project continued to gain attention, most prominently in state and local media. Using Access World News and searching for "Atlantic Coast Pipeline" showed that media outlets across the Virginia Commonwealth issued over 1700 articles between October 1, 2014 and December 31, 2016 (see Table 1). Media articles are concentrated around the communities nearest to the pipeline and coverage fell short of reaching broader national audiences as did the Dakota Access Pipeline (see Figure 7). The ACP is a prominent issue in the Commonwealth and remains a topic of interest.

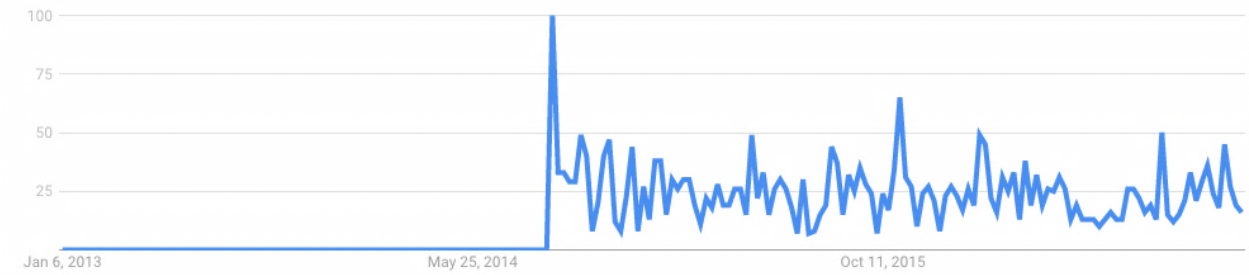

Figure 6. Graph of search counts for "Atlantic Coast Pipeline," tracked by Google Trends®, between Jan. 1, 2013 and Dec. 31, 2016.

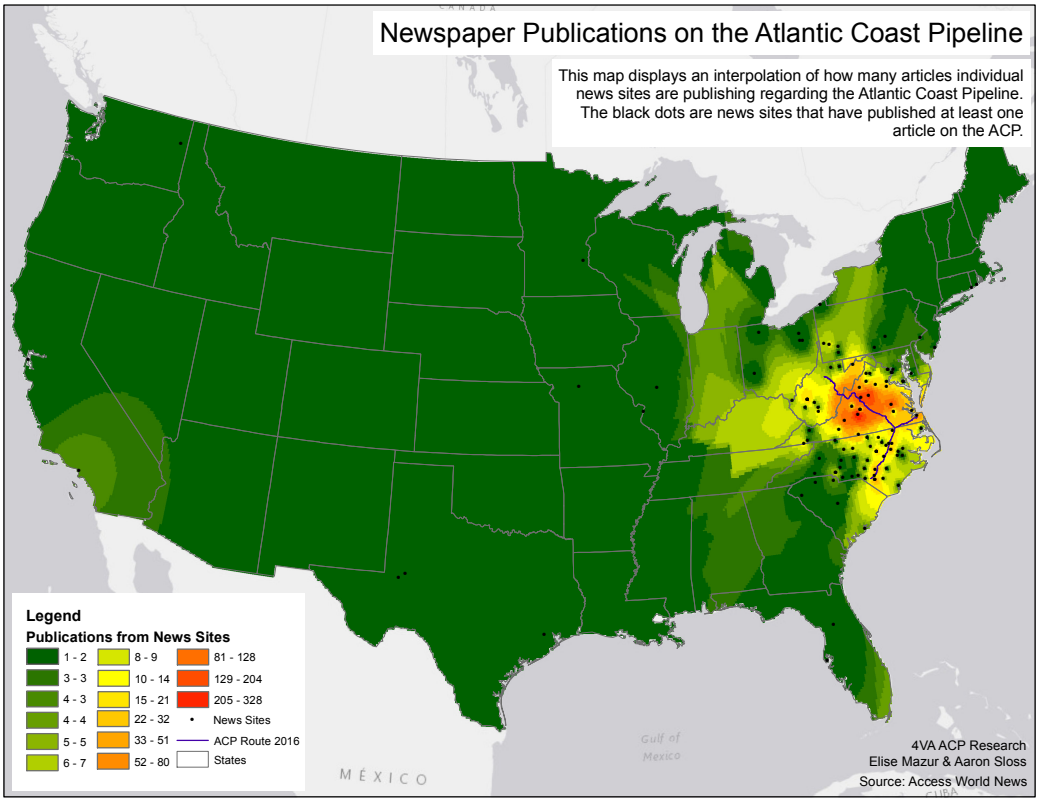

Figure 7. Newspaper publications on the ACP by location of media outlet.

Publication	Articles Published
The News & Advance	494
The Daily Progress	321
The News Virginian	287
Richmond Times-Dispatch	207
Roanoke Times	155
Virginian-Pilot	70
Free Lance-Star	45
Daily News-Record	37
Daily Press	31
Danville Register & Bee	26
Bristol Herald Courier	14
Culpeper Star-Exponent	13
Floyd Press	6
Progress-Index	5
All others	16
Total	1727

Table 1. Virginia-based publications related to the ACP project by news source.

4.2 Planning, application, and construction

Founded on October 1st, 1977, the Federal Energy Regulatory Commission (FERC) is a federal agency created under the "Commerce Clause" in the U.S. Constitution to regulate interstate transmission of natural gas, oil, electricity, and hydropower infrastructure projects. It is an independent agency, which means that it falls under the Department of Energy but "shall not be subject to further review by the Secretary [of Energy] or any officer or employee of the Department" (42 USC § 7172g) and is instead reviewed by federal courts. The scope of FERC's authority can be found here. FERC falls under the Executive Office of the President (EOP) and thus makes decisions as guided by the executive branch (and, ultimately, the President). The chair of FERC is

appointed by the President and confirmed by the Senate and has final decision-making authority for the agency.

4.2.1 Planning Process for Pipelines

a. **Open Season:** Energy utility companies must apply for the authorization of new pipeline construction from FERC. The application process is initiated when a company issues an official public announcement of their intent to file an application (U.S. Energy Information Administration, 2017). Following the announcement, the applicant is required to hold an "open season" that lasts 1-2 months. An open season is defined as a period during which the sponsor of a pipeline project can gauge the level of market interest and allow customers to enter into nonbinding purchasing agreements. If enough customers sign nonbinding agreements for a portion of capacity rights (i.e. rights to the pipeline's profits) to make the project profitable for the applicant then the plan continues and the applicant develops preliminary project design documents. If there is not enough evident market interest, meaning that enough companies enter into non-binding agreements, then the project is either dropped or put on hold indefinitely. The contracts do not become binding until the construction permits are issued, which is almost at the final stage of the planning and permitting process.

b. **Pipeline Design:** As part of the preliminary project design, the applicant must create a proposed pipeline route, then identify and contact landowners affected by the planned pipeline route. The applicant must negotiate and file easements with the private landowners where the pipeline is planned. The easement process requires the landowners to consider the impact that construction will have on their land and the compensation they expect from the applicant. If the owners and the applicant cannot reach an agreement, then the applicant may claim "eminent domain" which means that they believe that it is "necessary" that the land be turned over for their construction and right-of-way purposes. While it is up to FERC to decide whether eminent domain is applicable, the judicial branch would review any cases that contest FERC's decisions (Legal Information Institute, n.d.).

c. **Request for FERC's Pre-Filing Process:** The applicant can request that FERC conduct the environmental review of the application during the scoping and planning process. This is one Pre-Filing Option listed in the National Environmental Policy Act (NEPA). Applying for pre-filing is optional but very common and must be first approved by FERC. Pre-filing approval is announced by FERC 6-9 months on average before the application is officially completed.

d. **Publicity:** While negotiating a pipeline plan, the applicant must announce their plans (i.e. the tentative outline of events, map of proposed project, project design) to the public by holding public meetings. Those meetings are primarily for those that the pipeline will directly affect, e.g. landowners. The public meetings are important for people to understand the details of the process and the applicant's project plan. In the case of pre-filing, an open house is required. An open house is a forum hosted by the applicant in the vicinity of the proposed pipeline for the purpose of communicating with the public and receiving feedback. FERC sends staff to answer

questions for the public about the "pre-filing process and invite stakeholders/the public to participate in the environmental and certificate application proceedings" (Office of Energy Projects Division of Gas, 2015). There are multiple open houses hosted according to the size of the project.

e. **Surveys and Resource Reports:** The applicant must complete surveys with permission from the landowners, including soil, field, and noise surveys for construction. They must create a geological report for FERC that enumerates certain geographical qualities such as bedrock lithology, stratigraphy, structural features, glacial features, unconsolidated deposits, and mineral resources. The report must also include the potential hazards that could be created during construction of the project, such as anticipated erosion for various locations and soil types, as well as measures to mitigate the environmental impacts of construction. The full requirements for a geological resource report are listed here.

   The applicant must also include a public resource report that predicts the potential environmental effects that pipeline construction will have along the proposed route. This report should include a water quality, wildlife and agriculture, cultural, socioeconomics, geology, soil, aesthetic, land, air and noise, safety, and design analysis (an example geological report is shared here). During pre-filing, FERC issues a Notice of Intent to prepare an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). FERC then opens the scoping process to public comments through FERC's website, public meetings, and conversations with interested stakeholders. The public comments are intended to inform the EA or EIS reports.

f. **File Application with FERC:** The applicant now officially files an application for construction with FERC. Based on the plan, FERC examines the application and decides whether to grant a Certificate of Public Convenience & Necessity or not.

4.2.2 Application Process for Pipelines

a. **Application Reception:** FERC receives the application, and a notice of application (example here) is issued. This notice is a public announcement of the details of the proposal and includes instructions on how individuals may voice their opinions on the proposal. Citizens may become legally involved by motioning to intervene in accordance with the requirements of the Commission's Rules of Practice and Procedure. Citizens may also file comments with the Secretary of FERC without becoming involved legally.

b. **Scoping:** During this scoping process, FERC consults with resource agencies—like the Army Corps of Engineers or the Department of the Interior's Fish and Wildlife Service (FWS)—to identify issues and alternatives to be analyzed. FERC will also identify other environmental review and consultation requirements under state, tribal, or local laws. This is the point at which FERC ensures that the project proposal complies with the various environmental laws of the state or states in which the pipeline will be built. During the scoping process, private citizens have another opportunity to get directly involved in the application process. They can attend and participate in the public scoping meetings and inform FERC staff about the

environmental and/or socioeconomic factors that are important to them and their livelihoods. Citizens can also make various suggestions as to alternatives to the proposed project that should be evaluated.

c. **Data Requests:** Following the scoping process, if deemed necessary, FERC can make data requests from the two corporate officials appointed by the chairmen of the applicant company (a requirement of FERC) that require that the applicant address in detail any concerns that FERC has with the pipeline plan.

d. **Preliminary Determination of Need Based on Non-Environmental Factors:** FERC can issue a preliminary determination on whether it believes that the goal of the project proposed is in line with the *public* interest, regardless of environmental factors before it examines the environmental components separately. This determination tends to be made for larger projects. There is an example of one of these statements on the FERC website, linked here.

e. **EIS vs. EA:** Following its analysis of the societal impacts that the project could have, FERC must thoroughly study how the project will affect the environment. It can release its report to cooperating agencies within the project, following its publication of a Notice of Intent, by either an Environmental Impact Statement (EIS) or Environmental Assessment (EA), whichever is deemed most appropriate for the scale and risk of a given project.

    - An EIS is usually required for large and complicated projects with significant environmental impacts and is a document prepared to describe the effects for proposed activities on the environment. Federal agencies prepare an EIS if "a proposed major federal action is determined to significantly affect the quality of the human environment," (EPA). "Environment," in this case, is defined as the natural and physical environment *and* the relationship of people with that environment. The types of actions that require an EIS can be found in §380.6 of the National Government Publishing Office's Federal Regulation website, linked here. Following the release of the first EIS draft is a comment period during which individuals can ask questions and recommend any measures of mitigation that they would like included in the final EIS draft. The comment period lasts for a minimum of 45 days. Additionally, FERC holds public meetings in the project area to hear the people's comments on the draft directly. Questions are responded to and a final EIS is constructed based on public response and released.

    - An EA is an assessment of the environmental consequences (positive and negative) of a plan, policy, program, or project prior to the decision to move forward with the proposed action. It entails a more rapid examination and is sometimes used to speed up the process for small-scale projects. A comment period follows the release of the first EA draft, however there are no required public meetings. Questions posed by the public are addressed in the Commission Order, a formal statement made by FERC that includes the details of the EA.

f. **Order to Approve or Deny Project:** Based on extensive analysis of benefits and expenses, environmental and social implications, EIS's or EA's, and various other reports, FERC decides to approve the project or deny it. FERC announces their decision in a formal Order. If the project is approved, the applicant may construct and operate the project after obtaining permits from the Clean Water Act, Coastal Zone Management Act, and Clean Air Act. If denied, the applicant or the public can ask FERC to rehear the case or refer to the FERC Administrative Law Judge, or the applicant or supporting legal parties can take FERC to court.

4.2.3 Construction Planning Process for Pipelines

a. **Final Project Design:** Following approval, the applicant's proposed design must be finalized and prepared for construction; small changes to the route may be permitted but only within the parameters of the proposed construction grounds. A Commission Order must be filed, which requires the applicant to file the plans, surveys, and any additional required information prior to construction.

b. **Right-of-Way Acquisition:** The applicant must obtain a legal right-of-way for the land included in the construction route. This part of the construction process was incorporated into the Reliability Standards of the FERC processes in 2007 and has since been edited (2014) to be more lenient in its enforcement. It allows the applicant to use more space than an easement calls for in its construction, however it requires that the applicant restore the extra space used following the completion of construction.

c. **Pipeline Construction**: Pipeline construction is usually completed within 18 months from the start of construction and can be completed in as little as six months. Construction can be delayed because additional time may be needed to acquire local permits from towns and land-use agencies located along the proposed construction route, as well as environmental obstructions or lawsuits in the case of more controversial projects.

d. **Right-of-Way Restoration**: Following construction, the applicant must restore any disturbed land not covered under an easement. In essence, this means the applicant has to replant trees and grass, for example.

e. **Completion and Testing:** Commissioning and testing the completed pipeline project usually takes about one to three weeks. This process involves subjecting the new segments of the pipeline to hydrostatic testing (pipe filled with stationary water under high pressure) or other tests of the line in-situ. Line packing, which involves filling the pipeline with an initial base load volume of natural gas, is usually required for new pipelines or for larger expansion projects. The Department of Transportation and the Office of Pipeline Safety are responsible for testing oversight and the final approval to put the pipeline in service.

4.3 Pipeline Construction Methods Review

The following section briefly reviews two methods of underground construction: Trench construction and trenchless construction. Trench construction is often utilized when few obstacles exist along the pipeline route. Construction safety is enhanced with trenched construction as compared to trenchless construction. Trenchless construction is often

implemented for situations where obstacles, such as roads, rivers, or mountains, obstruct the pipeline route and prohibit the digging of trenches.

This section does not review the extensive engineering and construction documents for the ACP provided by Dominion. The plans, which include tunneling under the Blue Ridge Highway and Interstate I-64, are linked here. Information from some opposition groups to the proposed ACP plans can be found on the Friends of Nelson website, but not all opposition is discussed thoroughly in this report.

4.3.1 Trench Construction

Large pipeline projects, like the Atlantic Coast Pipeline project, often are constructed using trench construction methods. The required amount of right-of-way land for construction is cleared and leveled to give construction workers space to operate while reducing risk. Trench construction generally includes the excavation of a trench, construction and compaction of a foundation for the pipeline, welding of pipeline segments, lowering the pipeline into the trench, and finally careful backfilling and compacting of fill material into the trench, burying the pipeline. According to the PHMSA website on pipeline construction, the following are steps included in the trench construction of a pipeline.

i. **Clearing and Grading:** During the initial stage of pipeline construction, a corridor is established along the right of way to accommodate delivery vehicles, construction equipment, and workers. For the largest sections of the Atlantic Coast Pipeline (42-inch diameter), the proposed construction corridor is approximately 125 feet in width. The maintenance right-of-way for these same sections after construction is approximately 75 feet in width. The construction corridor for the smaller sections of the pipeline (20 inch diameter) is approximately 75 feet during construction and 50 feet post-construction.

ii. **Trenching, Hauling, and Stringing:** Following the clearing of the right-of-way, an open trench is excavated through the center of the corridor. Wheel trenchers are pieces of machinery used to dig trenches of specific width and depth. Excavation machinery, and potentially explosives, are used on uneven or more challenging terrain. After the trench is dug, the steel pipeline segments are hauled from the manufacturer to the site. In the case of the ACP, the pipeline segment manufacturer is Dura-Bond Industries in Steelton, Pennsylvania. At the site, the segments are placed on grade and roughly parallel to the trench – a process known as stringing. A foundation of gravel, crushed rock, and/or other materials is constructed at the bottom of the trench to provide continuous support for the pipeline. Foundation specifications generally include location, thickness, smoothness, material, and compaction requirements.

iii. **Welding and Coating:** Pipeline segments are joined by welding to create a continuous pipeline section. Weld inspection is a critical step to confirm that weld integrity meets design specifications. A variety of methods exist for weld inspection and non-destructive testing (NDT), including visual inspection, Radiographic Inspection (RT), Magnetic Particle Inspection (MT), Liquid Penetrant Inspection (PT), and Ultrasonic Inspection (UT) to detect defects. Defects are fixed and retested. A durable anticorrosion protective coating is applied to the outside of the pipeline to protect the segments and the fabricated joints from

physical wear and corrosion. For the ACP, the coating specified is 3M Scotchkote 323, SPC SP-2888, SPC SP-3888, Denso Protal 7200, and/or Denso Protal 7125 (Atlantic Coast Pipeline, LLC; Dominion Transmission, Inc., 2017).

iv. **Lowering, Padding, and Backfilling:** Once a section of pipeline has been welded, tested and coated, it is then lowered into the trench with side-booms, as shown in Figure 8. The trench is backfilled and compacted to the engineered specifications, effectively burying the pipeline. The surface is restored to grade with surface treatments such as grass.

Figure 8. Trench construction and placement of pipelines on flat ground. Image source: Arabian Oil and Gas.

v. **Testing and Fabrication of Other Components:** Once the pipeline is placed and backfilled, integrity is confirmed by hydrostatic testing with pressurized water.

Pressure vessel construction typically requires hydrostatic testing performed at 150% of the designed operating pressure. Once all testing has been successfully completed, crews "tie in" the necessary components into the pipeline, such as laterals and compressor stations.

4.3.2 Trenchless Construction and Horizontal Directional Drilling

Trenchless construction is a method primarily used to place small pipelines (1-6 inches in diameter) that are typically constructed for light industrial applications and residential areas, as shown in Figure 9.

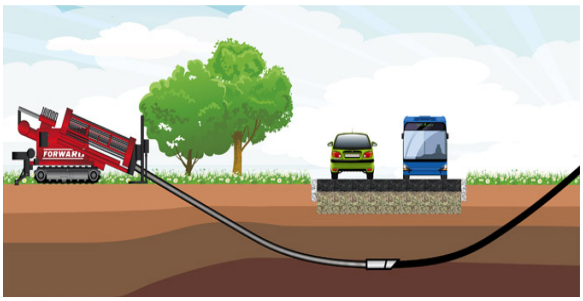

Figure 9. Horizontal directional drilling methods can be utilized at water and road crossings.

Horizontal directional drilling might be used under obstacles such as roadways, rivers, and mountains. The method eliminates the need to ballast pipelines to prevent "floating" to the surface and reduces transportation detours. The machinery required to construct large diameter pipelines, such as the ACP (42-inch diameter), would be substantial. The ACP plans include similar construction methods, requiring the boring of a one-mile tunnel under the Blue Ridge Highway, Appalachian Trail, and other roads. As per industry norms, the ACP plans contain few details specifying the construction means and methods (Atlantic Coast Pipeline, LLC, 2016).

4.4 Oversight of Operations

Several government agencies have roles in the supervision and regulation of a pipeline; however, PHMSA is the primary regulatory agency. PHMSA focuses primarily on safety, efficiency, and facility requirements. The Transportation Security Administration (TSA) of the Department of Homeland Security (DHS) plays a small role in the regulation of natural gas pipelines, with responsibility for coordinating security for all transportation related operations.

According to their website, PHMSA's responsibilities are as follows:

1. Evaluating safety standards for improvements and proposing and issuing new rules
2. Setting and enforcing regulations and standards for the design, construction, operation, and maintenance or abandonment of pipelines by pipeline companies
3. Educating operators, states, and communities on how to keep pipelines safe
4. Facilitating research and development into improved pipeline technologies
5. Training state and federal pipeline inspectors
6. Administering grants to states and localities for pipeline inspections, damage prevention, and emergency response
7. Analyzing pipeline safety and accident data

4.5 Stakeholder Constellation

The stakeholder constellation for the ACP follows a pattern of involving citizens and affected communities who offer input to regulatory agencies, who in turn communicate with the regulated parties (Dominion and partners). Ancillary organizations such as the media, city officials, and researchers (like the 4-VA team) play an indirect, often mediating role in these interactions. Affected community members form new organizations and enroll into existing organizations that serve as direct political action organizations to mobilize grassroots opposition and communicate with government leaders. The U.S. Forest Service is one of the organizations that spans the boundary between affected party and governmental organization. Their unique position seems to offer great power in influencing the proposed route (NewsPlex, 2015). Other parties, including private businesses, have negotiated for small route alterations in Nelson County, such as Silverback Distillery. The stakeholder constellation pits advocates for the pipeline against the affected community and situates the regulatory agency in the unenviable position of decision-maker and mediator of political pressures (see Figure 10).

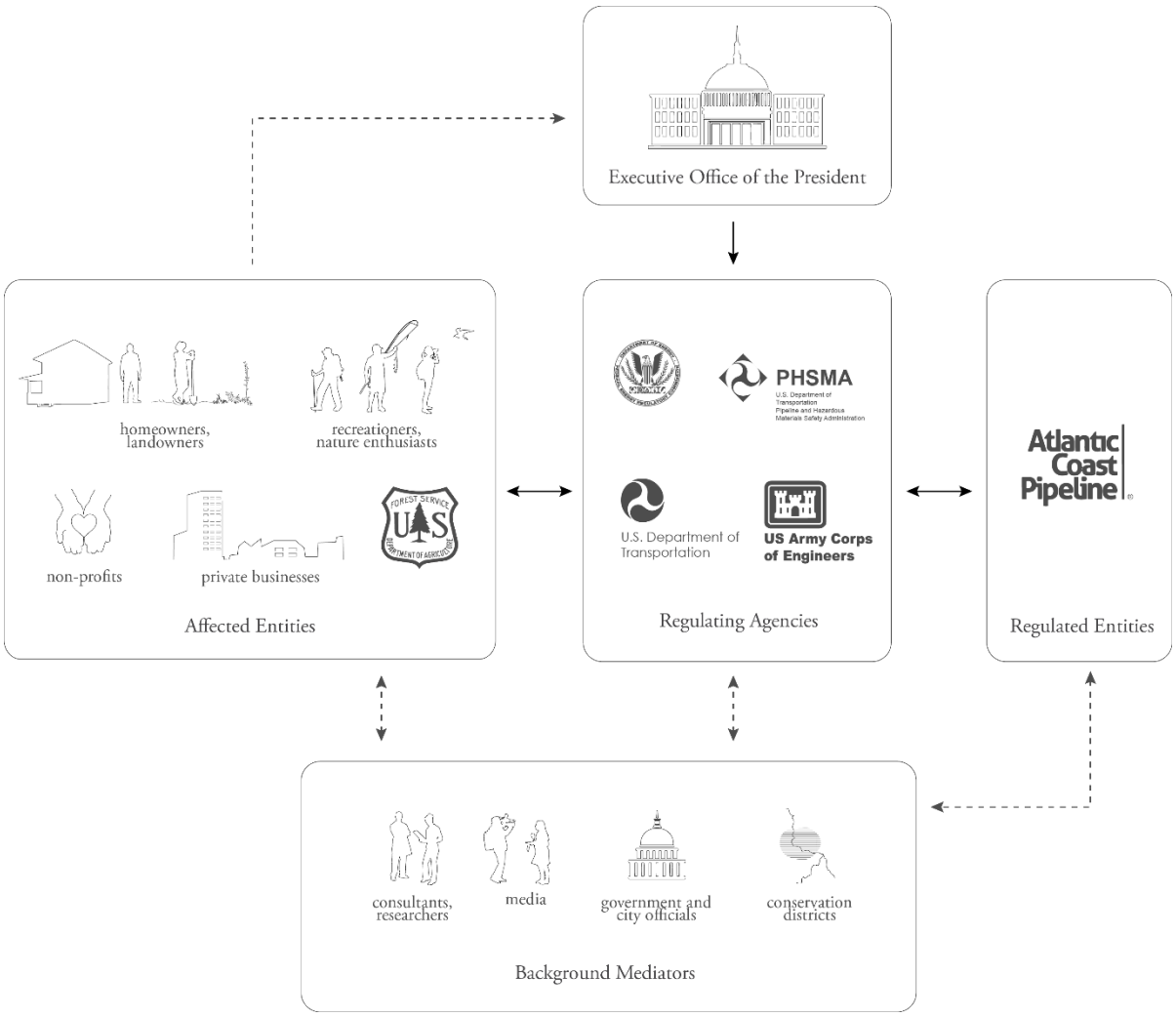

Figure 10. The stakeholder constellation of the Atlantic Coast Pipeline project.

4.6 Geographic Attributes

Interaction with Human Demographics

The ACP route bypasses the cities of Waynesboro and Staunton to minimize the potential risk to denser population areas, a clear priority for most large pipeline projects. The counties of Augusta and Nelson are largely rural, but the overall low population density masks higher density along the proposed pipeline route, especially in Nelson County. The area surrounding Wintergreen Resort is one of (if not *the*) most densely populated areas in Nelson County, and the proposed route crosses the Blue Ridge mountains at that point and through the eastern valley, near Beach Grove Road and the Rockfish River. Our purpose here is not to determine the 'right' population density of the residents impacted by a pipeline route, but rather to make transparent what is hidden in the aggregate measure of population density that clearly exposes rural communities to greater relative risks, since the utilitarian logic (harm the least number of people) is calculable in this respect and can be planned for accordingly.

Age and income are two key demographics in Augusta and Nelson counties. Looking at age and income draws attention to a concern that might be raised on behalf of rural communities, which tend to be older and have lower earned income. Those community members might accept nominal payment for 'Rights of Way' easements for proposed pipelines. The first map, shown in Figure 11, shows how the proposed pipeline route affects a concentration of older residents living in the Wintergreen area, just to the east of the Appalachian ridge. The majority of the proposed route in this region will affect an aging population with an average age between 40–60 years. The second map, in Figure 12, shows how the proposed route intersects with pockets of higher earned income (greater than $65,000 median household income) and areas with lower earned income (less than $35,000).

Interaction with the Natural Environment

In addition to human interactions, the ACP will interact with, and impact, the natural environment. In order to better understand potential environmental impacts, spatial analysis was used to explore potential impacts on environmentally-sensitive areas, especially wetlands and geologic formations that may require

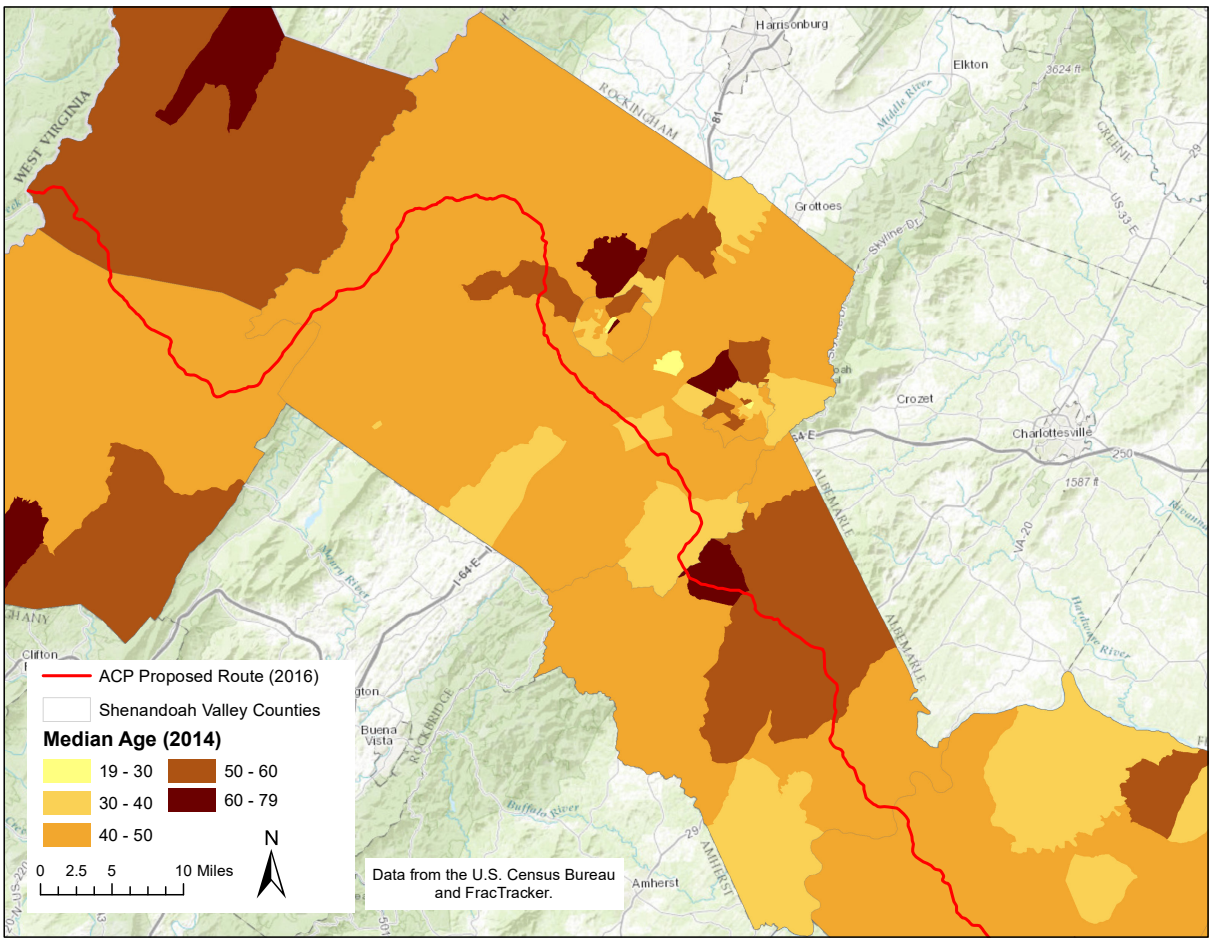

Figure 11. Median age of population affected by proposed pipeline route.

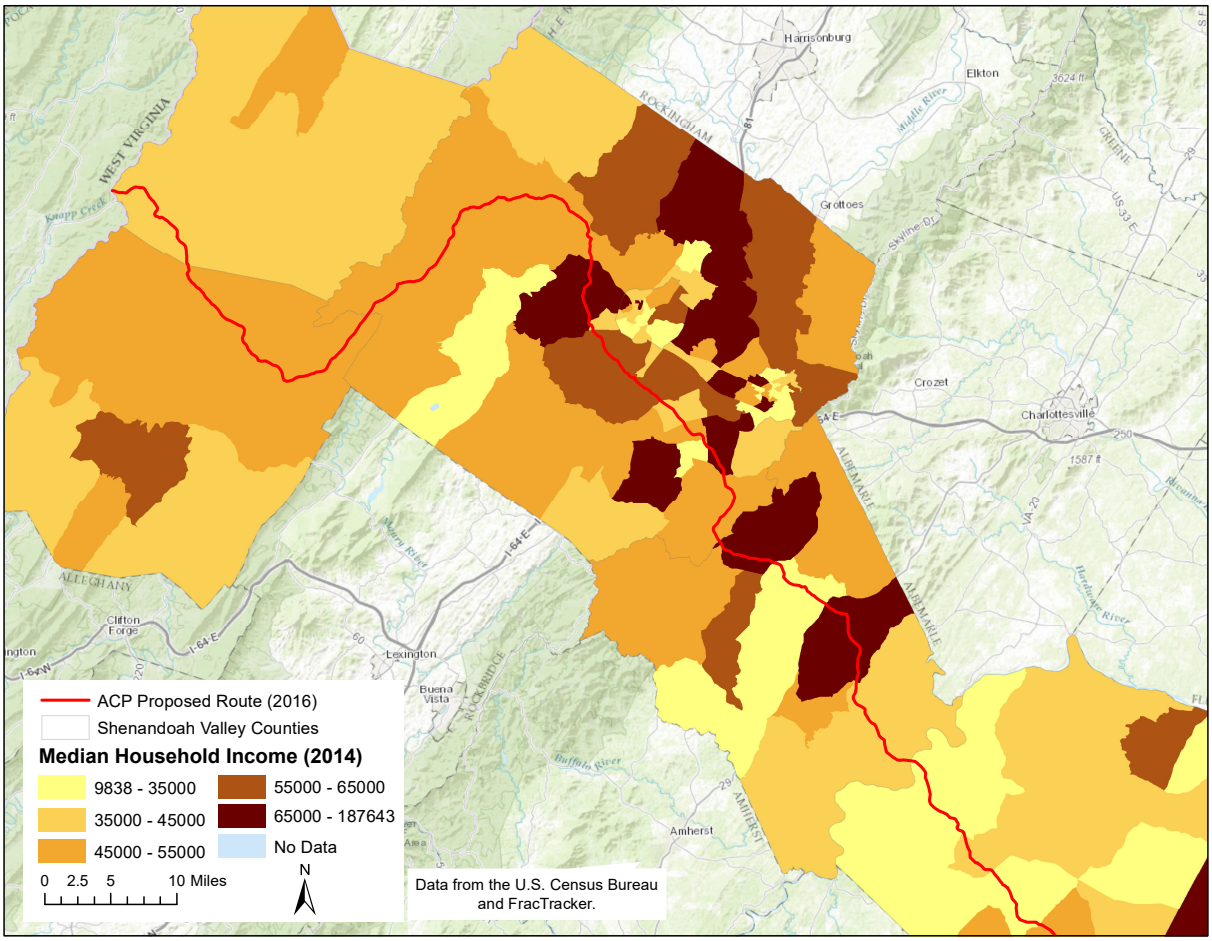

Figure 12. Median household income as reported in 2014 for the population affected by the proposed pipeline route.

non-traditional or invasive construction methods. The map shown in Figure 13 shows 15 key points where the proposed route intersects with wetlands in the two counties of interest. Wetlands provide critical ecosystem services including, but not limited to, flood control, wildlife habitat, and breeding grounds for fish and semi-aquatic species. Wetlands are protected by the Virginia Water Protection regulations (VSR § 62.1-44.15:20) and require permit approvals that routinely require mitigation or reconstruction of impacted wetlands and nearby ecosystems. However, the outcome of public comments on the interactions between the proposed Mountain Valley Pipeline and the Atlantic Coast Pipeline were not included in this report (Viriginia Department of Environmental Quality, 2017).

An additional map (see Figure 14) shows the geographical conditions that most likely will demand non-traditional pipeline construction approaches (as described in Section 4.3: Pipeline Construction Methods Review) due to above average slopes or high concentrations of shallow bedrock. The predominate location and greatest length of non-traditional construction is planned to take place under the Blue Ridge Parkway and Appalachian Mountain range.

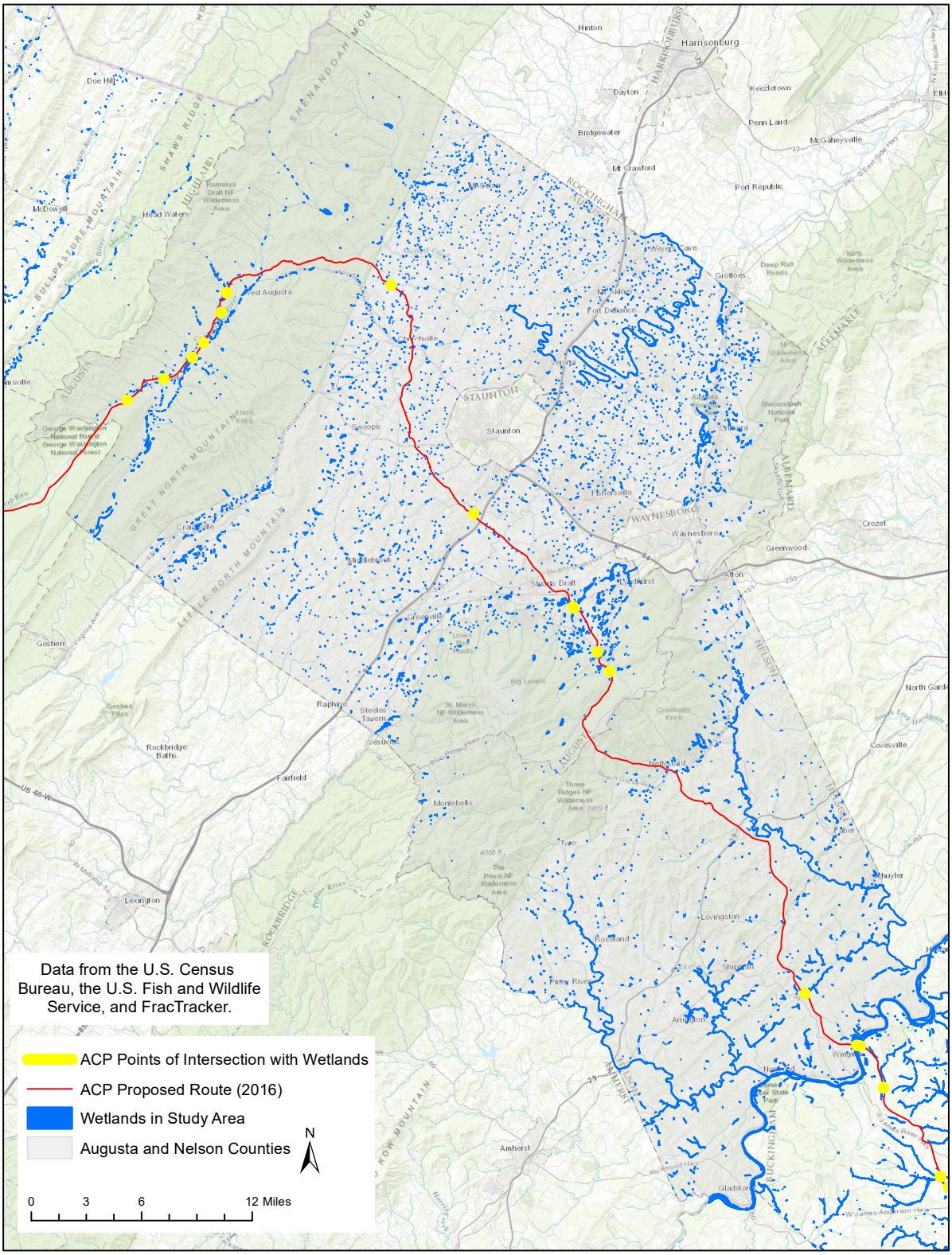

Figure 13. Wetland areas and intersection points with the proposed pipeline route.

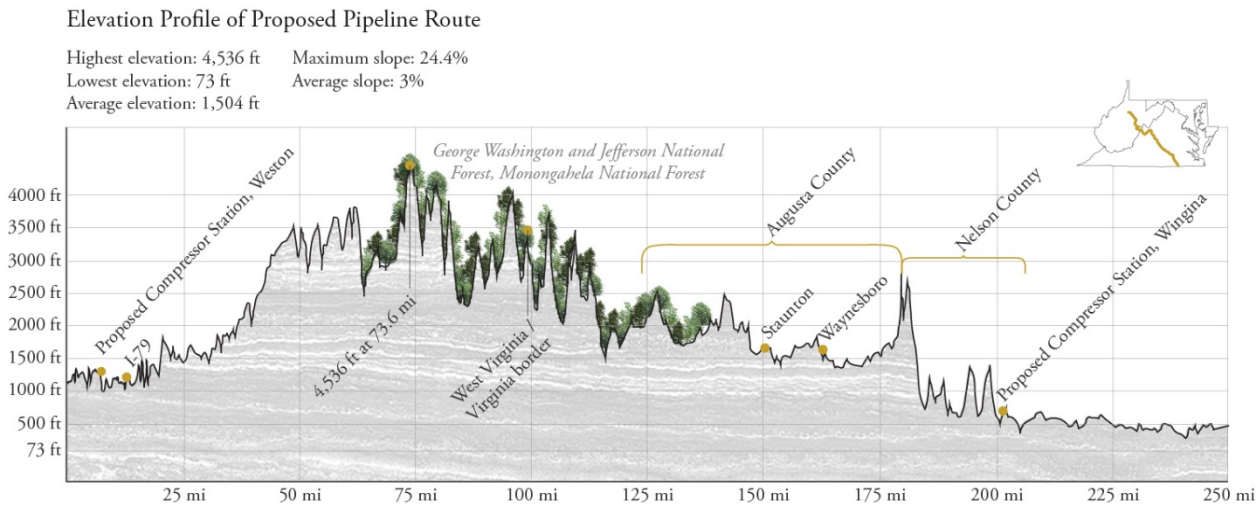

Figure 14. Elevation change along the west to east transect of the proposed pipeline route from mile marker zero to 250. Note: The highest point is at the apex of the Blue Ridge Mountains.

Comparison to Similar Case Study

Interactions between human populations and large-scale energy infrastructure are, of course, not limited to the ACP. As a comparison, the map shown in Figure 15 shows two proposed pipeline networks in Ohio. It highlights how proposed pipeline routes can alternatively interact with higher-wealth suburban areas or be proposed to affect lower-income, rural communities. Utility companies do not have to explicitly report population density, age, or median income for the affected communities.

Looking at the work of geographical researchers—for example Bolin, Grineski, and Collins (2005)—there is a long, historical record of poorer communities, especially those that are predominately non-white, being burdened with risks in a disproportional manner to wealthier, white communities. Since the economic benefits of the ACP are designed to favor urban regions, such as the metropolitan area of Hampton Roads and Virginia Beach, the distribution of risks and benefits is inequitable and those inequities will persist if population density guides future proposals.

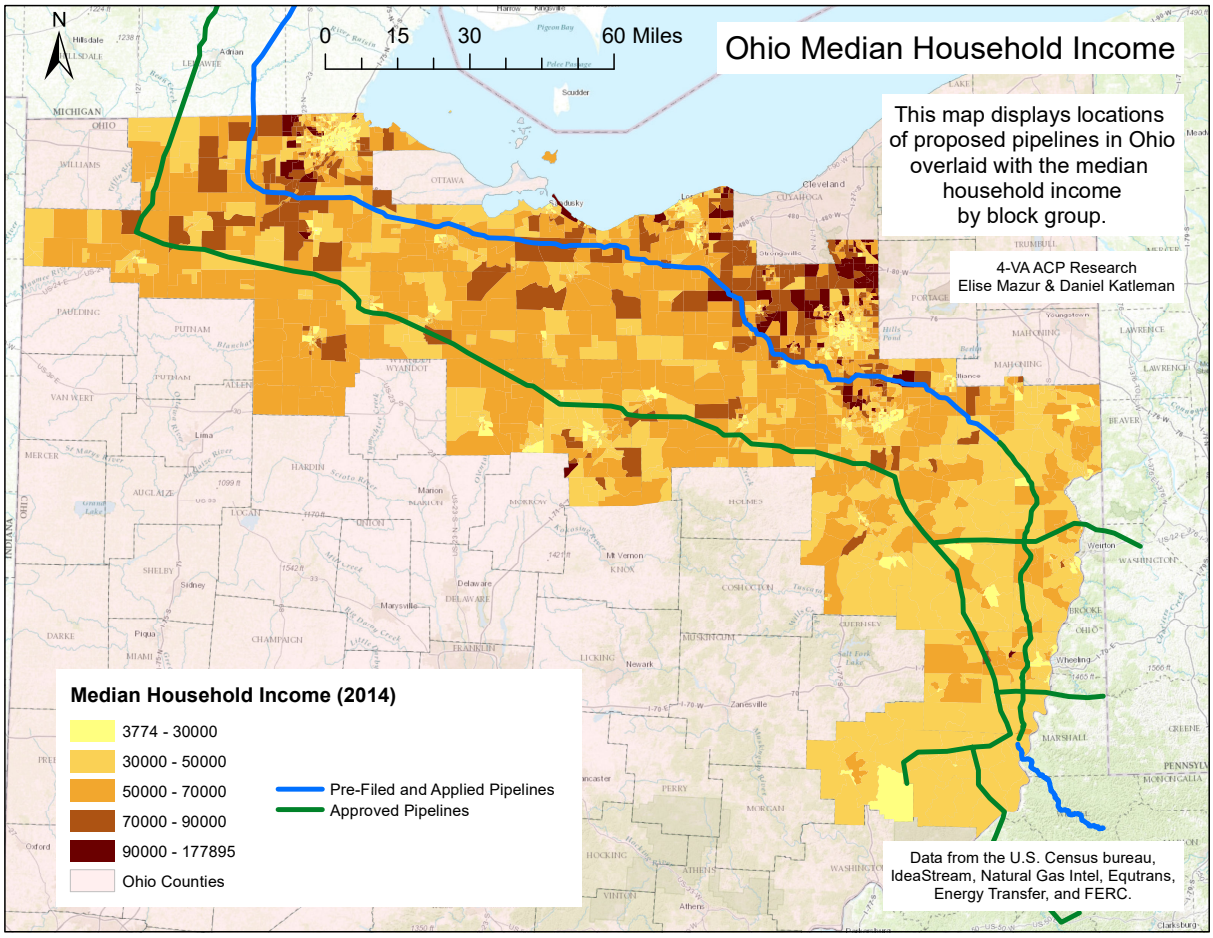

Figure 15. The Rover Pipeline Project is the approved pipeline (Green Line) and the NEXUS Gas Transmission Project was pre-filed (Blue Line) in Ohio. The map shows median household income along the pipeline routes.

4.7 Survey results and analysis

As explained in Section 2.1: Research Methods, 272 persons completed the survey and were asked 18 questions pertaining to their preferences for pipeline and energy infrastructure development. Although the majority of respondents completed the entire survey, there was inevitably variance in the degree of completion and therefore the number of responses to each individual question. No results are reported for questions that were answered by less than 90% of the participants. The full questionnaire can be reviewed in Appendix C, along with a summary of the descriptive results for each closed-ended question in Appendix D. The survey responses provide a wealth of information pertaining to residents' preferences. This section presents in-depth findings for a set of questions that were deemed most pertinent to the project.

While the questions covered a range of factors that influence a respondent's support or opposition to the ACP and large-scale infrastructure projects in general, there was a consistent lack of support for the ACP project regardless of the factor in question, for example safety, risk, compensation, or environmental impacts. In addition, opposition to the proposed pipeline

is considerably higher in the counties that will be directly impacted by the pipeline's construction and operation than opposition in the Commonwealth overall (see Section 4.7.2.: How Close is Too Close?). This is despite economic analyses, which suggest that counties will be positively impacted by construction and operation of the pipeline and will receive direct compensation via tax revenues, plus indirect benefits from jobs. While this result is unsurprising, it reinforces the debate about who benefits from—and pays for—energy infrastructure projects, and how decision-making for infrastructure projects that impact public and private lands can be made in an equitable and just manner.

4.7.1 Respondent Demographics

The average age of respondents was 58 years, while the median age was 62 years. In Augusta County, Nelson County, Staunton, and Waynesboro, the average age of all residents, based on U.S. Census estimates, is closer to 43 years. For this study, all participants were required to be at least 18 years of age. Therefore, the average age and median age of our sample is skewed higher than the overall population.

Respondents reported their race as white 96.2% of the time and 3.8% as another race or undeclared. Based on the census, Augusta's population is 93.5% white while in Staunton, Waynesboro, and Nelson, 84% of the population are white. Thus, our results reflect the *sentiment* of those that self-identify as white and are not representative of non-white persons in the region.

In regards to gender, the survey accurately represents the general population with 52.7% female respondents, similar to the combined average of 51.9% female in Augusta County, Nelson County, Staunton, and Waynesboro.

The largest group of family income from among our survey respondents identified themselves as earning $50,000-$74,999 per year. In comparison to the general population, a higher proportion of respondents earned $100,000 and above per year. The respondents' reported higher education levels, as indicated by 62.4% with a Bachelor's degree or higher level of education, while the U.S. Census shows that only 3.1% of Augusta County, 13.4% of Staunton, 6.7% of Waynesboro, and 8.2% of Nelson County has a Bachelor's degree or higher. Taken together, this suggests a positive selection bias on the basis of income and education for persons that opted to take and complete the survey. This finding suggests that the perspectives of persons with lower incomes and less formal education are not well represented in this survey's results.

4.7.2 How Close is Too Close? The NIMBY Effect

Approval or opposition to a pipeline is decided by a variety of factors. One factor that needs to be addressed is the influence of proximity to a respondent's home or community. Survey responses indicate that the relative location of the ACP has an effect on the support for pipelines, with people showing stronger opposition when proposed pipelines are closer to their homes and community.

In collecting data for this survey, all respondents were physically located in Nelson or Augusta Counties in Virginia at the time of the survey. Therefore, Nelson and Augusta Counties represent the "home" location. The results in Table 2 show that 73% of the survey respondents oppose building a new natural gas pipeline in Nelson and Augusta. For the rest of the counties throughout Virginia referenced in

Question: Suppose a new natural gas pipeline was planned to be built through _____. Would you support or oppose its construction?

Response	Augusta & Nelson Counties (N=260)	Rockbridge County (N=262)	Shenandoah County (N=262)	Montgomery County (N=262)	Jefferson County, TX (N=261)
Oppose	73.5	65.3%	62.6%	61.5%	46.7%
Support	15.4%	15.3%	14.9%	16.0%	16.9%
Not sure	9.6%	16.4%	16.8%	16.8%	27.2%
No opinion	0.4%	1.5%	3.8%	4.2%	8.1%
Refuse to answer	1.2%	1.5%	1.9%	1.5%	1.2%

Table 2. Support for pipeline construction based on county. Note: 95% confidence intervals are < 6.0%.

the survey, the results showed opposition from about 61-65% of respondents, with opposition decreasing as the location moved further away from the "home" counties. This offers evidence that pipeline opposition decreases with distance from the impacted community.

To further test this point, all survey participants in Nelson and Augusta counties were asked to express their views on pipeline construction in a remote location: Jefferson County, Texas. We explored this as a comparative site for two reasons. First, the name "Jefferson" is prominent in this region, and second, Jefferson County is a major hub of petroleum and natural gas pipeline infrastructure. Thus, it was surprising to discover that 46.7% of respondents opposed new pipeline construction in Jefferson County in Texas. While opposition to building a pipeline decreased with distance from the 'home' counties of Augusta and Nelson, approximately 45% of respondents held an opinion of Build-Absolutely-Nothing-Anywhere-Near-Anyone (BANANA). Furthermore, 20-25% of respondents more classically fall in the Not-in-My-Backyard (NIMBY) group and are less opposed to pipelines that are farther away from their home region.

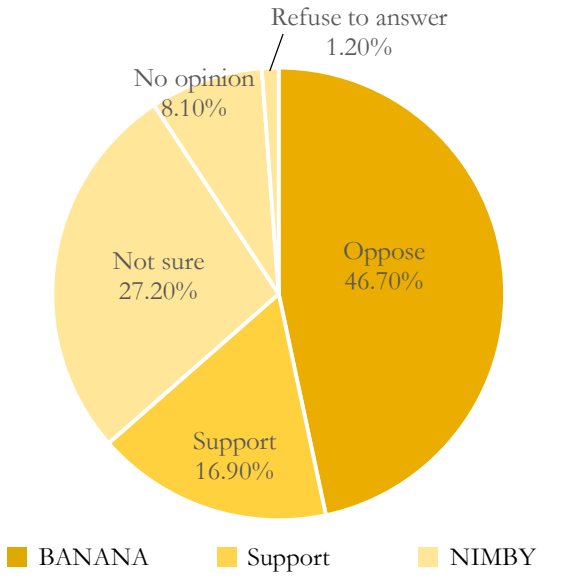

Figure 16. Comparison of Nelson and Augusta county survey takers' attitudes toward pipeline construction in Jefferson County, Texas.

To make this result more meaningful, the research team did a comparison to the results from another poll conducted for the Virginia's Chamber of Commerce, released in October 2016. That poll was based on telephone interviews with 500 registered "likely" voters across Virginia and showed that support for the Atlantic Coast Pipeline was 55% and opposition was only 29% (The Tarrance Group, 2016). A similar poll of 500 "likely" Virginia voters was conducted in May 2017 by Hickman Analytics for the Consumers Energy Alliance, which showed that support for the Atlantic Coast Pipeline was 54% and opposition was 31% (Hickman Analytics Inc., 2017).

The two polls match on overall support for the pipeline in the entire state of Virginia. This support for the pipeline across Virginia in comparison to Nelson and Augusta Counties is likely due to the fact that most Virginian residents are geographically more distant from the proposed route.

This difference between local and statewide approval raises questions about the influence of NIMBY. Our survey showed an increase in opposition against the ACP if the route was 5 miles from a respondent's property rather than 50 miles from the property (Table 3). There is reason to speculate that there is a NIMBY effect in pipeline support.

However, in the specific case of the ACP, another factor that may be affecting the difference in local and statewide approval rates is the distribution of consequences related to the pipeline. It is the residents of Nelson and Augusta Counties who will suffer from land seizing, construction risks, and property devaluation as a result of their proximity to the pipeline, while most of Virginia will be unaffected or actually benefit from increased access to natural gas, such as areas like Hampton Roads and Virginia Beach. Therefore, the survey results support that proximity has an impact on pipeline approval and the trend is that opposition decreases with distance from a proposed pipeline.

Question: Would you favor or oppose building the Atlantic Coast Pipeline within _____ of your home?

Response	5 miles	50 miles
Favor	13.6%	19.7%
Oppose	80.3%	72.0%
Not sure	6.1%	8.3%
Refuse to answer	0.0%	0.0%

Table 3. Support for pipeline construction based on distance from property. Note: 95% confidence intervals are <5.5%.

4.7.3 Risk Assessment: How Big is Too Big?

One aspect of the project that showed a divide in perspectives was the relative risks associated with the size of the proposed pipeline. As illustrated in Figure 17, the general trend among respondents shows a moderate agreement that smaller diameter pipelines are perceived as relatively safer, but as the diameter of the natural gas pipeline increased, the approval for the pipeline declined to strongly opposing the largest pipelines.

Question: Here we ask that you consider different sizes of natural gas pipelines. Please indicate the extent to which you agree with the following statement. Transporting natural gas in pipelines that are _____ in diameter is safe.

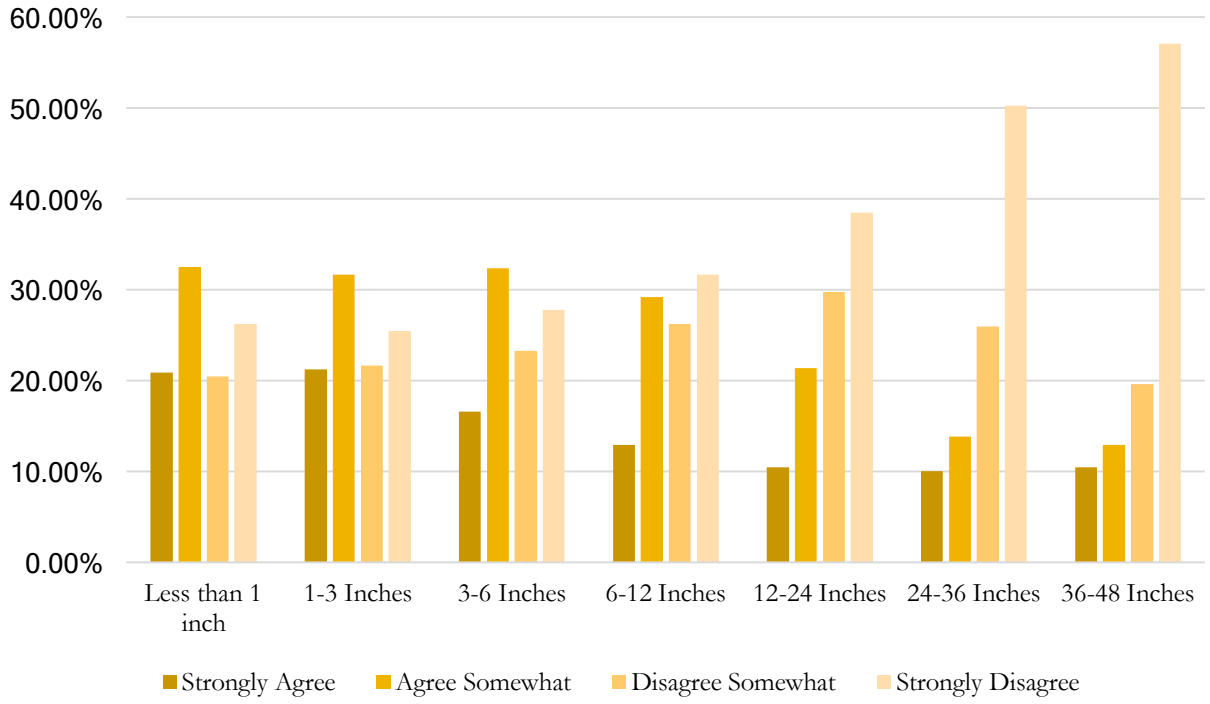

Figure 17. Relative risk based on pipeline size. Note: 95% Confidence intervals less than 6%.

Surprisingly, only a slight majority of respondents stated that the pipeline was safe at the smallest diameter (less than 1 inch), with 53.1% stating that they "strongly agree" and "somewhat agree" that that size pipeline was safe. A slight majority of respondents consistently agreed that the pipeline was safe at 1-3 inches (52.8%) and 3-6 inches (50.8%). A shift occurred at 6-12 inches in diameter, with only 41.94% stating that a pipeline was safe at that size. The approval rating for the 12-24 and 24-36 inch diameter pipeline continued to decline, at 40.7% and 23.8% respectively. The largest pipeline diameter, 36-48 inches, had the lowest of the total approval ratings, with only 23.3% expressing that it is safe while 56.9% of respondents strongly disagreed that a pipeline of that size is safe. This overall trend shows that small to moderate sized pipelines (1-12 inches in diameter) are considered reasonably safe, but that the perceived relative risks increase as the volume of the natural gas transported increases as a function of the size of the pipeline.

From a technical standpoint, larger diameter pipes afford incrementally greater energy efficiency due to the reduced drag (or resistance) of fluids flowing through them. This compels companies to increase the size and reduce the number of compressors stations along the

route. An existing Columbia Gas pipeline that runs through Augusta County is 20-inch in diameter and has experienced one failure, which may influence the risk perceptions in the community.

4.7.4 Who Has the Power? A Stark Contrast between Ideals and Present Reality

When asked about who should inform decisions about energy infrastructure, respondents indicated a clear discrepancy between the current reality of decision-making authorities for new pipeline infrastructure and who should *ideally* be making decisions. The results for both landowners (Table 4) and non-landowners (Table 5) indicate a sense of disenfranchisement. This discrepancy is especially prominent in regards to the role of individual landowners and non-landowners. For the current decision making process, only 28.9% of respondents viewed them landowners as "very important," whereas in an ideal situation, 75.2% of survey takers viewed them as "very important." Similarly, only 7.88% of surveyors considered non-landowners as "very important," but in an ideal scenario, 31.8% considered non-landowners "very important" to the decision-making process.

There is a clear attitude that the power of decision-making does not seem to be in the hands of those most affected. To illustrate this point, 66.8% of respondents believed that individual corporations were currently "very important" in the process, but only 13.3% said they were ideally "very important" (Table 6). Overall, this presents a finding that individual landowners and non-landowners are marginalized in decision-making processes, while private corporations are afforded too much influence on decision-making. There is a clear preference for rebalancing power between corporate utilities and the communities affected.

Question: Who are the most important groups making decisions about energy infrastructure?

Individual Landowners	Currently (N=253)	Ideally (N=258)
Very Important	28.9%	75.2%
Somewhat Important	10.7%	17.0%
Somewhat Unimportant	26.5%	4.7%
Not Important	34.0%	3.1%

Table 4. Decision making power of individual landowners. Note: The corresponding p-value for a two tailed t-test is <0.05 and 95% confidence interval.

Individual Non-Landowners	Currently (N=241)	Ideally (N=242)
Very Important	7.9%	31.8%
Somewhat Important	18.3%	40.1%
Somewhat Unimportant	25.3%	19.0%
Not Important	48.6%	9.1%

Table 5. Decision making power of individual non-landowners. Note: The corresponding p-value for a two-tailed t-test <0.01 and 95% confidence interval.

Individual Corporations	Currently (N=256)	Ideally (N=241)
Very Important	66.8%	13.3%
Somewhat Important	16.8%	21.2%
Somewhat Unimportant	7.0%	27.8%
Not Important	9.4%	37.8%

Table 6. Decision making power of individual corporations. Note: The corresponding p-value for a two-tailed t-test <0.05 and 95% confidence interval.

4.7.5 Eminent Domain: What Uses Constitute Public Value?

An issue that has garnered opposition to the proposed pipeline among the residents of Nelson and Augusta Counties is the use of eminent domain to acquire the land necessary for the pipeline. The survey collected data on the topic

of eminent domain by first asking if respondents support eminent domain for a private company. The survey then asked what eminent domain uses constitute public value (e.g. highways, natural gas pipelines, drinking water pipelines, government buildings, sewage lines, cable, and internet).

When asked about the use of eminent domain for private corporations, the majority of survey takers believed eminent domain should not be used for private companies (78.7% "no", n=254, 95% confidence interval). The second question offers insights into the types of projects for which respondents support or oppose the use of eminent domain. A majority of respondents approved of eminent domain for highways, drinking water pipes, and sewage pipes, while respondents disapproved of its use for natural gas pipelines, government buildings, cable, and internet.

Eminent domain in Virginia allows private property to be taken only for public use and with compensation. The results in Figure 18 suggest that a natural gas pipeline, such as the ACP, is not a public value for local residents. The use of eminent domain for the ACP could become the "case law" for how public value is constituted for energy infrastructure, and it is now the subject of a Virginia State Supreme Court case (Cavallaro, 2017).

Question: Please indicate the extent to which you agree with the following statements. I am in favor of using eminent domain for:

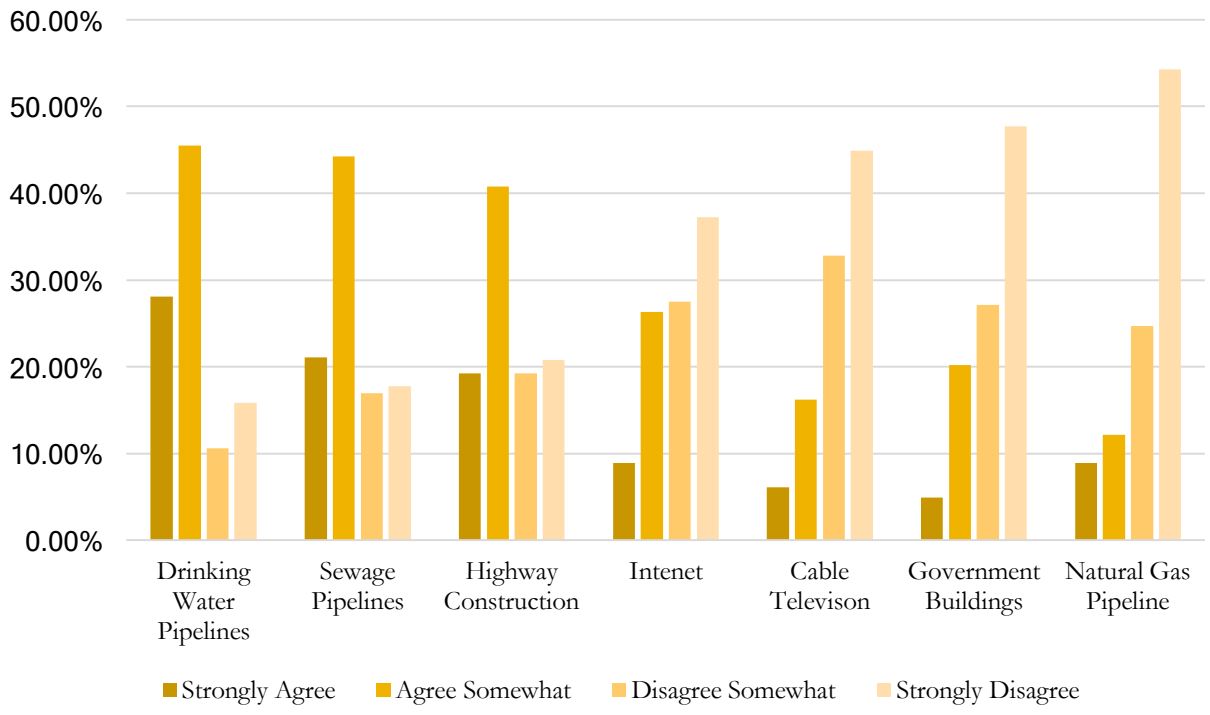

Figure 18. Approval for use of eminent domain for various projects. Note: Data collected from this study, the Atlantic Coast Pipeline Survey (N=254). Confidence intervals >95% for this survey result.

4.7.6 The Influence of the Distrust: A History of Poor Public Relations?

In addition to general questions about public and private interests, the survey posed questions of trust and how public sentiments affect the opposition to the proposed energy infrastructure projects. Dominion Power is a major utility company in the Commonwealth of Virginia with a long history in the state. It is also the leading utility company among the consortium that owns the Atlantic Coast Pipeline, LLC. Since Dominion is a major player in energy infrastructure in Virginia and in the ACP project, it is important to consider the publics' trust in this organization and how that influences this case.

Table 7 shows the results of an all-Virginia phone survey conducted in June 2015 and in May 2017. There is an indifference, which is heightened in the 2017 survey, to the influence of Dominion as the utility company proposing the pipeline. However, within Nelson and Augusta Counties, there is opposition to the pipeline because of Dominion's leadership.

The survey results also show evidence that Dominion is not regarded as a trustworthy company. Table 8 shows that most people strongly disagreed with the possibility of Dominion predetermining the compensation of land affected by the pipeline construction. This distrust, however, likely stems more from the fact that Dominion is a for-profit utility company. Still, this demonstrates a lack of confidence between private citizens and Dominion. Also, when plainly asked if "you would support the construction of the Atlantic Coast Pipeline if it was under the authority of Dominion Virginia Power," 77% of participants responded with disapproval, the highest of any other response (Table 9).

Also noted was the fact that the response options presented did not generate a positive response for any of the organizations listed in the table. This may suggest that the survey question either offers inadequate options or that respondents generally do not trust anyone to construct high-risk energy infrastructure.

Question: And as you may know, Dominion is one of the companies that has proposed the Atlantic Coast pipeline. Does this make you:

Region of Data Collection	More likely to support the pipeline	More likely to oppose the pipeline	Does not change your opinion on the pipeline	Don't know	Refuse to answer
All Virginia (June 2015*)	18%	7%	66%	9%	n/a
All Virginia (May 2017*)	10%	8%	78%	3%	n/a
Nelson & Augusta Counties**	3.0%	26.4%	69.4%	0.8%	0.4%

Table 7. Effect of Dominion's influence on pipeline approval. Notes: *Prior data collected in "All Virginia" is from a survey conducted in June 2015 and again in May 2017 by Hickman Analytics, Inc. over the phone with 500 registered Virginia voters. **Data collected in "Nelson & Augusta Counties" is data collected from this study, the Atlantic Coast Pipeline Survey (N=265), with confidence intervals of greater than 95% for survey results.

Question: Please indicate if you would approve the construction of the Atlantic Coast Pipeline if compensation for the pipeline was predetermined by Dominion.

Answer	Percent
Strongly Agree	4.8%
Agree Somewhat	4.4%
Disagree Somewhat	13.7%
Strongly Disagree	77.0%

Table 8. Outcomes predetermined by Dominion for all landowners. Note: Data collected from this study, Atlantic Coast Pipeline Survey (N=248). Confidence intervals of greater than 95%.

Question: Please indicate if you would support the construction of the Atlantic Coast Pipeline if it was under the authority of:

Authority	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Dominion Virginia Power	7.7%	6.5%	9.8%	76.%
Commonwealth of Virginia	5.7%	17.2%	18.9%	58.2%
County Government and Supervisors	7.8%	20.9%	20.1%	51.2%

Table 9. Authority over construction of the Atlantic Coast Pipeline. Note: Data collected from this study, Atlantic Coast Pipeline Survey (N=244). Confidence intervals of greater than 95%.

The survey also provided insights on the question of how landowners should be compensated for the land required to build the ACP. The results support the conclusion that respondents distrust Dominion but also reveals that the respondents were mostly indifferent to the form of compensation when making the decision. The respondents largely opposed the project if Dominion decided the compensation for the land, with approximately 91% of responses either somewhat or strongly disagreeing. This is in contrast to the most favored compensation plan of using annual revenue as the deciding factor for compensation, with only 70% of responses either somewhat or strongly disagreeing, closely followed by a local assessor with 74%. All other means of compensation had 80% of responders somewhat or strongly disagreeing. These numbers show that while the method of compensation does significantly change opinion, the large majority of respondents still oppose the ACP regardless of how compensation is provided (see Figure 19).

Question: Please indicate if you would approve construction of the Atlantic Coast Pipeline if compensation for the pipeline was determined by _____.

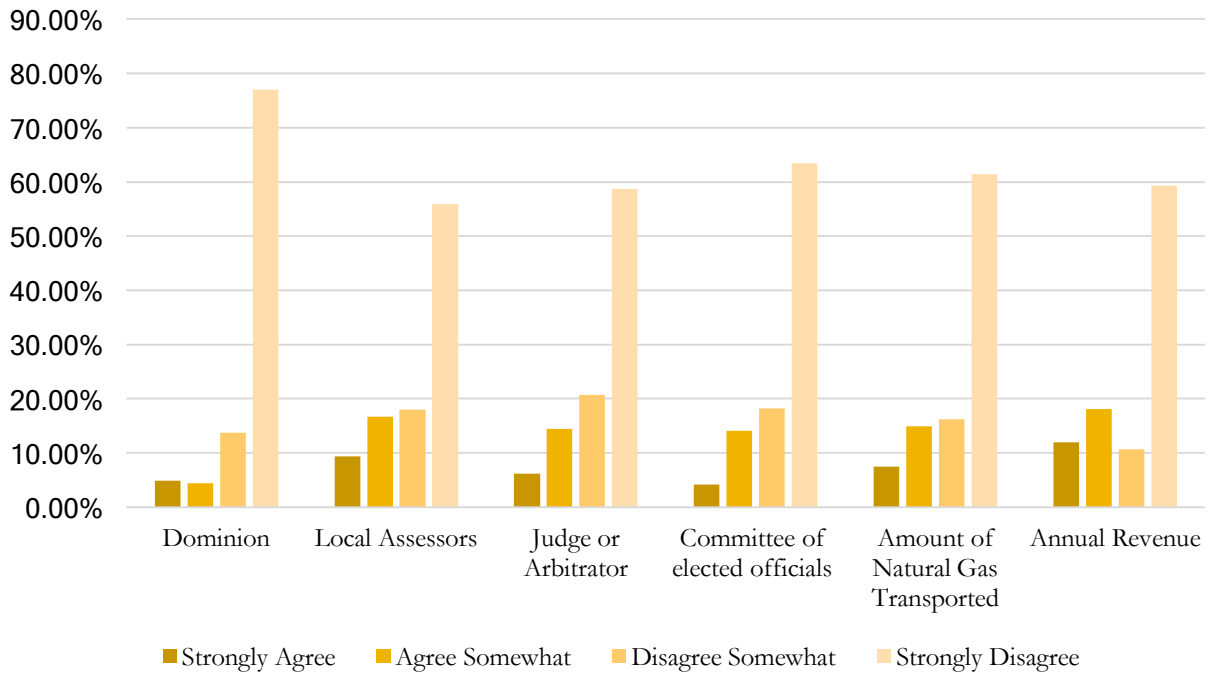

Figure 19. Approval for construction based on compensation. Note: Confidence interval of 95%.

Therefore, these results indicate that the company in charge of energy infrastructure does have an impact on the approval of the project, particularly at the local level. In the specific case of the Atlantic Coast Pipeline, the involvement of Dominion as a leading company appears to increase the level of local opposition to the project.

4.7.7 Environmental Concerns: Roles of Recreation and Natural Parks for Opposition

Nelson and Augusta counties are located in the Piedmont and Valley regions of Virginia and contain parts of Shenandoah National Park and the George Washington and Jefferson National Forests. The counties also contain other outdoor recreation attractions such as streams, lakes, and state or county parks. Survey results indicate that respondents find these to be an important factor in their opposition to the ACP. More than 90% of survey respondents "strongly agree" that national parks, national forests, state parks, and county parks are important for the region. In fact, 96% of respondents strongly agreed that national forests are important to the region. This value is also reflected in the actions of the participants, as 88.8% of survey respondents reported visiting a national park at least once in the past year, and 93.5% self-reported to have hiked or taken a walk in the woods at least once.

The role of outdoor recreation and natural parkland in the region is compulsory to conversations about the Atlantic Coast Pipeline because the pipeline poses risks to natural areas

in and around Nelson and Augusta counties. Besides having a 50-foot-wide corridor along the entire pipeline route, 15.9 miles of the pipeline is proposed to actually traverse the George Washington and Jefferson National Forests, ultimately impacting 430 acres of national forest in Virginia and West Virginia during construction (Forest Service, 2017). In addition, recreational tourism is a strong contributor to the economies of Nelson and Augusta counties. A study by Key-Log Economics concluded that the ACP would cause an annual $20.2 million loss in recreation tourism expenditures in Augusta County alone (Key-Log Economics, 2016). This loss is thought to be due to the disruption to natural beauty in the region and the harm to valued natural recreation areas caused by the ACP. Therefore, in the case of the ACP, there may be an influence from the role of recreation and natural parks on its opposition (see Figure 20).

Question: How often do you _____?

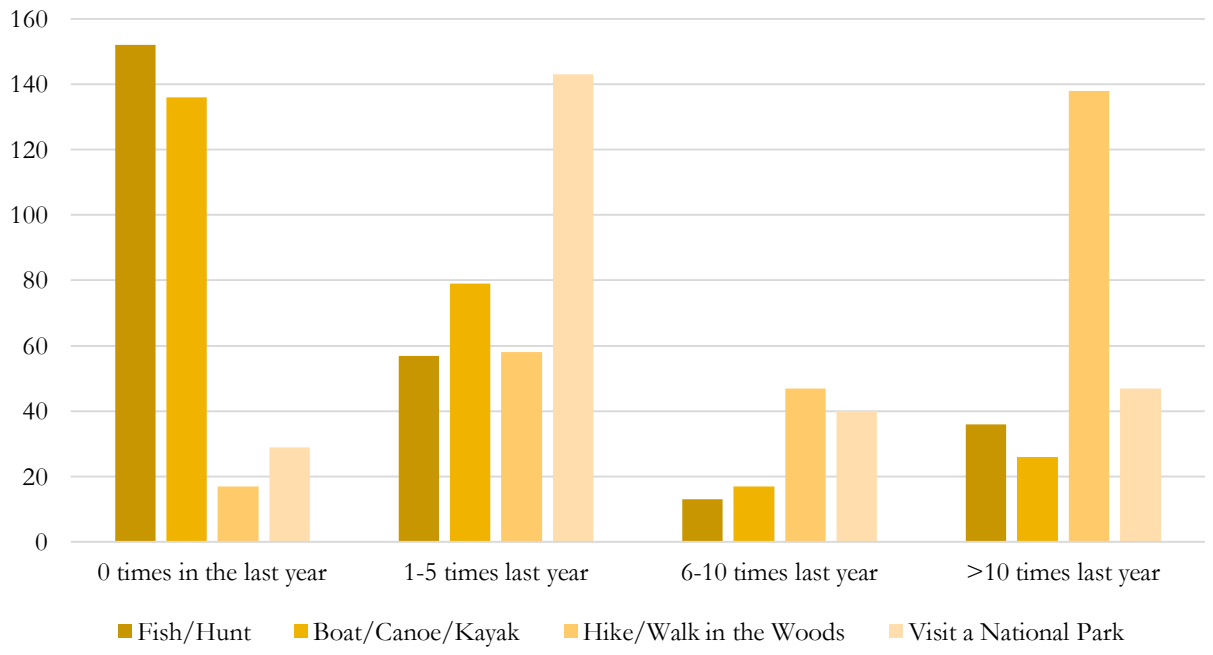

Figure 20. Participation in outdoor recreational activities.

4.8 Workshops

The workshops were held in familiar spaces that were also close to the proposed ACP construction: (1) Rockfish Valley Community Center, (2) Staunton Public Library, and (3) the Bill Brooks Memorial Park in Stuarts Draft. As common places for civic meetings, these sites were chosen to foster public engagement and open dialogue on this local issue. Meeting community members in their familiar surroundings was seen as an important element in both soliciting honest feedback as well as earning the right to provide information. A basic premise for each workshop was to discover values and viewpoints of participants and to evaluate how these changed after presenting information related to energy infrastructure.

The first workshop offered informative speakers chosen to represent potentially conflicting viewpoints on pipeline development, as well as alternative but parallel viewpoints for a local highway project to provide context. The second workshop encouraged participants to propose their own energy infrastructure solutions working in small groups. The third workshop offered a guided tour of one segment of the proposed ACP route in Augusta County.

4.8.1 Workshop A: Rockfish Valley Community Center

The first workshop featured Hung Nguyen, the Community Assistance & Technical Services Manager at PHMSA for the Eastern Region, and Dave Covington, a District Location Design Manager for the Virginia Department of Transportation (VDOT). The workshop afforded each invited speaker 30 minutes for presentations and 30 minutes for questions. Out of the 42 persons that accepted an invitation to the workshop, 4 attended. The low turnout, while admittedly disappointing, allowed for genuine interactions between residents and state and federal agents.

Mr. Nguyen opened with an introduction to the roles and responsibilities of PHMSA as the federal organization that ensures compliance in the construction and operation of pipelines that traverse interstate boundaries. Mr. Nguyen shared that 81% of pipelines under PHMSA are natural gas lines, like the ACP. PHMSA is notified by FERC and then participates as a cooperating agency during the pre-filing and application phase of approval. PHMSA is not responsible for project approval, which is FERC's mandate. PHMSA approves or requires revisions to pipeline construction and maintenance plans after site approval is complete. The long-term oversight of pipelines for structural integrity is handled by Virginia State Corporation Commission's (SCC) Division of Utility and Railroad Safety. Mr. Nguyen classified the ACP as a low-probability/high-risk pipeline and stated the radius of the blast resulting from a catastrophic event would be close to 1 kilometer (0.6 miles) depending on local geography; hills or valleys would also affect the projected blast radius. The conversation shifted to the inspection of the pipeline and who would inspect the ACP. PHMSA is aware of the pre-filing process, but does not get involved in route selection; they only review the construction plans and decide if the plans meet established standards. Mr. Nguyen held that state officials from PHMSA would conduct the inspections, share the reports with PHMSA, and then post them publicly on the National Incident Notification system for regulated pipelines.

Mr. Covington shared two perspectives on the project; one was from his role in VDOT, while the other was from his role as a land owner and an avid explorer of caves in the region affected

by the planned route for the ACP in the Stuarts Draft area. He opened by stating that VDOT has no official position on the ACP and that his statements would demonstrate how VDOT engages the public in transportation planning. Historically, transportation planning has been negatively impacted by political agendas, which had led to the passage of HB2 in 2014 that sought to remove politics from transportation and make a commitment to "Smart Scale" planning. VDOT committed to six factors that are used to inform a scorecard approach to evaluating project alternatives in the transportation planning process (VDOT, DRPT, Office of Intermodal Planning and Investment).

A key aspect highlighted in the talk was increased commitment to public engagement, transparency, and accountability. This involves communicating with other agencies, landowners, and the broader public in open forums. Yet, eminent domain remains challenging and landowners often pursue legal rulings in the hopes of securing higher prices for their land. As for the ACP, Mr. Covington stated that VDOT is a 3rd party to the ongoing planning processes and will accommodate the approved route where possible. He stated, however, that there was no consensus among the 130 transportation agencies on how new pipelines should 'interact' with state and federal highways. The lack of consensus between federal and state agencies on how to construct such a large (42-inch diameter) pipeline under major highways sparked conversation on the construction methods for tunneling and encasing the pipeline to prevent corrosion and prevent catastrophic failures and explosions.

The participants asked questions about the proliferation of route alternatives and if Dominion is using alternative routes to distract or confuse the public. Another participant argued that the alternatives pitted one county against another to shift the conflict away from Dominion and generate conflict between residents in different areas of central Virginia. One participant questioned why, in a sparse rural community, the route was converging at one of the "most disruptive locations that cuts off 700 homes and businesses on the mountain." He argued that there must be a less impactful way to move gas. This drove the conversation toward the notion of 'demonstrated need' for the energy in coastal Virginia. The consensus among the participants was that the stated need for the pipeline was insufficient, unsubstantiated, and subject to change after approval is granted and construction started.

4.8.2 Workshop B: Staunton Public Library

Augusta County contains no utility-scale energy-generating facilities that continuously supply more than 20 megawatts (MWs) to the energy grid. This makes Augusta County almost exclusively dependent on external energy sources and utility providers. This workshop engaged four participants in a series of activities on their preferred energy sources and the criteria for selecting those energy sources. It suggests what local decision-making bodies, such as county and municipal governments, residents, and businesses, might do to bring citizens into the energy planning process.

Energy Trade-offs

At the start of the workshop, the participants were asked to identify three energy sources that were the most ideal, and to rank the importance of six criteria for selecting energy sources. Then, after an approximately 15-minute presentation on seven optional energy sources, the participants were asked to rank one energy source at a time based on the six criteria: Environmental impacts, land requirements, human health risks, monetary cost, long

term employment, and aesthetics. Their rankings were all made in comparison to natural gas, which served as the baseline energy source. Participants assigned values of +1, 0, or –1 for each criteria and then discussed their rationale after ranking each energy source. A member of the research team then created a Pugh Chart to reveal their preferences (see Table 10). Participants ranked hydroelectric, geothermal, and biomass as the top three energy sources, a shift from their initial ranking. The participants felt the activity helped them work through the tradeoffs between energy sources.

Impact Categories	**Natural Gas**	**Nuclear**	**Solar**	**Wind**	**Geo-thermal**	**Biomass**	**Coal**	**Hydro-electric**
Monetary Cost	0	-1	0	-1	0	-1	-1	1
Environmental Impacts	0	-1	1	1	1	0	-1	1
Land Requirements	0	1	-1	1	1	0	-1	1
Human Health Risk	0	-1	1	-1	1	0	-1	1
Visual Appeal	0	0	-1	0	0	0	-1	1
Long Term Employment	0	0	-1	-1	-1	1	1	0
Renewability	0	1	1	1	1	1	0	1
Total	0	-1	0	0	3	1	-4	6

Table 10. Energy Pugh chart showing desirability ranking of energy sources other than natural gas. Note: Total row indicates how the different sources compare to each other with regards to these criteria.

Energy Grid Mapping

Participants were then asked to form two groups and create their own energy planning maps and energy infrastructures for Augusta County, placing pushpins on a map to indicate where they would like to place future energy sources to meet projected electricity needs in Augusta by 2040. The pushpins represented different quantities of energy, allowing participants to consider fewer large energy sources (nuclear or coal) or more numerous, smaller energy sources in relation to land area. The groups were provided basic size and space factors to inform their work. Participants also consulted maps that depicted localized wind, solar, and geothermal potentials.

This activity was designed to geospatially connect participants with each type of energy source. While neither group favored new coal or nuclear power plants within Augusta County, there were marked differences in the two maps. The placement of the pins and desired energy sources that targeted 2040 energy demands were quantified and charted in Table 11.

Sources	Energy Sources by type on map		Energy Production per Source		Energy Generation Capacity as Percentage of Total	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Natural Gas	0	2	0	400	0	26%
Nuclear	0	0	0	0	0	0
Solar	42	38	840	760	41%	49%
Wind	0	2	0	40	0	2%
Geothermal	41	2	820	40	40%	2%
Biomass	4	2	400	200	19%	13%
Coal	0	0	0	0	0	0
Hydroelectric	0	3	0	120	0	8 %
Total	87	1560	2060	1560	2060	100%

Table 11. Summary of energy source preferences of the Staunton workshop participants.

Group 1 focused on empowering individuals to build their own energy systems by incentivizing new home construction and upgrading municipal buildings for geothermal and solar energy. The map they created, shown in Figure 21, shows a decentralized pattern of solar coupled with geothermal. They emphasized collective buying to lower costs. To meet the region's demand for night-time

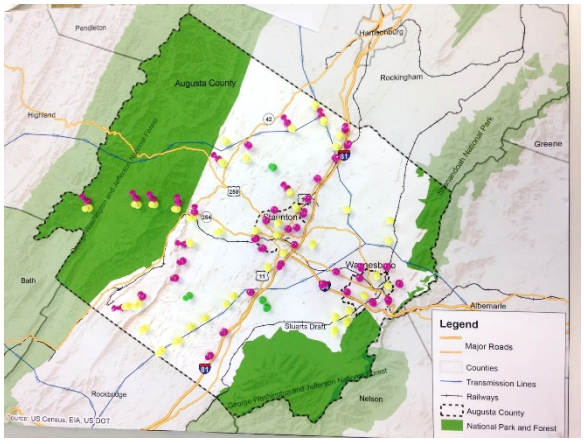

Figure 21. Energy sources charted by Group 1. The map features Augusta County and shows major roads, county lines, existing major energy transmission lines, railways, and national parks and forests. Note: Yellow = Solar, Pink = Geothermal, Green = Biomass.

base load energy, a pin for burning trash at the existing landfill (or biomass energy) was placed on the map. There was strong opposition to wind for aesthetic reasons, and hydroelectricity was not considered feasible due to the flat topography in Augusta County.

Group 2 placed pushpins representing solar power in tightly concentrated areas of energy production; their map is shown in Figure 22. They agreed to place a few win-generating sites, with the exception of wind turbines, on the reclaimed land around landfills. Group 2 indicated that solar cells could be located over parking lots, distribution centers, and farmland. Biomass energy was also placed at the existing landfill. Group 2 chose to place hydroelectricity in some of the rivers on the eastern side of the county; although these rivers are not currently viable hydroelectric sites, they envisioned the placement of small-scale, floating turbines. Their focus was on concentrated efforts supported by policies and incentives, as well as the redevelopment and use of restored land.

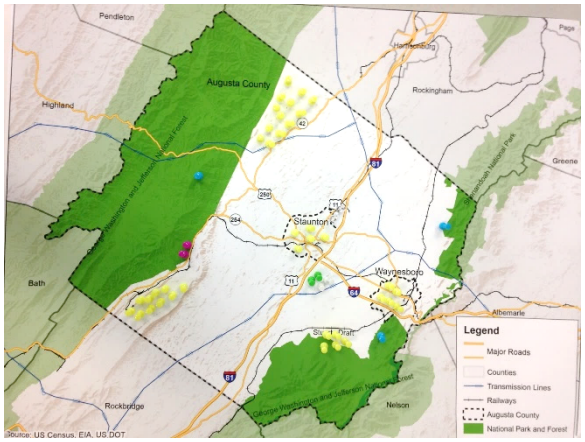

Figure 22. Energy sources charted by Group 2. The map features Augusta County and shows major roads, county lines, existing major energy transmission lines, railways, and national parks and forests. Note: Yellow = Solar, Pink = Geothermal, Green = Biomass; White = Wind; Blue = Hydroelectric.

Comparing Initial Rankings, Pugh Charts, and Energy Maps

The initial questionnaire showed that the top three preferred energy sources are solar, geothermal, and hydroelectricity. However, the next activity, which confronted participants with trade-offs, resulted in hydroelectric, geothermal, and biomass as the top three preferred energy sources.

The third activity, energy mapping, took into account the specific geographic capacity for different energy into account, resulting in a preference for solar, geothermal, and biomass. This shows that participants expressed their values in different ways based upon the activity and changed course when confronted with information about site-specific choices. One group made the decision to diversify their energy portfolio, while the other was determined to meet the regional energy needs with renewable energy exclusively.

Participant Reflections

The participants offered specific recommendations for implementing solar and geothermal energy sources through policies that incentivized contractors and homebuilders to install those energy sources in new residential and commercial projects. The participants discussed how the regional energy utility (Shenandoah Valley Electricity Cooperative) should invest in energy generation within the region. The participants felt incentives for schools, churches and industrial building owners to purchase solar panels were desirable.

4.8.3 Workshop C: Stuarts Draft

The third workshop offered a guided tour of the Stuarts Draft area along the proposed ACP route in Augusta County (Figure 3). The goal of the guided tour was to educate the public on pipeline construction routing, economic development in rural areas, and relationships with regionally-recognized water resources (Todd, 2016). Nine participants started the guided tour at the Bill Brooks Memorial Picnic Shelter and, after a brief orientation, they drove to the Columbia Gas Pipe Stand near the intersection of Patton Farm Road and Wayne Avenue. The participants met two undergraduate students from the research team and discussed pipeline construction methods, largely drawing from the information presented in Section 4.3: Pipeline construction methods review. Then participants drove to a recently closed Sherando Grocery Store at the intersection of Howardsville Turnpike and Mt Torrey Road. At that location they deliberated with two undergraduate research assistants about the Augusta County Economic Development Plan. The final stop was the Coiner Spring water treatment facility where information on karst geology, groundwater resources, and connections to city and county infrastructure was the primary topic.

Stop 1: Columbia Pipe Stand

The conversation at the first stop centered on pipeline construction. Participants responded to questions about the size, location, and land use impacts of the construction of the ACP. Questions such as "Will crossings go under the road?" were addressed with information sheets. By observing the existing (smaller) pipeline, it became clear to one participant that dual uses would be problematic after construction and prompted him to ask, "So farmers wouldn't be able to plant while they're building?" Another participant raised concerns about farm equipment: "Pipelines have a weight capacity and landowners may have a limit of where they can use their heavy equipment."

Other participants felt the ecosystem impacts of cutting a linear corridor through forests are a major concern. One participant expressed, "I'm just thinking specifically about fragmentation of species. Like box turtles, if they are transplanted from their habitat they can't survive." Participants drew connections and aligned issues of economics and environmental impacts, with one explaining, "My opinion is I don't like it. I live right around the corner. They say they're gonna tear up a 150-foot swath through the woods, I don't like it. Ain't gonna help this area out. They say it's gonna bring jobs but that's horse crap." Another participant felt fine about the companies involved, but not the distribution of benefits: "Dominion is a safe company, but there's no benefit for this area." Participants discussed and asked questions about the beneficiaries of the pipeline: "Is most of this gas going to Virginia Beach?"

For most, the construction itself was less worrisome than the long-term maintenance and inspection. One participant asked, "How often are they gonna get checked?" Another expressed, "They're gonna send someone out here to check for wells and they're gonna need to inspect it. What are they gonna do if it leaks? They're just always going to be digging and fixing." Participants left the first stop after expressing they were more informed about the construction, but not convinced that the pipeline would support the farmers, ecosystems, or regional economy. Questions about pipeline inspections remained open.

Stop 2: Sherando Grocery (now closed)

At this stop the discussion focused on economic development, although one participant was clear about not wanting any more growth in the area. For some, economic development and growth were not a public good in this rural area, saying "I don't want to see any more people. I wish the place would just stop growing. I grew up in Northern Virginia and there are more and more of them coming down here. There is a Target, Walmart… this place is rural, leave it rural."

Another participant remained convinced the pipeline did not fit into an economic future for this county, but simply benefited corporate outsiders: "Charge them taxes like they would charge ordinary companies or resident taxes. Don't give them benefits for creating taxes that won't even provide any jobs. We ain't gonna benefit from the gas."

The issue of who would get the construction jobs, and the nature of those opportunities, was also questioned. "They say that it'll give jobs but those will be temporary, right?" The participants had mixed opinions on the pipeline, though they all understood that there were different viewpoints, as well as positive and negative attributes and tradeoffs. As one participant stated, "No I don't have an issue with the pipeline going through here, but I guess the negatives could be minimized."

One person felt the primary benefit, if any, would be realized by the property owners: "I don't think the economics are great if there are more jobs but they are importing them. The only way to see a lasting economic benefit from it is if you pay the people whose property it's going through by the gallon that goes past them. … I don't have property that's being messed with so I don't know. I know some guys who have gotten paid already. I don't think it is that big of a deal." Another confirmed that landowners were getting paid: "Last week a friend of mine's sister's neighbor got paid. There is a small section right on the edge of their property only 800 square feet."

One participant felt the pipeline corridors would draw game and wildlife, though the corridors would impact farmers. "There's lots of pipelines around already, they're a pain to get around them with heavy equipment, but you can drive normal cars over them. They are good places to shoot deer from them."

Participants continued to confront and negotiate the tradeoffs between the local environmental impacts and the pipeline. "It's basically left up to you to figure out what environmental resources they are cutting through." The tradeoff between environmental damage and economic growth was understood to be a longstanding comprise: "When they are tearing the forests up, yeah I can see our forests shrinking already. Our world is growing and we are getting more and more people and then the prices go up, you know supply and demand." Others expressed a desire to preserve natural resources: "Tearing through national forests, that does suck because we got less and less forests now."

Stop 3: Coyner Spring Park

Coyner Spring Park is a recreational and watershed protection area jointly serving as the source spring for a City of Waynesboro water treatment facility. As a result of the popularity of the park for dog walking and Frisbee, additional participants joined the pipeline discussion extemporaneously. Ross Morland, an engineer with the City of Waynesboro, detailed the quality and value of the water source located there and led a walking tour of the treatment facility. Discussion focused on the karst formations defining the source aquifer and the risks posed by construction or accidents.

The water treatment facility is the primary water supply for the city of Waynesboro's. Due to the technical expertise available at this site, discussion remained focused on water resources in the area as opposed to the impact of the pipeline specifically. While this site was located near one of the earlier proposed pipeline routes, later route revisions relocated the pipeline further south, relieving pressure here. Thus, participants were less concerned with impacts at this location specifically, and more interested in water resources in general.

Participant Reflections

Participants attended the guided tour to learn more about the ACP and, after a few hours, learned specifics about construction methods, economic development, and water resources relating to the pipeline. Participants asked that, in the future, a small introduction to the ACP be given with information about the pipeline, route alternatives, and where the pipeline is in the approval process. Even without this background, a group of community members traveled through their own community, engaged in civil dialogue, and deliberated openly on issues of pipeline construction, economic development, and environmental resources. In this manner, they confronted and negotiated tradeoffs between investments in built infrastructure with land use impacts and the

economic and environmental future of their community. While other organizations offered similar guided tours, the purpose of this activity was not advocacy (Reed, 2016), but rather an approach to creating spaces for discussion about important issues and affording community members the chance to engage persons with different perspectives. As "pro-pipeline" and "anti-pipeline" rhetoric plays out on a national stage, what is lacking in contemporary decision-making are forums that create spaces for robust dialogue and open negotiation between people with a stake in their community's future. Again, this workshop prototype offers a model for re-imagining dialogue among neighbors to facilitate genuine exchanges about significant changes to their community.

5.0 DISCUSSION AND CONCLUSION

This research project sought to explore the Atlantic Coast Pipeline project from multiple perspectives, including observation and examination of:

- The approval process from governmental, non-governmental, and industry sources
- Media representation and internet search frequency as an indicator of the level of interest
- Key organizations and individuals and how the stakeholders interact
- Perspectives from persons that live, work, and relax in Nelson and Augusta counties
- Perspectives on construction and approval, energy planning efforts, and key issues in the route selection process through alternative forms of public engagement

From this evidence it is clear that there is contention between Atlantic Coast Pipeline, LLC claims of ample demand for the natural gas and the opposition groups who support a renewable energy agenda. The regulators understand the risks of pipelines as low probability/high risk, while the persons surveyed expressed strong concerns about the size, scale, and proximity of the impacts that would occur from a pipeline failure. The selection of rural areas will continue to have a higher impact on less wealthy and older populations, based upon the demographics of persons that live in rural versus urban areas. The preference for rural areas by industry and regulators ascribes to a utilitarian ethic (in other words, impacting the least number of persons) while also benefiting the population centers in urban areas. This ultimately results in an inequitable distribution of risks for rural populations and few tangible benefits in terms of long-term employment or reduced prices for natural gas.

The opposition to the proposed ACP is not based upon one, singular issue. The survey and workshops offer evidence that five different issues underlie opposition to the proposed ACP including:

- Eminent domain
- Proximity (distance from the pipeline)
- Preference for renewable energy investments
- Preservation of national and state parks and natural resources
- Distrust in Dominion, as well as imbalances between industrial decision-makers and local officials and landowners

Energy infrastructure investments are often large and are planned to last decades, thus decisions about the location, forms of energy they support, and distribution of costs and benefits need to be discussed openly and trade-offs considered. Currently, corporations appear to

initiate planning processes for energy infrastructure with the explicit goals of short-term profits and long-term control. There is a mismatch between these objectives, and the existing regulatory processes offer few ways for organizations other than private utilities to directly propose infrastructure investments.

What is facing this nation is a critical need to invest in energy infrastructure to support the public interests in terms of national security and economic, societal, and environmental well-being. The research results reveal that a true democratic process is lacking. The pipeline process needs to provide a space for robust debate, the consideration of alternative view points, and decision-making that can inform investments in future energy infrastructure. The current process creates divisive conflicts between community members and utilities, between regulatory agencies and communities, and between regulators and utility companies. The FERC process offers no room for communities to envision and propose energy solutions. The orchestrated public forums do little to build relationships between people; rather, they drive wedges between communities. The proliferation of route options that are issued from utilities offers minimal room for meaning input or careful consideration between alternatives.

The current federal approach through FERC does serve to facilitate interactions between the states and Federal government. Any argument for state authority certainly violates the Commerce Clause in the US Constitution (Article I, Section 8, Clause 3). The profit-maximizing approach, while efficient at yielding high returns for capital investments by private corporations, appears to be inequitably distributing the risks among the poor and elderly living in rural communities; wealthy and predominately younger communities in urban regions are favored.

What might serve the United States better is a national dialogue on energy in each and every state and between bordering states, to draw out priorities that can inform future energy infrastructure planning efforts across the nation as a means to address the societal and environmental issues related to energy investments (Miller, Iles, & Jones, 2013; Miller & Richter, Social Planning for Energy Transitions, 2014). It is clear that the status quo of awaiting prefiling notifications issued by utility companies, followed by the formation of oppositional groups that launch long, hard political battles, is not only delaying investments in energy infrastructure, but is reinforcing the divisive political discourse.

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7.0 GLOSSARY

Canadian Energy Pipeline Association (CEPA) represents Canada's transmission pipeline companies who operate approximately 119,000 kilometers of pipeline in Canada and 15,000 kilometers of pipeline in the United States.

Capacity Rights are the amount of the natural gas that will be produced, transported, stored, distributed or utilized in a pipeline that is distributed amongst various stakeholders for their purposes.

Certificate of Public Convenience and Necessity is a type of regulatory compliance certification for public service industries.

Clean Air Act regulates air emissions from stationary and mobile sources. This law authorizes the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and to regulate emissions of hazardous air pollutants.

Clean Water Act establishes regulations for discharges of pollutants into the waters of the United States and the regulations for quality standards for surface waters.

Coastal Zone Management Act is a law, the goal of which is to preserve, protect, develop, and where possible, to restore the resources of the nation's coastal zone.

Commission Order is a formal statement made by FERC that states that a project plan is under regulation and can be completed officially and legally.

Compressor stations are facilities in which natural gas being transported through pipelines is pressurized at intervals of 40 to 100 miles. They are placed periodically along the pipeline and propel the gas through the pipe.

Data request is a request for information made by one party to another, typically in conjunction with a regulatory proceeding (i.e. the application process).

Docket Number is a serial number given for reference to a summary of a message or statement (application in this case), usually recorded chronologically in a register.

Easement is a right to cross or use someone else's land for a specified purpose.

Eminent domain is the right of a government or its agent to expropriate private property for public use, with payment as compensation.

Energy Information Administration (EIA) collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment.

Environmental Assessment (EA) is the evaluation of the short-term and long-term environmental consequences of a plan, policy, program, or project prior to the decision to move forward with the proposed action. It also identifies ways to minimize, mitigate, or eliminate negative consequences.

Environmental Impact Statement (EIS) is a document prepared to describe the effects of proposed activities on the environment. "Environment," in this case, is defined as the natural and physical environment and the relationship of people with that environment.

Federal Energy Regulatory Commission (FERC) is an independent agency that regulates the interstate transmission of natural gas, oil, and electricity. FERC also regulates natural gas and hydropower projects.

Federal Register is a daily publication by the U.S. federal government that issues proposed and final administrative regulations of federal agencies.

Independent agency is a government-funded entity that exists outside of the federal executive departments.

Looping is adding a parallel pipeline along a segment of pipeline in order to create greater capacity.

Mitigation is the act of reducing the severity, seriousness, or painfulness of something.

National Environmental Policy Act (NEPA) is a United States environmental law enacted on January 1, 1970 that promotes the enhancement of the environment and has established the President's Council on Environmental Quality (CEQ).

Notice of Application is a formal statement made by FERC following the submittal of an application for a project.

Not-in-My-Backyard (NIMBY) is the characterization that residents, community members, etc. in an area raise strong opposition to a development project when it is near their personal property (or "yard"), but do not show concern when it is proposed or located elsewhere.

Open Season is a period of 1-2 months during which the sponsor of a pipeline project can gauge the level of market interest by reaching out to potential shippers and investors and can give those customers an opportunity to enter a nonbinding agreement to sign up for a portion of the capacity rights that will be available.

Pipeline and Hazardous Materials Safety Administration (PHMSA) is responsible for developing and enforcing regulations for the safe, reliable, and environmentally sound operation of the U.S.'s 2.6-million-mile pipeline network.

Pre-filing is the application phase created in 2007 to speed the scoping and application process by allowing FERC to conduct its environmental survey process during the application planning stage so that issues with the application are actively addressed when they appear.

Preliminary determination is conditional approval granted by FERC after the review of all the terms and conditions of a proposed construction project.

Reliability Standards are requirements for the operation of large energy facilities and the design of planned additions or modifications to such facilities to the extent necessary for reliable operation.

Resource Report is an in-depth synopsis on the current state of natural resources around the project and what materials the sponsor will need to complete the project.

Right-of-way is the legal right, established by an easement, to pass along a specific route through grounds or property belonging to another; it is a term used for the land under construction.

Scoping means to assess or investigate something; in the case of large energy projects, the scoping process is arduous and entails environmental and social surveys and examination of the environmental implications of the project.

Shippers contract with a pipeline for transportation of natural gas and retain the title to all natural gas while it is being transported by the pipeline.

Stakeholder is a person with a vested interest or concern in something; for example, ACP stakeholders include shippers, investors, customers, land-owners around the site, construction workers, project organizers, designers, companies, etc.

Subsidization is to aid or promote (as a private enterprise) with public money.

APPENDIX A - SURVEY LOCATIONS AND RESPONSES

Survey Location	Respondents	Persons Approached	Response Rate	Date
Nellysford Post Office	4	10	40%	5/19/2016
True Value Hardware	6	15	40%	5/23/2016
Nellysford IGA	10	50	20%	5/24/2016
Wintergreen Market	6	25	24%	5/25/2016
Trager Brothers Coffee	4	15	27%	5/26/2016
Piney River Country Store	1	5	20%	5/26/2016
Rockfish Gap Community Center	8	25	32%	5/31/2016
Nellysford IGA	13	50	26%	6/1/2016
Trager Brothers Coffee	6	15	40%	6/2/2016
Nelson County Farmers Market	47	150	31%	6/4/2016
JMD Farm Market & Garden Center	3	6	50%	6/6/2016
Churchville Library	6	15	40%	6/7/2016
North Augusta Farm Market	12	45	27%	6/8/2016
Greenville Trading Post	4	15	27%	6/9/2016
Cranberry's Grocery and Eatery	4	10	40%	6/10/2016
Riverside Grocery	10	25	40%	6/13/2016
Mountain View General Store	5	10	50%	6/14/2016
Riverside Grocery	10	25	40%	6/15/2016
Staunton Mall	1	2	50%	6/16/2016
Staunton Farmers Market	16	60	27%	6/18/2016
Craigsville IGA	2	10	20%	6/21/2016
Staunton Junction	1	5	20%	6/22/2016
Staunton Coffee and Tea	11	20	55%	6/26/2016
North Augusta Farm Market	13	30	43%	6/29/2016
Staunton Public Library Workshop	2	2	100%	7/9/2016
Broadmoor Plaza Post Office	6	15	40%	7/12/2016
Augusta County Public Library	9	15	60%	7/13/2016
Stuarts Draft Farm Market	5	15	33%	7/14/2016
Broadmoor Plaza Post Office	1	5	20%	7/15/2016
Waynesboro Farmers Market	3	10	30%	7/16/2016
Augusta County Yard Sale	12	25	48%	7/16/2016
Waynesboro Public Library	8	25	32%	7/18/2016
The French Press	3	10	30%	7/19/2016
Bill Brooks Shelter	20	70	29%	7/23/2016
Totals	**272**	**830**	**32.7%**	

APPENDIX B - WORKSHOP AGENDAS

Workshop A: Speaker Panel

Activities	Desired Outcome
Meeting to order (Rider Foley)	Complete required IRB process Introduce opening speakers
Speaker #1: Hung Nguyen, Community Assistance & Technical Services Manager, PHMSA, Eastern Region.	Share perspective from PHMSA on pipeline construction, relationship with FERC.
Burst Reflections #1	Have participants reflect
Speaker #2: Dave Covington, District Location Design Manager, Virginia Department of Transportation (VDOT)	Share perspective from VDOT on transportation planning, public engagement in pipeline construction.
Burst Reflections #2	Have participants reflect
Speaker #3: Dr. Anita Puckett, Director of Appalachian Studies Program at VT (CANCELLED LAST MINUTE)	Share research on energy sources and infrastructure and community impacts.
Burst Reflections #3	Have participants reflect
	BREAK
Plenary discussion and town hall style questions and responses	Offer participants the opportunity to ask questions and enter into discussion with speakers
Closing remarks by each speaker	Offer speakers final statement
Burst Reflections #4	Have participants reflect
Lunch and post-survey	Lunch and complete post-survey

Workshop B: Engaging with Future Energy Sources

Activities	Desired Outcome
Meeting to order (Rider Foley)	Complete required IRB process

	Introduce nature and activities of workshop
Activity #1: Energy Trade-offs	Allow participants to consider and select their preferences for energy trade-offs.
	BREAK
Activity #2: Mapping Future Energy Sources	Allow participants to construct maps that express their preferences for locations and sources of future energy sources in Augusta County, VA
Activity #3: Reflections and debrief	Discuss the workshop, lessons learned and takeaways points. Feedback from research team on mapping v. trade-off exercises.
Lunch and post-survey	Lunch and complete post-survey

Workshop C: Guided Community Tour

Activities	**Desired Outcome**
Stop #1 Bill Brooks Memorial Picnic Shelter Workshop Orientation	Complete required IRB process and share route map
Stop #2: Columbia Gas Pipestand	Share methods for pipeline construction
Stop #3 Country store (now closed)	Share challenges and opportunities for economic development
Stop #4 Spring / Water treatment facility	Share information on geology, water resources, and groundwater
Stop #4: Post-tour survey	Gather information on 'value' of exercise.

APPENDIX C - SURVEY INSTRUMENTS

Section I. Decision-making and energy infrastructure

We are interested in your perspectives about who makes decisions about energy infrastructure.

1. <u>Currently,</u> who are the most important groups making decisions about energy infrastructure?

[Please mark only one box in each row]

	Very Important ▼	Somewhat Important ▼	Somewhat Unimportant ▼	Not Important ▼
Individual landowners……..	☐	☐	☐	☐
Individual non-landowners……	☐	☐	☐	☐
Local government officials……	☐	☐	☐	☐
State government officials……	☐	☐	☐	☐
Federal government officials..……	☐	☐	☐	☐
Individual corporations……	☐	☐	☐	☐
Trade associations……..……..	☐	☐	☐	☐
Advocacy organizations……..	☐	☐	☐	☐
Academic researchers……..	☐	☐	☐	☐

1.2 <u>Ideally,</u> who are the most important groups making decisions about energy infrastructure?

[Please mark only one box in each row]

	Very Important ▼	Somewhat Important ▼	Somewhat Unimportant ▼	Not Important ▼
Individual landowners……..	☐	☐	☐	☐
Individual non-landowners……	☐	☐	☐	☐
Local government officials……	☐	☐	☐	☐
State government officials……	☐	☐	☐	☐
Federal government officials..……	☐	☐	☐	☐
Individual corporations……	☐	☐	☐	☐
Trade associations……..……	☐	☐	☐	☐
Advocacy organizations……	☐	☐	☐	☐
Academic researchers……..	☐	☐	☐	☐

Section II. Hazards and Risks

We are interested in your perspectives about the hazards and risks that are posed by energy infrastructure.

2.1. Would you favor or oppose building a nuclear power plant within 50 miles of your home?

- ❑ Favor
- ❑ Oppose
- ❑ Unsure
- ❑ Refuse to answer

2.2. Do you think nuclear power plants generally are a safe source of energy or not?

- ❑ Safe
- ❑ Unsafe
- ❑ Unsure
- ❑ Refuse to answer

2.3. Do you think natural gas is generally a safe source of energy or not?

- ❑ Safe
- ❑ Unsafe
- ❑ Unsure
- ❑ Refuse to answer

2.4. Would you favor or oppose building the Atlantic Coast Pipeline within 50 miles of your home?

- ❑ Favor
- ❑ Oppose
- ❑ Unsure
- ❑ Refuse to answer

2.5. Would you favor or oppose building the Atlantic Coast Pipeline within 5 miles of your home?

- ❑ Favor
- ❑ Oppose
- ❑ Unsure
- ❑ Refuse to answer

3. Please complete the following sentence.
I am worried about how a possible accident as a result of the Atlantic Coast Pipeline will affect:

[Please mark only one box in each row]

	Strongly Agree ▼	Somewhat Agree ▼	Somewhat Disagree ▼	Strongly Disagree ▼
My property ……..	☐	☐	☐	☐
My town……	☐	☐	☐	☐
My county……	☐	☐	☐	☐
People in my community……	☐	☐	☐	☐
My nation……..	☐	☐	☐	☐
National parks and forest……	☐	☐	☐	☐
Industrial parks……	☐	☐	☐	☐
Schools……	☐	☐	☐	☐
Highways and roads……	☐	☐	☐	☐
Power lines and communication……	☐	☐	☐	☐
Drinking water supplies……	☐	☐	☐	☐
Animals……	☐	☐	☐	☐
Air quality……	☐	☐	☐	☐
Land use for farming……	☐	☐	☐	☐

4. How far away is the proposed pipeline route from where you live? *[Choose one answer]*

- ❑ Through the property where I live
- ❑ Through the property where I work/farm
- ❑ Adjacent to the property where I live
- ❑ Through the community where I live
- ❑ Through the state where I live
- ❑ Not sure

Section III. Safety and pipeline construction

5.1 Suppose a new natural gas pipeline was planned to be built through Augusta and Nelson county, near the cities of Staunton and Waynesboro, Virginia. Would you support or oppose its construction?

- ❑ Oppose
- ❑ Support
- ❑ Not sure
- ❑ Refuse to answer

5.2 Suppose a new natural gas pipeline was planned to be built through Rock Bridge county, near the city of Lexington, Virginia. Would you support or oppose its construction?

- ❑ Oppose
- ❑ Support
- ❑ Not sure
- ❑ Refuse to answer

5.3 Suppose a new natural gas pipeline was planned to be built through Shenandoah county, near the city of Strasburg, Virginia. Would you support or oppose its construction?

- ❑ Oppose
- ❑ Support
- ❑ Not sure
- ❑ Refuse to answer

5.4 Suppose a new natural gas pipeline was planned to be built through Montgomery county, near the city of Blacksburg, Virginia. Would you support or oppose its construction?

- ❑ Oppose
- ❑ Support
- ❑ Not sure
- ❑ Refuse to answer

5.5 Suppose a new natural gas pipeline was planned to be built through Jefferson county, near the city of Port Arthur, Texas. Would you support or oppose its construction?

- ❑ Oppose
- ❑ Support
- ❑ Not sure
- ❑ Refuse to answer

6.1. We are interested in your views about safety and pipeline construction. Please indicate the extent to which you agree or disagree with the following comments.

[Please mark only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Transporting natural gas by underground pipelines is safe…….	☐	☐	☐	☐
Transporting natural gas by above ground pipelines is safe……	☐	☐	☐	☐
Transporting natural gas by trucking is safe……..	☐	☐	☐	☐
Transporting natural gas by railroad tanker is safe……	☐	☐	☐	☐
Transporting natural gas by ship over the water is safe…….	☐	☐	☐	☐

6.2. Here we ask that you consider different sizes of natural gas transportation pipelines. Please indicate the extent to which you agree with each of the following statements.

[Please mark only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Transporting natural gas in pipelines that are less than 1 inch in diameter is safe……..	☐	☐	☐	☐
Transporting natural gas in pipelines that are 1 - 3 inches in diameter is safe……	☐	☐	☐	☐
Transporting natural gas in pipelines that are 3-6 inches in diameter is safe……	☐	☐	☐	☐
Transporting natural gas in pipelines that are 6-12 inches in diameter is safe……	☐	☐	☐	☐
Transporting natural gas in pipelines that are 12-24 inches in diameter is safe……	☐	☐	☐	☐
Transporting natural gas in pipelines that are 24-36 inches in diameter is safe……	☐	☐	☐	☐
Transporting natural gas in pipelines that are 36-48 inches in diameter is safe……	☐	☐	☐	☐

7.1. Which energy sources do you believe are most important to America's energy future?
[Please pick up to three]

- ❑ Solar power
- ❑ Wind power
- ❑ Natural gas
- ❑ Energy efficiency/savings
- ❑ Oil
- ❑ Hydroelectric power
- ❑ Waste to energy
- ❑ Nuclear
- ❑ Geothermal power
- ❑ Coal
- ❑ Biofuels/biomass
- ❑ Don't know
- ❑ Refuse to answer

7.2. Would you support natural gas consumption for any of the following activities

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Residential use (cooking and heating)	☐	☐	☐	☐
Industrial use	☐	☐	☐	☐
Electricity generation	☐	☐	☐	☐
Economic gain for landowners with mineral rights	☐	☐	☐	☐
Economic gain for shareholders in private companies	☐	☐	☐	☐
Natural gas should not be used	☐	☐	☐	☐

8. Here we ask that you provide information about the benefits and risks of natural gas transportation. Please indicate the extent to which you agree with each of the following statements

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Only a few people in the area will receive any benefits from the natural gas pipeline	☐	☐	☐	☐
I worry that there will be some sort of catastrophic accident involving natural gas pipeline	☐	☐	☐	☐

9.1. As you may know, Governor McAuliffe supports the Atlantic Coast pipeline. Does this make you:

- ❑ More likely to support the pipeline
- ❑ More likely to oppose the pipeline,
- ❑ Does not change your opinion on the pipeline
- ❑ Don't know

9.2. And as you may know, Dominion is one of the companies that has proposed the Atlantic Coast pipeline. Does this make you:

- ❑ More likely to support the pipeline
- ❑ More likely to oppose the pipeline,
- ❑ Does not change your opinion on the pipeline
- ❑ Don't know
- ❑ Refuse to answer

9.3. What do you think is the safest way to transport natural gas:

- ❑ By truck
- ❑ By rail
- ❑ By pipeline
- ❑ Same/no difference
- ❑ Don't know
- ❑ Refuse to answer

Section IV. Civic and Political Activity

10. In this section we ask you about your personal civic activities. Please indicate which of the following organizations you are currently a member, if any. *[Please check all that apply]:*

- ❑ Church, synagogue, mosque, or religious organization
- ❑ Political club or political party committees
- ❑ Professional societies, trade or business association, or labor union
- ❑ Service organizations such as Rotary or Lions
- ❑ Youth support groups (e.g. Girl's & Boy's Club, Little League Parents Association)
- ❑ Neighborhood or homeowners associations
- ❑ PTA, PTO, or school support groups
- ❑ Groups sports team or club (e.g. softball team, bowling league)
- ❑ Other: Please specify _____

11. In the last four weeks, how many hours, if any, did you engage in volunteer activities?

_____ hours of volunteer work in the last four weeks.

12.1. How interested would you say you personally are in politics?

- ❑ Very interested
- ❑ Fairly interested
- ❑ Not very interested
- ❑ Not at all interested
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

12.2 Generally speaking, do you usually think of yourself as a Republican, Democrat, Independent, or what?

- ❑ Republican
- ❑ Democrat
- ❑ Independent
- ❑ Other, specify:_____
- ❑ No preference
- ❑ Don't know
- ❑ Refuse to answer

Here are some different forms of political and social action that people can take. Please indicate, for each one, whether you have done any of these things in the past year, whether you have done it in the more distant past, whether you have not done it but might do it, or have not done it and would never, under any circumstances, do it.

13.1. Signed a petition

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.2. Boycotted, or deliberately bought, certain products for political or environmental reasons

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.3. Took part in a demonstration

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.4. Attended a political meeting or rally

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.5. Contacted, or attempted to contact, a politician or a civil servant to express your views

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.6. Donated money or raised funds for a social or political activity

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.7. Contacted or appeared in the media to express your views

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

13.8. Expressed political views on the internet

- ❑ Have done it in the past year
- ❑ Have done it in the more distant past
- ❑ Have not done it but might do it
- ❑ Have not done it and would never do it
- ❑ Can't choose
- ❑ Don't know
- ❑ Refuse to answer

Section V. Recreational Activities

14.1 How often do you go fishing/hunting?

- ❑ 0 times in the last year
- ❑ 1 – 5 times last year
- ❑ 6 - 10 times last year
- ❑ >10 times last year

14.2. How often do you go boating/canoeing/kayaking in this area?

- ❑ 0 times in the last year
- ❑ 1 – 5 times last year
- ❑ 6 - 10 times last year
- ❑ >10 times last year

14.3. How often do you go hiking or take a walk in the woods?

- ❑ 0 times in the last year
- ❑ 1 – 5 times last year
- ❑ 6 - 10 times last year
- ❑ >10 times last year

14.4. How often do you visit national parks?

- ❑ 0 times in the last year
- ❑ 1 – 5 times last year
- ❑ 6 - 10 times last year
- ❑ >10 times last year

14.5. Please indicate the extent to which you agree with each of the following statements.

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
National parks are important to this region…….	☐	☐	☐	☐
National Forests are important to this region……	☐	☐	☐	☐
State parks are important to this region…….	☐	☐	☐	☐
County parks are important to this region……..	☐	☐	☐	☐

Section VI. Media and Information Sources

15. From where do you get your news and information?

- ❑ Television
- ❑ Radio
- ❑ Newspapers
- ❑ Internet
- ❑ Don't know

16. How often do you use the media, including television, newspapers, radio and the internet, to get political news or information?

- ❑ Several times a day
- ❑ Once a day
- ❑ 5-6 days a week
- ❑ 3-4 days a week
- ❑ 1-2 days a week
- ❑ Less than 1 day a week
- ❑ Never, or
- ❑ Can't choose?
- ❑ Don't know
- ❑ Refuse to answer

Section VII. Legal and economic dimensions

Governments sometimes use the power of eminent domain to acquire a person's property at a fair market price for other uses. Eminent domain allows the government to issue a private corporation the right of way through someone's property to build the Atlantic Coast Pipeline.

17.1. Do you think the government should be able to use eminent domain for this purpose or not?

- ❑ Yes, the government should be able to use eminent domain for this purpose
- ❑ No, the government should not be able to use eminent domain for this purpose
- ❑ Don't know
- ❑ Refuse to answer

17.2. Please indicate the extent to which you agree with each of the following statements.

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
I am in favor of eminent domain for highway construction	☐	☐	☐	☐
I am in favor of eminent domain for electricity transmission	☐	☐	☐	☐
I am in favor of eminent domain for natural gas pipelines	☐	☐	☐	☐
I am in favor of eminent domain for government buildings	☐	☐	☐	☐
I am in favor of eminent domain for drinking water pipelines	☐	☐	☐	☐
I am in favor of eminent domain for sewage pipelines	☐	☐	☐	☐
I am in favor of eminent domain for cable television	☐	☐	☐	☐
I am in favor of eminent domain for internet cables	☐	☐	☐	☐

17.3. Please indicate if you would you approve the construction of the Atlantic Coast Pipeline if compensation for the pipeline:

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Was predetermined by Dominion for all landowners……..	☐	☐	☐	☐
Was determined by local assessors based on land value……..	☐	☐	☐	☐
Was determined by a judge or arbitrator…….	☐	☐	☐	☐
Was determined by a local committee of elected officials……	☐	☐	☐	☐
Was determined by the amount of natural gas transported…..	☐	☐	☐	☐
Was determined by the annual revenue by transporting the natural gas……	☐	☐	☐	☐

18. Please indicate if you would you support the construction of the Atlantic Coast Pipeline if it was under the authority of,

[Please check only one box in each row]

	Strongly Agree ▼	Agree Somewhat ▼	Disagree Somewhat ▼	Strongly Disagree ▼
Dominion Virginia Power	☐	☐	☐	☐
Columbia Gas	☐	☐	☐	☐
State of Virginia	☐	☐	☐	☐
County Government and Supervisors	☐	☐	☐	☐

Section VI. Job History

19. What is your current job?

- ❑ Working full time
- ❑ Working part time
- ❑ With a job, but not working because of temporary illness, vacation, strike
- ❑ Unemployed, looking for work
- ❑ Retired
- ❑ In school, not working
- ❑ Working at home
- ❑ Other: Specify:_____
- ❑ Don't know
- ❑ Refuse to answer

20. In which profession/occupation do you or did you work? If you have had more than one job, focus on the main job? What is/was your job there?

- ❑ Employer/manager of establishment with less than 10 employees
- ❑ Professional worker lawyer, accountant, teacher, etc
- ❑ Supervisory - office worker: supervises others.
- ❑ Non-manual - office worker: non-supervisory
- ❑ Foreman and supervisor
- ❑ Skilled manual worker
- ❑ Semi-skilled manual worker
- ❑ Unskilled manual worker
- ❑ Farmer: has own farm
- ❑ Agricultural worker
- ❑ Member of armed forces, security personnel
- ❑ Never had a job

Section VII. Demographic Characteristics

21. Are you: ❑ Male ❑ Female

22. In what year were you born? 19_____

23. What is your highest level of formal education? *[Please check ONE box]*

Attended high school, but did not graduate ……..... ❑
High school graduate ……..... ❑
Attended college, but did not graduate from a 4-year college …..... ❑
Graduated from a 4-year college ..……..... ❑
Attended graduate or professional school, but did not graduate ..... ❑
Graduated from a graduate or professional school (e.g. MBA, MPA, JD, MD) ….. ❑
At least one of my parents graduated from a four-year college ❑

24. For statistical purposes only, we need to know your total family income for 2012. Will you please tell me which of the following categories best represents your total family income?

- ❑ Less than $10,000
- ❑ $10,000-$14,999
- ❑ $15,000-$24,999
- ❑ $25,000-$34,999
- ❑ $35,000-$49,999
- ❑ $50,000-$74,999
- ❑ $75,000-$99,999
- ❑ $100,000-$149,999
- ❑ $150,000-$199,999
- ❑ $200,000+
- ❑ Don't know
- ❑ Refuse to answer

25. For statistical purposes only, could you please tell me your race?

- ❑ White / Caucasian
- ❑ Black / African-American
- ❑ Hispanic / Latino
- ❑ Asian
- ❑ Middle Eastern
- ❑ American Indian or Alaska Native
- ❑ Native Hawaiian or Pacific Islander
- ❑ Other
- ❑ Don't know

26. Are you currently—married, widowed, divorced, separated, or have you never been married?

- ❑ Married
- ❑ Widowed
- ❑ Divorced
- ❑ Separated
- ❑ Never married
- ❑ Don't Know
- ❑ Refuse to answer

27. Which of the following is true? *[Please check all that apply]:*

- ❑ I was not born in the United States
- ❑ At least one of my parents was not born in the United States
- ❑ I was not born in the Commonwealth of Virginia
- ❑ I was not born in Augusta or Nelson County in Virginia

28. Tell us about yourself, what is your connection to the Augusta and Nelson county area in Virginia? (check all that apply)

- ❑ I live here
- ❑ I work in the area
- ❑ I am visiting the area

29. Do you have any children? If so, how many? Children ☐
[Enter "0" if you have no children]

30. Do you own land?

- ❑ Yes
- ❑ No
- ❑ Don't own land
- ❑ Don't know

31. Do you own your home?

- ❑ Yes
- ❑ No
- ❑ Don't own home
- ❑ Don't know

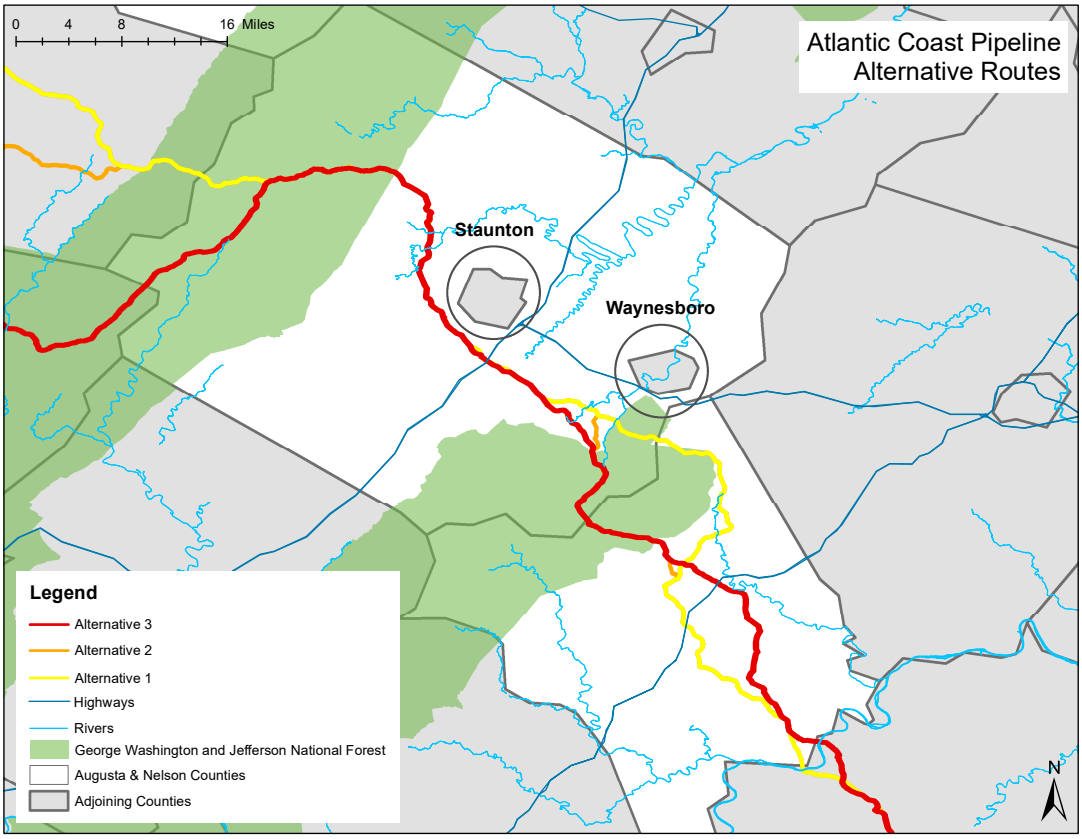
32. How long have you lived in Augusta or Nelson county area in Virginia?

- ❑ 0-4 years
- ❑ 5-9 years
- ❑ 10-19 years
- ❑ 20-29 years
- ❑ 30-39 years
- ❑ 40-49 years
- ❑ 50+ years
- ❑ I do not live in this region

33. Do you plan to give or sell your land or your home to your children?

- ❑ Yes
- ❑ No
- ❑ Don't know

34. We interested in your preferences between the routes proposed for the Atlantic Coast Pipeline. Look at the map and then select one of the alternative routes that you prefer.



Given the three alternative routes proposed for the Atlantic Coast Pipeline, I prefer:

- ❑ Alternative 1
- ❑ Alternative 2
- ❑ Alternative 3
- ❑ No pipeline
- ❑ Don't know
- ❑ Refuse to answer

Please feel free to explain your answer on the following page.

Thank you for taking your time to complete this questionnaire. Your assistance in providing this information is very much appreciated.

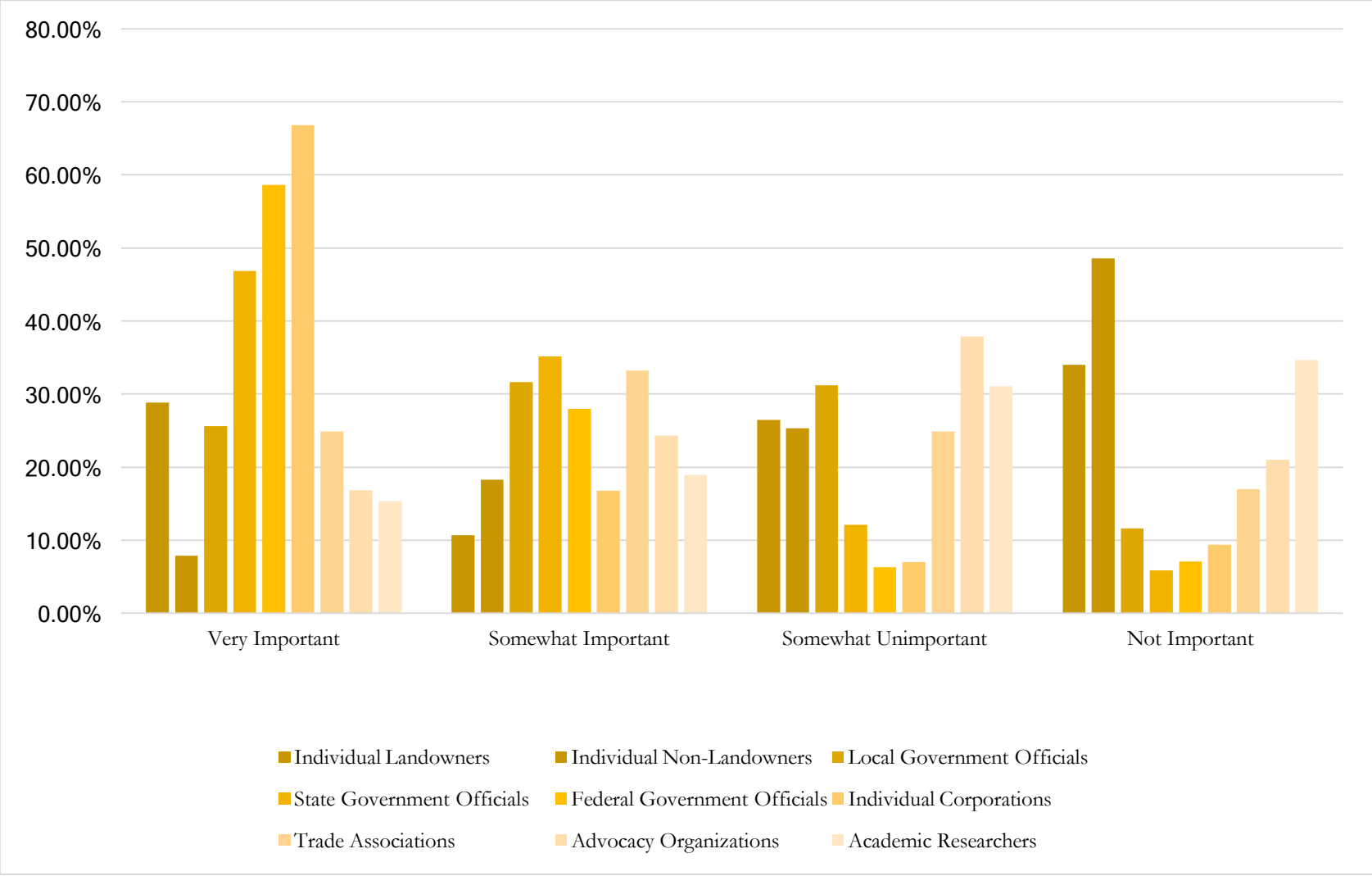
When the study is completed, we intend to post results at a public domain website: www.eands.virginia.edu. We invite you to peruse the results.

If there is anything else you would like to tell us about any of the topics covered by this questionnaire, please do so in the space provided below:

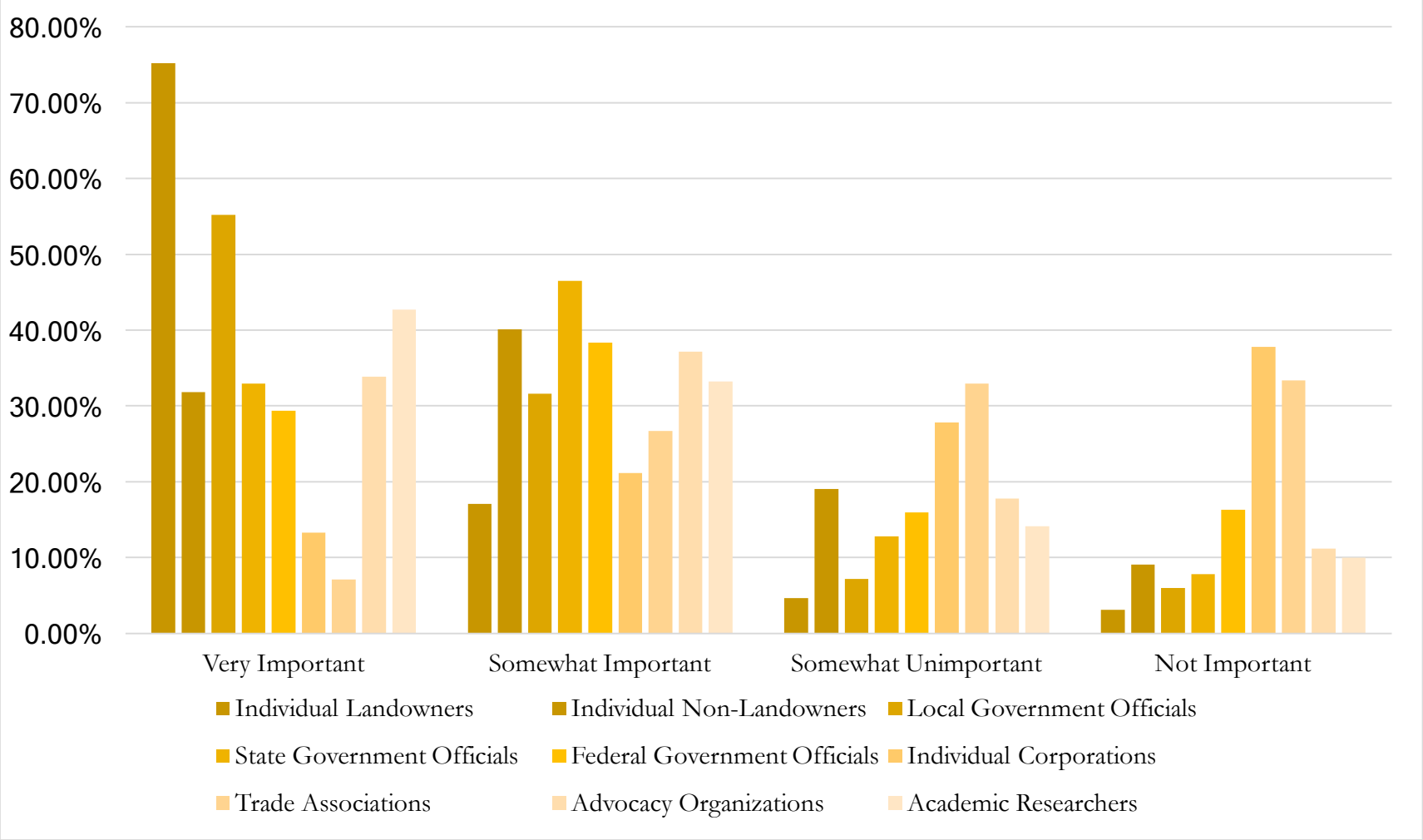
Dr. R. Foley
Atlantic Coast Pipeline – Research Project
P.O. Box 400744
School of Engineering and Applied Sciences
University of Virginia
Charlottesville, VA 22904-4744

APPENDIX D - DESCRIPTIVE SURVEY RESULTS

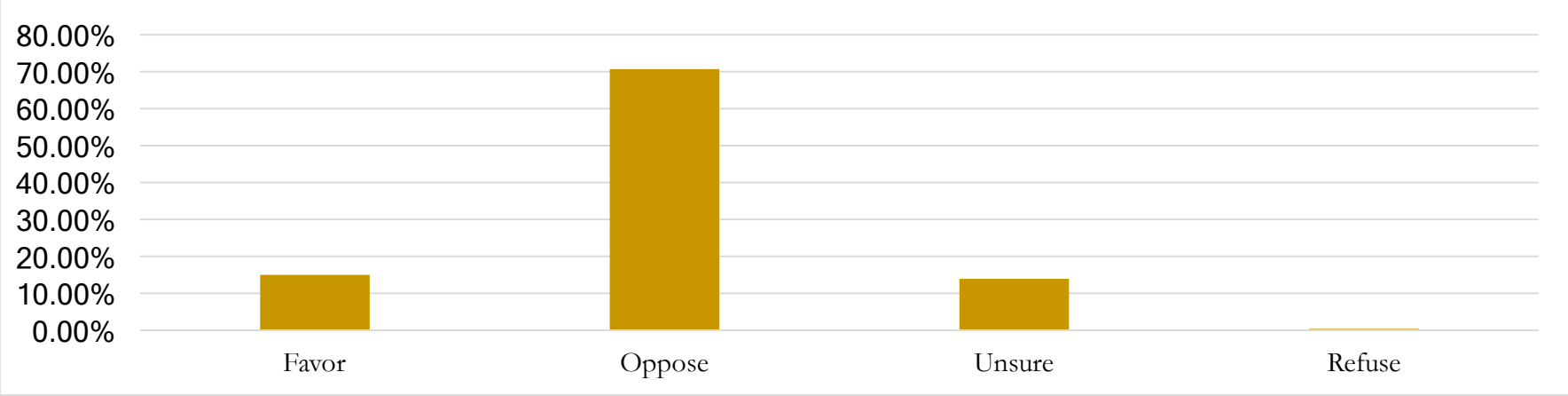
1.1 Currently, who are the most important groups making decisions about energy infrastructure?



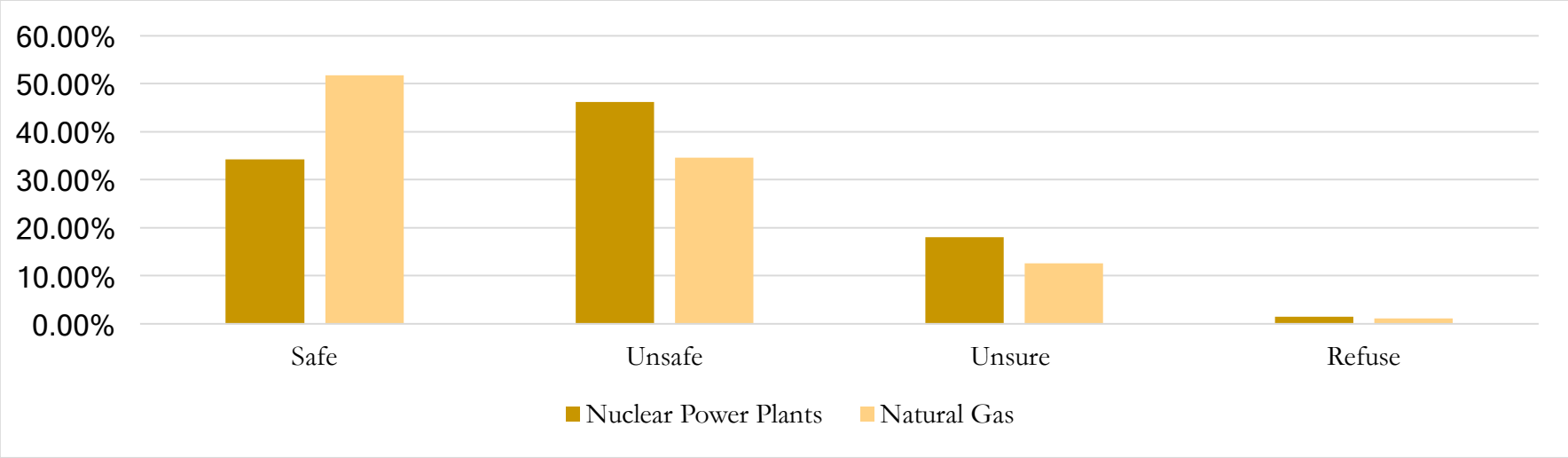
1.2 Ideally, who are the most important groups making decisions about energy infrastructure?



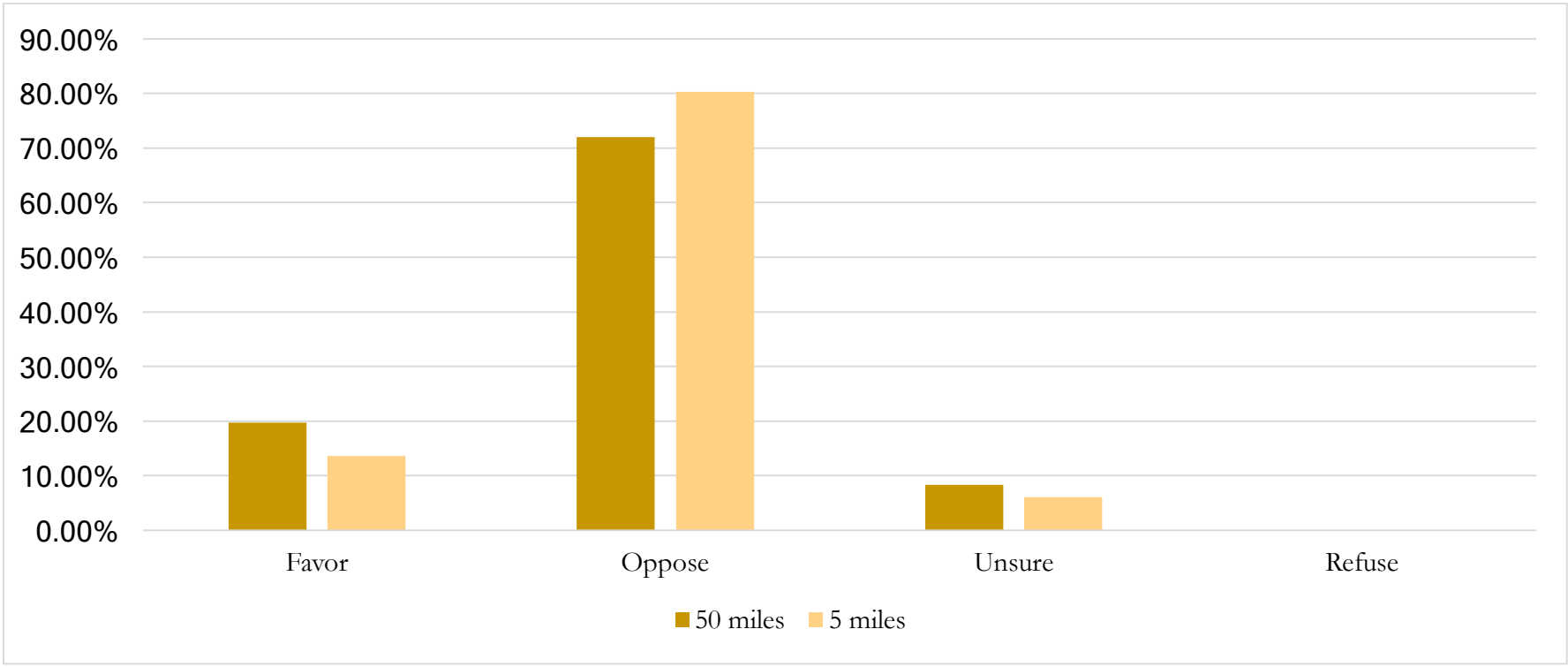
2.1 Would you favor or oppose building a nuclear power plant within 50 miles of your home?



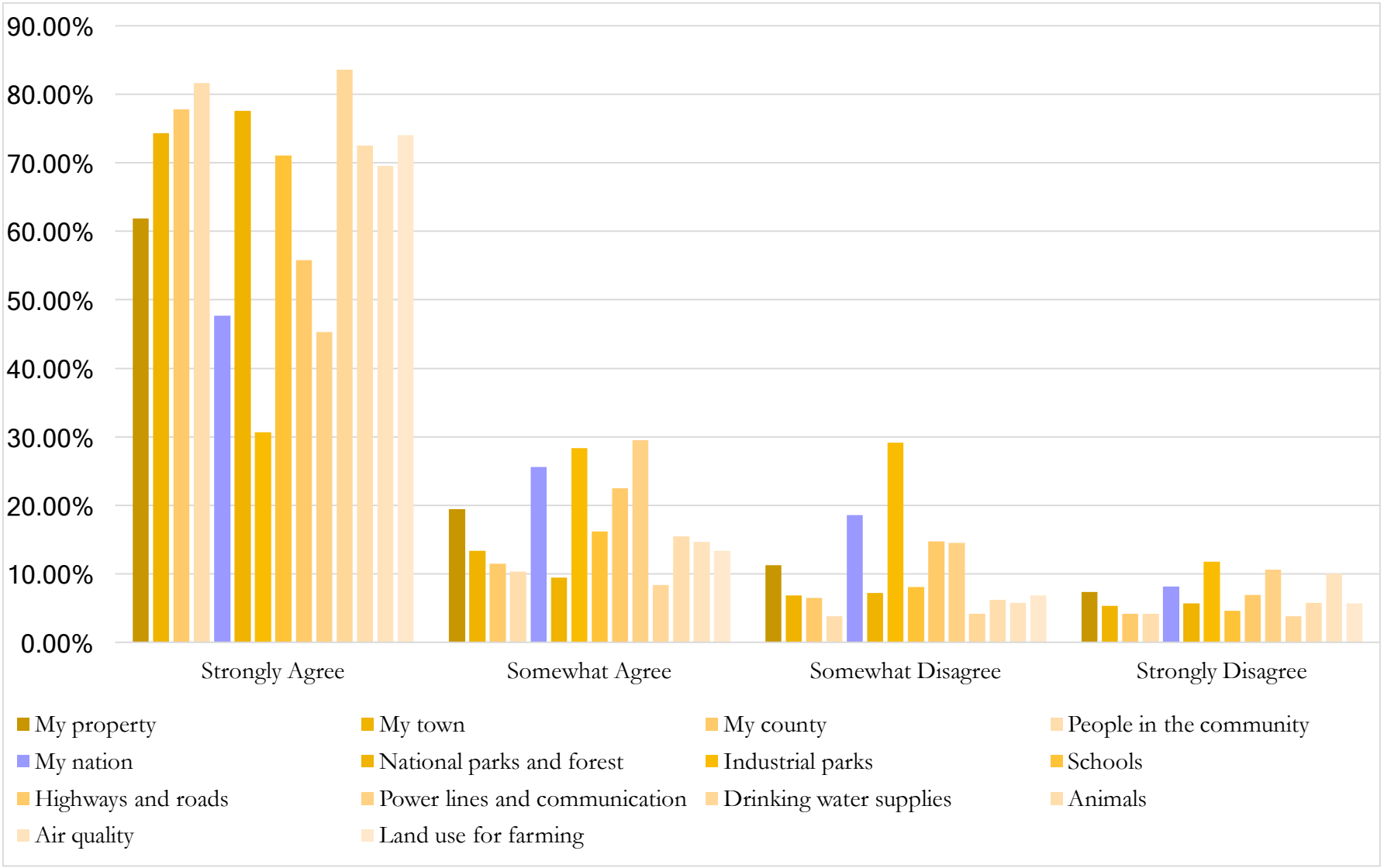
2.2 & 2.3 Do you think _____ generally are a safe source of energy or not?



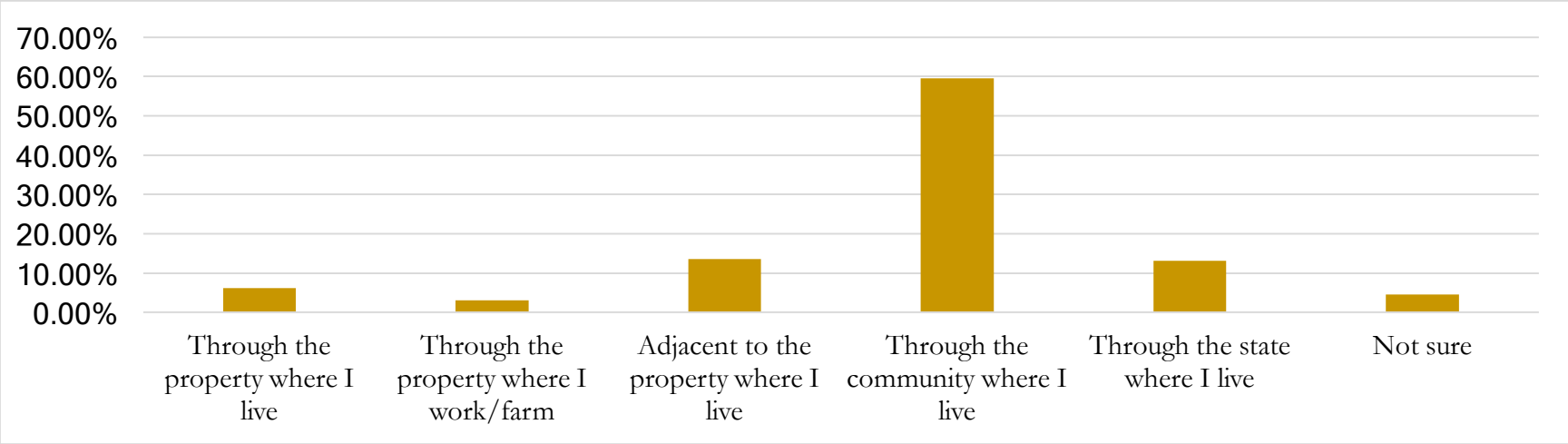
2.4 & 2.5 Would you favor or oppose building the Atlantic Coast Pipeline within _____ of your home?



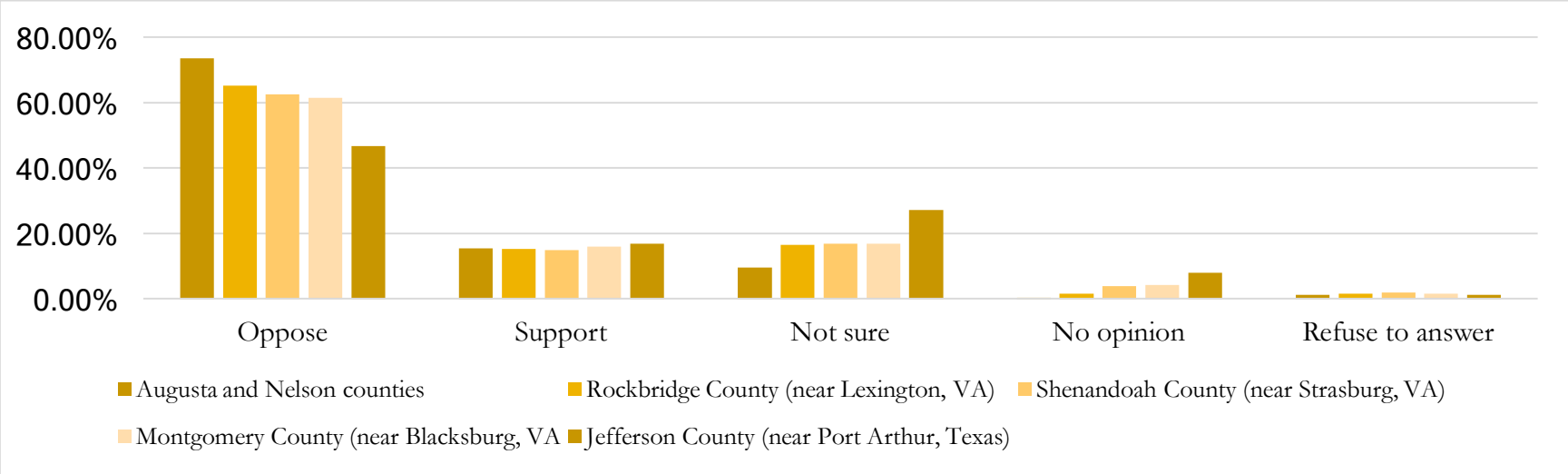
3. Please complete the following sentence. I am worried about how a possible accident as a result of the Atlantic Coast Pipeline will affect:



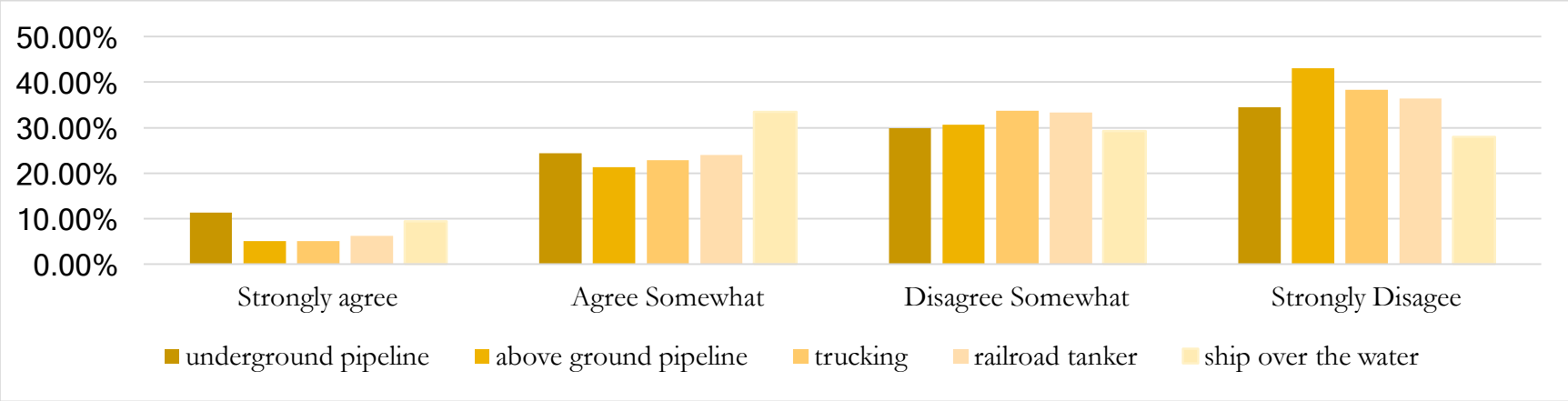
4. How far away is the proposed pipeline route from where you live?



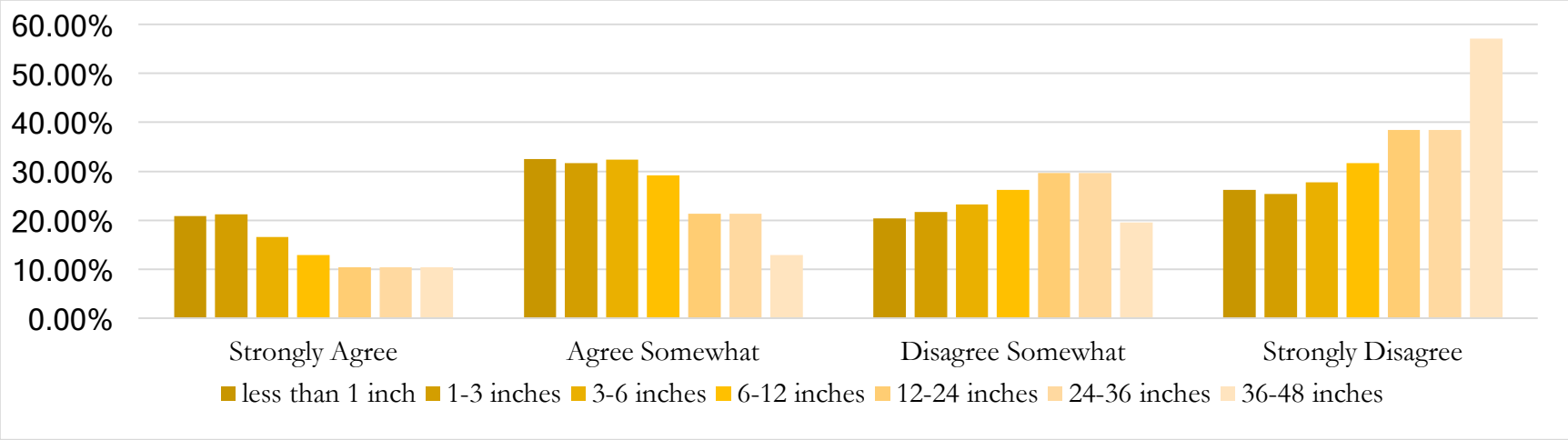
5.1 – 5.5 Suppose a new natural gas pipeline was planned to be built through _____. Would you support or oppose its construction?



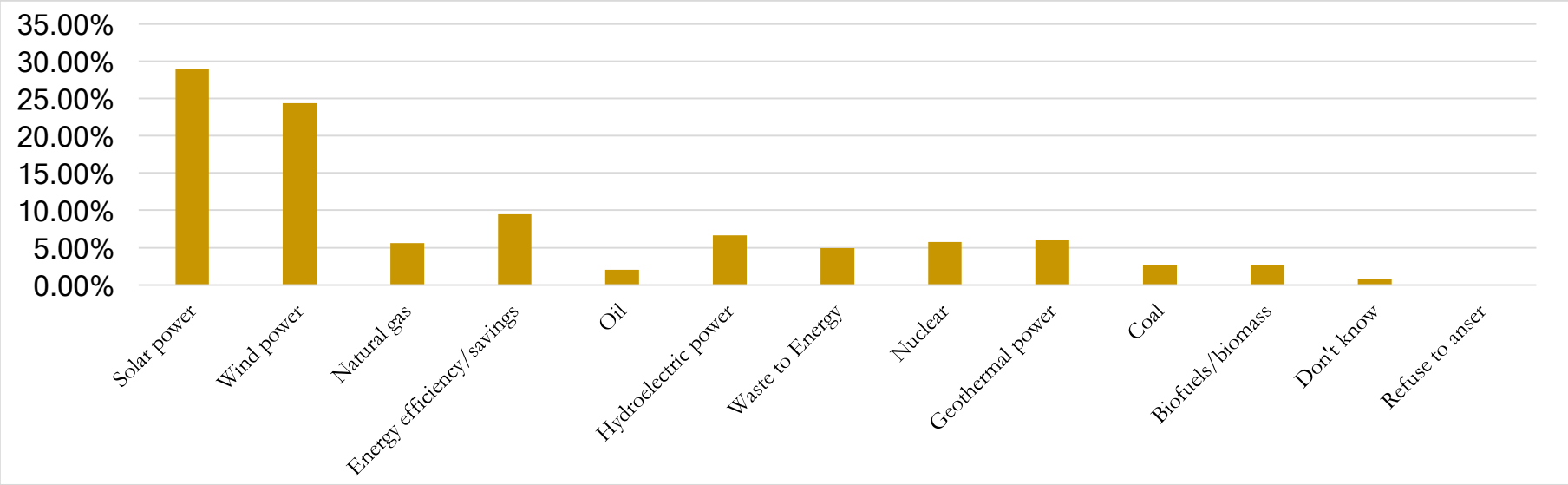
6.1 We are interested in your views about safety and pipeline construction. Please indicate the extent to which you agree or disagree with the following comments. Transporting natural gas by _____ is safe.



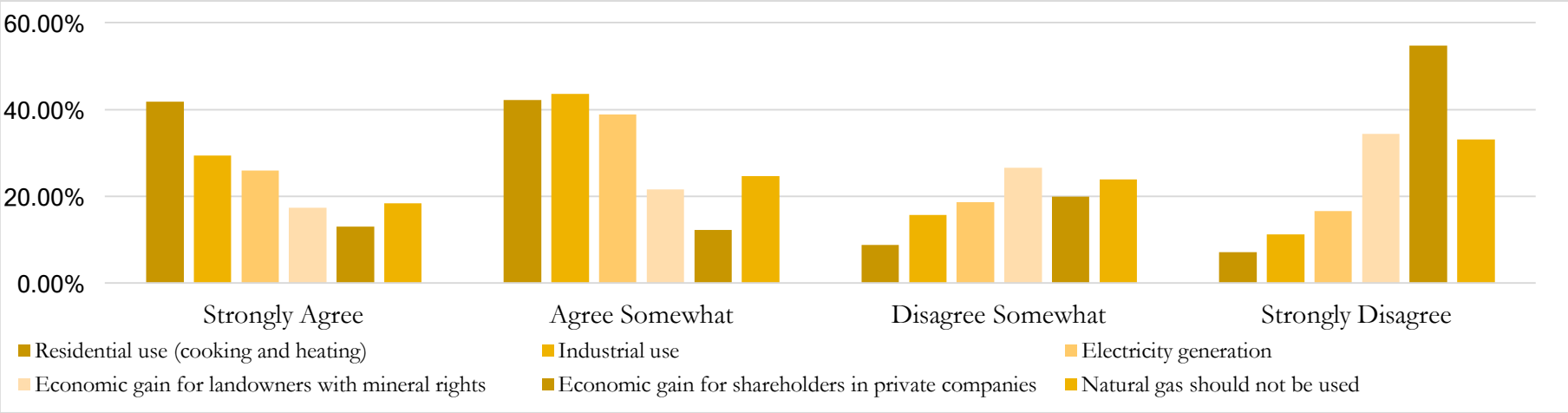
6.2 Here we ask that you consider different sizes of natural gas transportation pipelines. Please indicate the extent to which you agree with each of the following statements. Transporting natural gas in pipelines that are _____ in diameter is safe.



7.1 Which energy sources do you believe are most important to America's energy future? [select up to three]

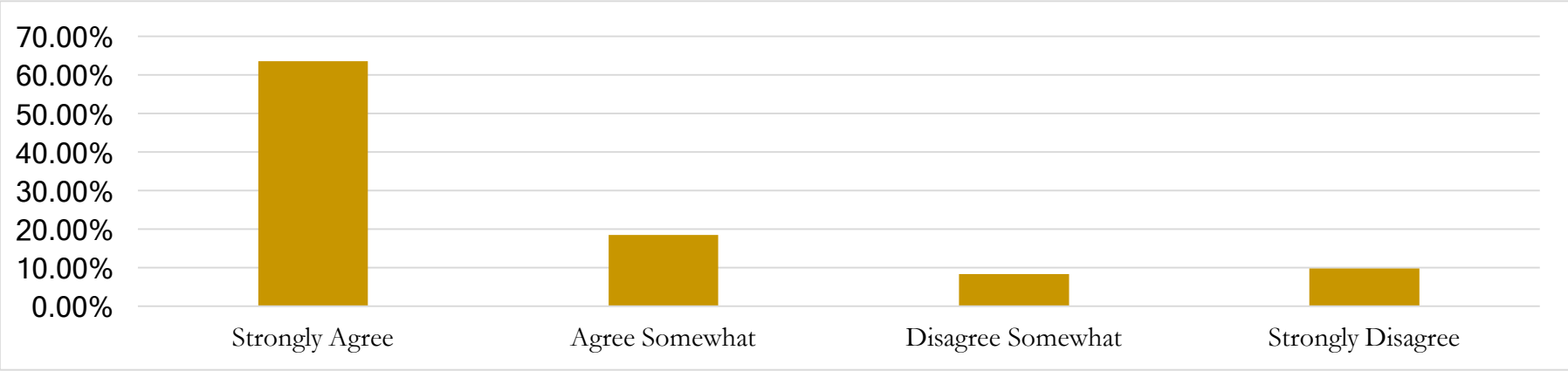


7.2 Would you support natural gas consumption for any of the following activities?

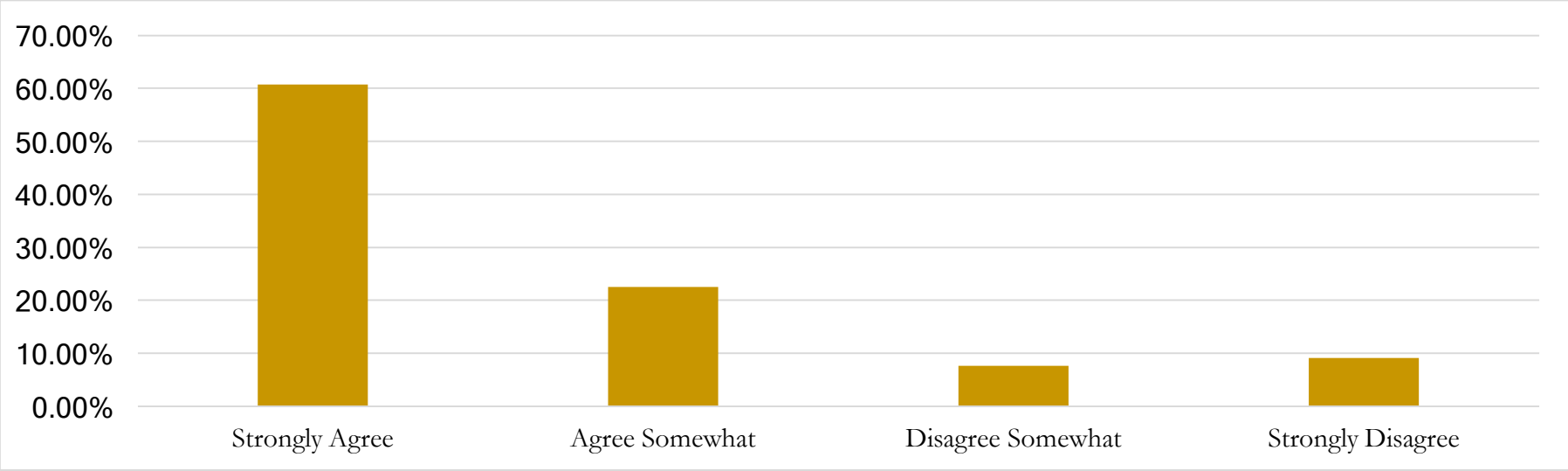


8. Here we ask that you provide information about the benefits and risks of natural gas transportation. Please indicate the extent to which you agree with each of the following statements.

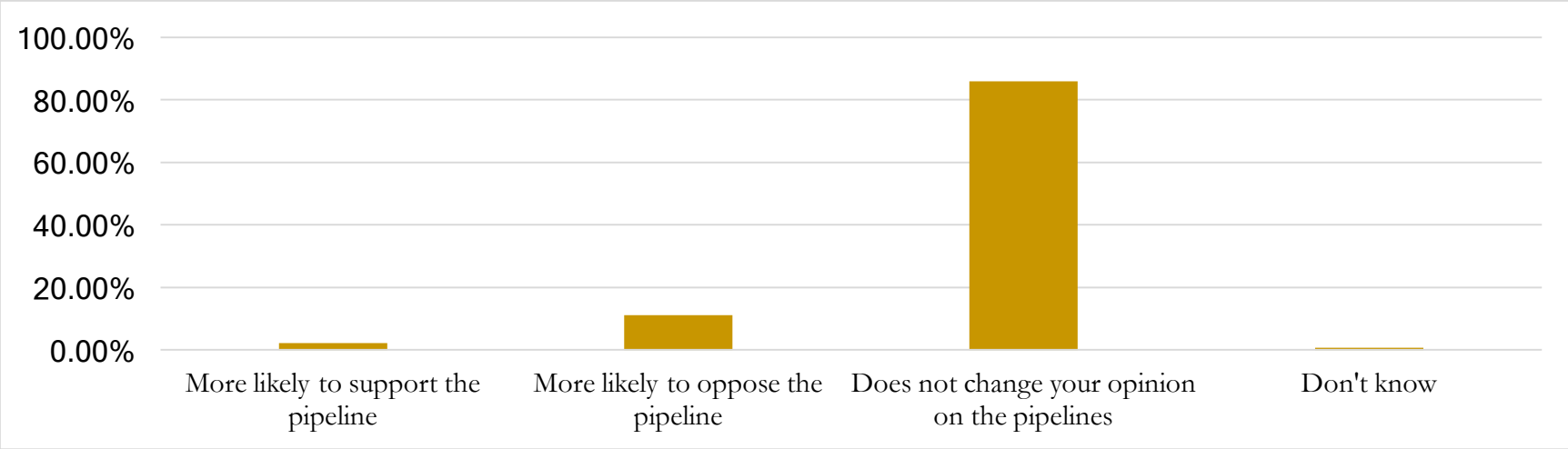
a. Only a few people in the area will receive any benefits from the natural gas pipeline



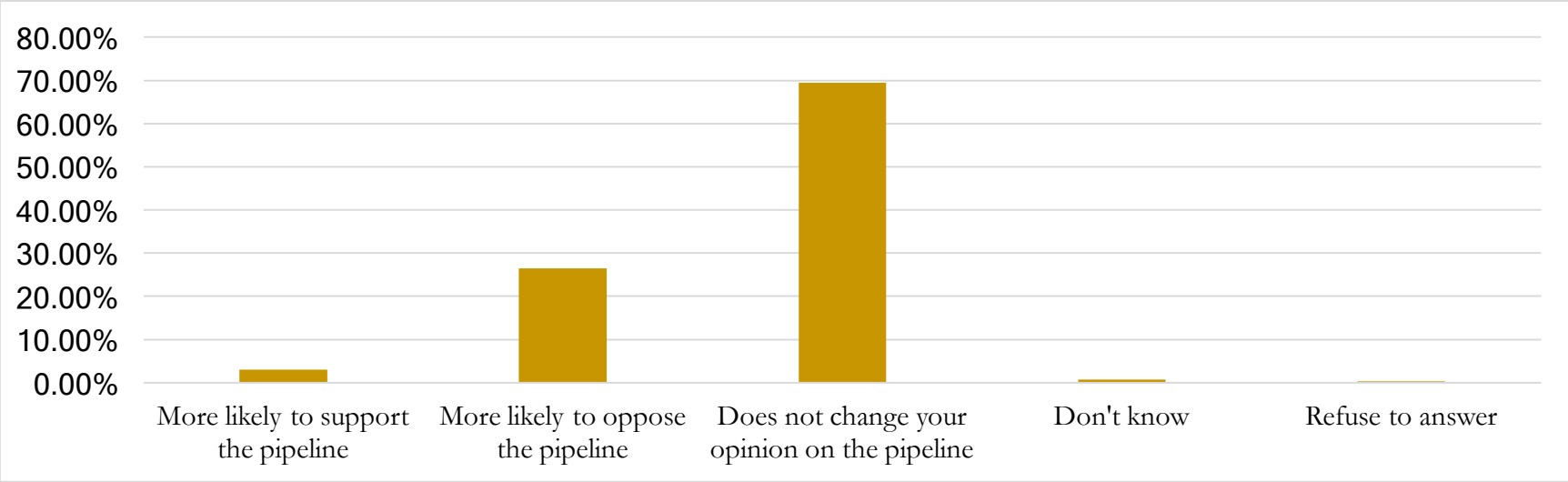
b. I worry that there will be some sort of catastrophic accident involving natural gas pipelines



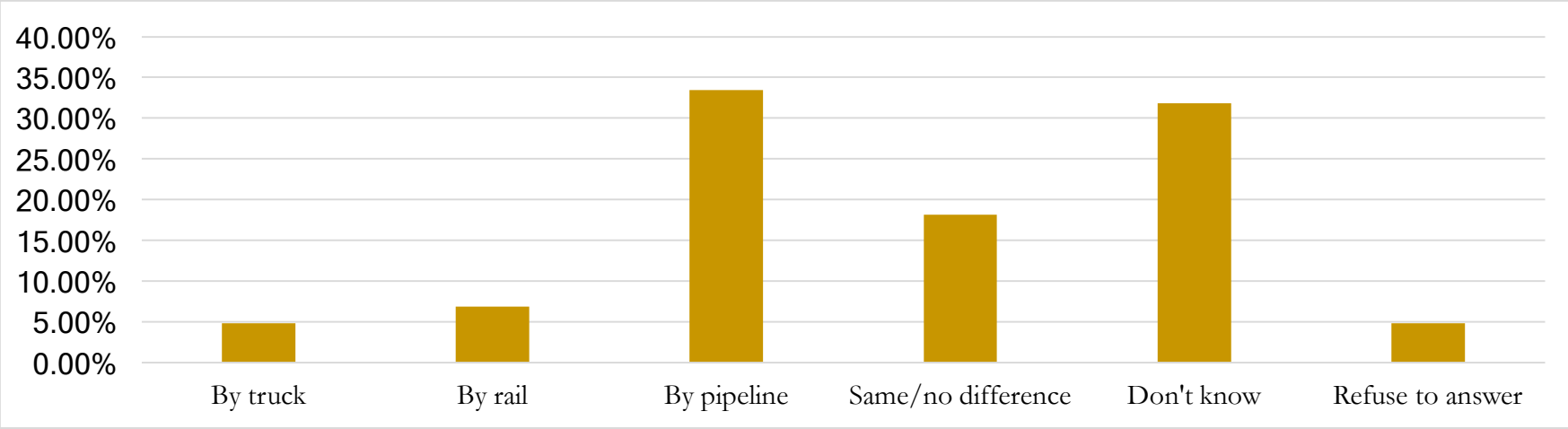
9.1 As you may know, Governor McAuliffe supports the Atlantic Coast pipeline. Does this make you:



9.2 And as you may know, Dominion is one of the companies that has proposed the Atlantic Coast pipeline. Does this make you:



9.3 What do you think is the safest way to transport natural gas:



9.4 We are interested in your preferences between the routes proposed for the Atlantic Coast Pipeline. Look at the map and then select one of the alternative routes that you prefer. Given the three alternative routes proposed for the Atlantic Coast Pipeline, I prefer: