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## Embodied Energy Geographies: An Exploration of Fracked Landscapes in the Ohio River Valley

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# Embodied Energy Geographies: An Exploration of Fracked Landscapes in the Ohio River Valley

Rachael L. Hood



Thesis submitted to the Eberly College of Arts and Sciences at West Virginia University in partial fulfillment of the requirements for the degree of Masters of Arts in the Department of Geology and Geography

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## ABSTRACT

### Embodied Energy Geographies: An Exploration of Fracked Landscapes in the Ohio River Valley

Rachael L. Hood

Methane gas production has boomed across the United States as a result of the development of fracking technology and its associated infrastructures, including pipelines. This production has provoked resistance over a litany of environmental and social concerns at both global and local scales. These concerns are compounded by a history of extractive economies and degradation in the Marcellus shale region of Appalachia and the Ohio River Valley. To date, there has been limited research at the intersection of extractive industry and emotional geography, especially around pipelines. This research draws on feminist, emotional, and energy geographies and uses semi-structured interviews and body mapping focus groups to investigate the ways in which place-based identity, sense of place, and place attachment have been impacted by the oil and gas buildout, and how these impacts are emotionally embodied.

Participants in this research spoke to the ways in which pipelines, compressor stations, gas wells, and other fracked gas infrastructures have significantly impacted their relationships to their homes, communities, and selves. They described the physical and psychological impacts from the industrial buildout, including health impacts and emotional upheaval, which could feel inescapable and uncontrollable. Participants invoked concepts of energy landscapes and energy terrains to discuss multiple scales and sites of impact from industry buildout, and understood the linked geographies of the home, landscape, and self through embodied emotions.

These findings highlight that fracked gas infrastructures have the affectual, emotional capacity to disrupt place attachment and place identity for impacted residents, manifested through embodied emotions. This thesis addresses the conceptual gap at the intersection of energy and emotional geographies through a focus on the embodied experiences of the self, home, and landscape in relation to the oil and gas buildout in the Ohio River Valley. This thesis has broad implications for decision-making processes around extreme energy production through an illustration of the lived experiences of fenceline communities.

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Lastly, thank you to the Heinz Foundation for funding this research.

## A Note on Settler Colonialism

Readers may notice that, throughout this thesis, I do not use the terms “landowner” or “property owner.” This choice of language is intentional. It is beyond the scope of this thesis, and my own knowledge, to analyze the intersections of settler colonialism and the experiences of and resistance to oil and gas among white, settler residents (for an explicit analysis of this intersection, see Bosworth, 2021). Thus, I do not focus on or engage in conversations about the legitimacy or inherent value of land ownership claims or titles, though these points are often a major contention within these conflicts. It is particularly relevant in studies of extractive industry to be clear in language and intention. Language is epistemic, meaning our words *do* something toward creating particular ways of knowing and being.

This research has taken place on the occupied lands and territories of the Adena, Cayuga, Cherokee, Haudenosaunee, Hopewell, Lenape, Mingo, Mohawk, Monongahela, Oneida, Onondaga, Osage, Shawnee, and Seneca peoples as well as those who we may never know but left a lasting legacy in Appalachia. These places have been meeting grounds for ceremony, learning, and sharing, and I want to take a moment to honor and extend my gratitude to the land itself and the peoples who have stewarded this land. This land has taught me values of interdependence, reciprocity, respect, balance, care, and accountability; I have learned how to be a better friend, coworker, organizer, and community member through its generous lessons.

Indigenous communities, who have held and cared for the land on which this research has taken place, have faced centuries of violent environmental and cultural destruction and harm. Indigenous peoples’ connection to this land has been assaulted by violence, disease, invasion, relocation, forced removal, and other colonial actions. Land dispossession was and is a traumatic and painful experience resulting in death, displacement, and collective suffering of countless individuals. This dispossession went hand-in-hand with the exploitation of enslaved African and Black labor, as well as other forms of domination and exploitation. Much of the development of this country today has been made possible through the unfree labor of enslaved Africans and their descendants who suffered the horrors of transatlantic trafficking, chattel slavery, and dehumanization through segregation, Jim Crow, and ongoing white supremacy.

In spite of these violences, this land continues to hold abundant historical, spiritual, cultural, and personal significance for the original habitants of this region. These lands are embedded with rich histories and continued struggles for survivance. Colonization is ongoing, as is Indigenous resistance. This acknowledgement is not a eulogy; the fight continues all across Turtle Island. I invite you to take a moment to reflect on what it means to be occupying stolen land, and if you do so as a settler, to examine what it means to be a settler. What can exist beyond territorial acknowledgements? How can we support Indigenous, Black, and Brown people in our everyday lives, individually and collectively? What do we need to do to get in right relation with the human and more-than human world? With this acknowledgement, I recognize that there is no way forward without #LANDBACK (NDN Collective, 2021). There is no life ahead of us without Indigenous stewardship of their lands. This acknowledgement is one, imperfect piece of a larger commitment toward dismantling the ongoing legacies of settler colonialism and achieving the liberation of people and land.

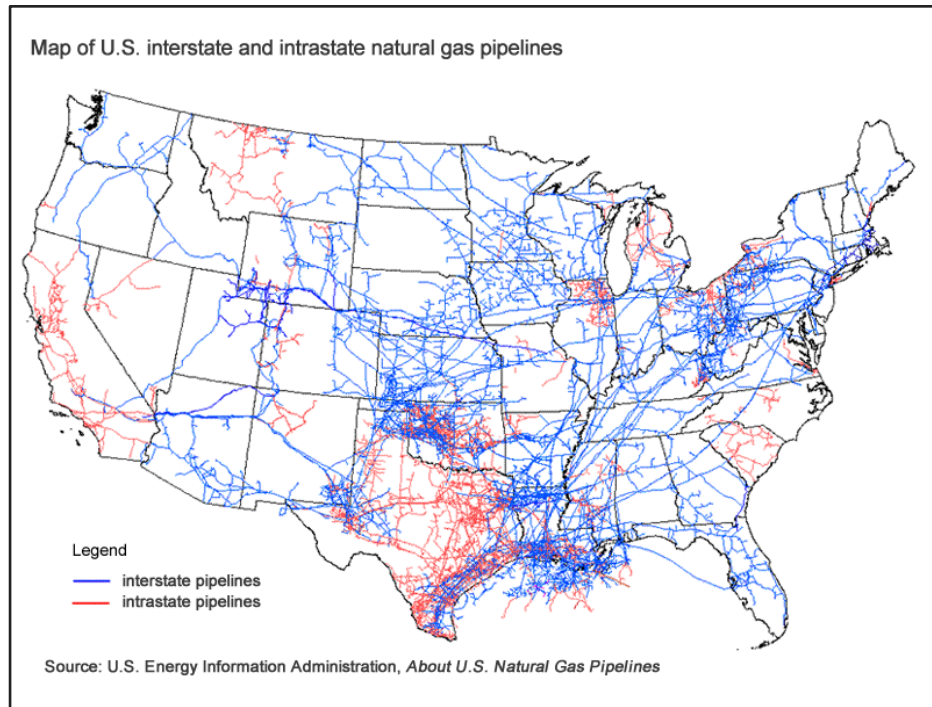
*Solidarity is an uneasy, reserved, and unsettled matter* (Tuck & Yang, 2012, p. 3)

## I. Introduction

Methane gas production has boomed over the past ten years in the United States as a result of new technologies that have made available previously inaccessible stores of oil and gas (Sovacool, 2014). Energy producers have combined two processes, horizontal drilling and hydraulic fracturing, resulting in what's known as unconventional oil and gas development, colloquially referred to as fracking (Merrill, 2012). In this process, a rock layer is cracked with heavy machinery using a high-pressure mix of water, sand, and chemicals, some of which are toxic to humans and animals including isopropanol, formamide, glutaraldehyde, and ethoxylated 4-nonylphenol (Lloyd-Smith, 2013). The oil and gas then flow back up to the surface along with the drilling fluids (McDermott-Levy, Kaktins, & Sattler, 2013). This process is considered by some to be one form of "extreme energy," in which energy extraction methods grow more intense over time, driven by unsustainable energy consumption (Short et al., 2015).

The United States is among the world's leading producers of methane gas (Doman & Kahan, 2018); in 2019, the U.S. produced 93.1 billion cubic feet of dry methane gas per day (Kopalek & Geary, 2020). As a result of an increase in methane gas prices in the mid-2000s, shale gas development has swelled particularly in the Bakken Shale (North Dakota), the Barnett Shale (northern Texas), and the Marcellus Shale (Central Appalachia) (Ratner & Tiemann, 2015). The expansion in shale gas production in the U.S. created a "bottleneck" effect as there was more gas being produced than there was transmission capacity (Oliver, 2015). As a result, development of pipelines in the U.S. has expanded alongside the increase in fracking activity (Feijoo et al., 2018). Pipelines are a necessary infrastructure in fracking operations as they transport methane gas or liquefied natural gas (LNG) from source to refinery facilities and from refinery facilities to homes and export centers. Today, there are almost three million miles of methane gas pipelines, including distribution lines, in the U.S. (U.S. Energy Information Administration [EIA], 2020) (**Figure 1**).





**Figure 1.** Map of inter- and intra-state methane gas pipelines (US EIA, 2020)

Fracking and pipelines are contentious issues both nationally and in communities directly affected by the infrastructures. Supporters, including industry representatives and some scientists, argue that the industry will encourage economic growth and provide energy security, and that methane gas will serve as a “transition” fuel away from other fossil fuels with a higher carbon footprint, like coal (Boudet et al., 2014). Despite the claims of necessity around energy independence and security, the U.S. is actually a leading exporter of methane gas (Zaretskaya, 2020). Moreover, there is no net climate benefit for at least two decades when coal plants are replaced with gas-fired power plants, and methane and other greenhouse gasses are leaked throughout the energy lifecycle; methane gas in the atmosphere traps 34 times more heat than CO<sub>2</sub> over a 100-year period (Healy, Stephens, & Malin 2019; Turner et al., 2016; IPCC, 2013). Thus, the framing of methane gas as a transition fuel is incompatible with the necessary decarbonization of the global energy system (McJeon et al., 2014). Opponents of fracking raise concerns that the expansion of pipelines and fracking infrastructure will “lock in” a fossil fuel economy (Kraushaar-Friesen & Busch, 2020), in addition to sounding alarms about public and environmental health impacts associated with oil and gas production. The Standing Rock protests of 2016 (SD) and the tree-sits conducted by Appalachians Against Pipelines (VA) are two salient and well-known examples of the significant attention to and opposition against methane gas pipelines (Estes, 2019; Appalachians Against Pipelines [AAP], 2022).

Social scientists have taken up the issue of methane gas development and social mobilization in recent years due to its widespread controversy (e.g., Bosworth, 2019; Gullion, 2015; Vasi et al., 2015), in part sparked by Josh Fox's 2010 documentary *Gasland*, which depicted Pennsylvania residents lighting their tap water on fire due to alleged fracking contamination. Even so, there remains a lack of social science and particularly geographic analysis of central Appalachia's gas boom (Turley & Caretta, 2020), and especially on the expansion of methane gas pipelines. Energy production creates vastly altered energy landscapes that exist as a dominant force over, in the case of the Ohio River Valley, previously small, rural communities. Research has shown that the landscape, and changes to the landscape, generate emotional impacts for the residents who experience those changes in the form of embodied emotions, linking the scale of the landscape to that of the body (Bennett, 2004; Davidson & Milligan, 2004). Moreover, energy research is overwhelmingly technical and economic in nature, but energy development has very real social, political, and cultural consequences that must be explored and documented in conversations about energy futures. There is hence a need to explore the ways in which energy landscapes generate embodied emotions and the way that residents come to understand these physical and emotional changes in response to the industry (Perry, 2016; Sangaramoorthy et al., 2016).

The aim of this research is to explore the emotional consequences of living near pipelines and methane gas infrastructure in the Appalachian communities of the Ohio River Valley, building on previous work by Dr. Caretta, Dr. Carlson, and Bethani Turley in the Hydrofeminist Lab at West Virginia University (e.g. Turley & Caretta, 2020; Caretta et al., 2021). Moreover, this research was conceptualized with the support of the Heinz Foundation and in collaboration with the Ohio Valley Environmental Council (OVEC) in response to the proposed development of the Appalachian Petrochemical Hub (APH), a petrochemical corridor similar to that of "Death Alley" in the Louisiana Gulf Coast (Castellón, 2021). In addition to a multitude of pipelines, this corridor would be powered by multiple cracker (plastics processing) plants, resulting in millions of tons of greenhouse gas emissions per year (Carlson & Caretta, 2021; Mishkin, 2019). This research contributes to the existing conceptual gap between energy and emotional geographies (Rohse, Day, & Llewellyn, 2020), particularly in relation to meanings around sense of place and the ways in which feelings of identity and community manifest through place-based attachment. Moreover, this research participates in a long tradition of critical research that is "both scientifically rigorous and socially relevant"

by investigating the lived experiences of fenceline communities<sup>1</sup> in the Ohio River Valley (Short & Szolucha, 2019, p. 266).

This thesis is organized into nine chapters, including this introductory chapter. Chapter II identifies the research aim and questions, followed by Chapter III which provides a background on Appalachia and fracked landscapes. This section establishes some of the systems and structures of methane gas production in the United States as well as broadly reviewing social science literature surrounding fracking and pipelines. Chapter IV presents the conceptual framework, which outlines the concepts from feminist geography, emotional geography, and energy geography that are utilized to frame this research. Through this literature review, the concepts of embodiment and energy landscapes are linked to demonstrate a contribution to the study of emotional energy geography. Chapters V and VI address the methodology and methods of the research design using tenants of feminist epistemology and positionality. Chapter VII presents the research findings using excerpts from interviews and body-mapping focus groups. Chapter VIII provides a discussion of the research results using available literature, and Chapter IX is a conclusion to the thesis which identifies future research avenues.

### *Terminology*

Throughout this thesis, I use the term “methane gas” to describe the fossil fuel produced by fracking. Historically, this product is often referred to as “natural gas.” A study from the Yale Program on Climate Change Communication (YPCC) found that the term “natural gas” provokes much more positive associations than the terms “methane gas” or “natural methane gas,” and respondents perceive “natural gas” to be a cleaner and safer fuel (LaCroix et al., 2020). The use of “methane gas” is a purposeful shift in language in line with calls from climate scientists and activists to use terminology that conveys the inherent danger/harm of the use of fossil fuel gas (Leber, 2022). This follows from Evensen et al.’s (2014) provocation to “provide as much description as possible” when researching and writing about the processes, risks, and benefits related to fracking (p. 136).

At times I use the term “shale gas” interchangeably with “methane gas” in order to describe the source of the fossil fuel, relevant to discussions about production in the Appalachian region. I also use the terms “oil and gas” or “unconventional oil and gas” to talk about production because fracking does not only produce dry methane gas but also other products, including “liquified natural gas” (LNG). The term “oil and gas” is more comprehensive and captures a whole of participant experiences, given that some are

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<sup>1</sup> Fenceline communities are residential areas that border industrial infrastructure and therefore (physically) witness and experience its direct impacts, including localized pollution (Adams et al., 2017). These communities are disproportionately composed of disenfranchised populations, including Black, Indigenous, People of Color (BIPOC) communities and the working class. (Fleischman & Franklin, 2017).

confronting oil and gas pipelines, both of which are a product of fracking. Finally, I use the term “fracking” to discuss participants’ experiences because it describes not only the physical process but is also invoked by participants in a broader sense to capture the effects of the entire production cycle, including compressor stations, truck traffic, waste disposal, and other industrial elements (Short & Szolucha, 2019). For affected communities such as those represented in this thesis, this word can capture aboveground lived experiences of unconventional oil and gas production (Short et al., 2015).

## **II. Research Aim and Questions**

The aim of this research is to explore how unconventional oil and gas infrastructure impacts peoples’ relationship to home and self, and how said impacts are emotionally embodied. This aim will be fulfilled through a study of residents affected by pipelines in the Ohio River Valley within West Virginia, Pennsylvania, and Ohio. The research questions that will be investigated are:

1. How have residents’ sense of place, place attachment, and place-based identity shifted as a result of pipeline development?
2. How are these changes manifested through embodied emotions?

## **III. Fracked Appalachian Landscapes**

The Appalachian region extends from southern New York to northern Mississippi (Appalachian Regional Commission [ARC], 2022). The boundaries of Appalachia were defined in 1965 by the Appalachian Regional Commission (ARC), which was created as part of President Lyndon B. Johnson’s War on Poverty. The Appalachian Regional Development Act (ARDA) established a federal-state partnership to strengthen Appalachia’s economy. Thus, the designation and definition of Appalachia is inherently political in nature, and there is significant variation in how closely residents from different parts of the region are tied to or claim the Appalachian moniker. The central Appalachian region, including eastern Tennessee, western North Carolina, southwestern Virginia, eastern Kentucky, and southern West Virginia is associated with the strongest regional affiliation (Cooper, Knotts, & Elders, 2011; Reed, 2018). Prior to the creation of the ARC, Appalachia was first constructed by urban journalists as a counterpoint to the purported progress being made by the rest of the country at the turn of the twentieth century (Eller, 2008), stereotyping Appalachians as backwards, poor, and uneducated.

Over several centuries, Appalachia, and particularly central Appalachia, has had a long and deep history of extraction, from timber to coal and now oil and gas, which has shaped the region economically, socially, and culturally (Lewis, 1978). For decades, the region has experienced socio-economic and

environmental deterioration at the expense of extractive industry, manifested through, for example, widespread unemployment and poverty, lack of healthcare access and an opioid epidemic, and educational disparities (DeBolt et al., 2021; Fabricant, 2015; Metcalf & Wang, 2019). This disparity has led to the description of Appalachia's landscape as a "sacrifice zone" (Gaventa, 2019), which Matthew Henry (2019) defines as "landscapes considered expendable in pursuit of what government and industry stakeholders perceive as a 'greater good'" (p. 405). Throughout the region's history with extractive industry, short-term economic growth, largely for extractive companies outside of the region, has been prioritized over long-term concerns regarding environmental, social, economic, and health impacts from resource extraction (Caretta et al., 2021; Chalfant & Corrigan, 2019). Extractive development, including mountaintop removal and other forms of mining, has destroyed much of the natural landscape of central Appalachia and has transformed the region into industrial sites with many Appalachian communities dependent on the fossil fuel companies for employment and livelihood (Eller, 2008; Lewin, 2019). As economic identities have been historically tied to the coal industry, extractive industry has weaponized those identities to maintain regional political influence and dodge environmental and social responsibilities (Bell & York, 2010). Though Appalachian communities may hold a forced dependence on industry, income increases in areas with ongoing shale gas extraction are minimal (Paredes, Komarek, & Loveridge, 2015).

Methane gas is the latest extractive economy in the Appalachian region as the coal industry continues to decline (Gruenspecht, 2019). The Appalachian Basin is home to the Upper Devonian, Marcellus, and Utica shale formations (Lampe & Stolz, 2015). The Marcellus shale region, which sits below western New York, Pennsylvania, Ohio, and West Virginia, is the largest shale gas formation in the country with an estimated methane gas supply equal to 45 years of U.S. consumption (Finkel & Law, 2011). These economies have transformed not only the social and cultural composition of impacted communities but also the natural landscape, with the construction of oil and gas pipelines, compressor stations, gas wells, and other extractive infrastructure (Caretta et al., 2021; Jacquet et al., 2018). Energy sprawl (new land required for energy production) is now the biggest driver of land use change in the United States (Trainor, McDonald, & Fargione, 2016).

A variety of environmental and health impacts are associated with fracking, including forest fragmentation, land disturbance, groundwater contamination and drinking water impairments, air pollution, earthquakes, noise, and traffic accidents (Brantley et al., 2014; Buchanan et al., 2017; Clark et al., 2021; Ehrman, 2020; Goodman et al., 2016; Graham et al., 2015; Hanson et al. 2017; Hays, McCawley, & Shonkoff, 2017). Unconventional fracked wells require well pads of five to ten acres in size, which produce large quantities of methane gas for a few months and then decline quickly, necessitating continuous drilling and fracking of new wells to maintain production (Lave and Lutz, 2014). The landscape alterations from

shale gas development culminate in the creation of fracked landscapes; Meng (2014) documents these “invasive landscapes” as fracking pads in the Marcellus shale region come to resemble a small town, with the clearing of mountaintops and ridges, gravel pavement, and crowding of trucks, bulldozers, and storage containers (pp. 110).

There are 59 different health impacts and 13 stressors that have been linked to hydraulic fracturing (Soyer, Kaminski, & Ziyank, 2020). Documented illnesses and symptoms experienced by communities impacted by fracking include increased rates of cancer, fatigue, headaches, ocular and dermatologic irritation, confusion, delirium, preterm birth and low birth weight, and respiratory, gastrointestinal, immunological, endocrine, and sensory deleterious effects (Clark et al., 2021; Deziel et al., 2020; Hirsch et al., 2018; Litovitz et al., 2013; McKenzie et al., 2012). Communities in close proximity to fracking sites are routinely exposed to toxic air pollutants with carcinogenic and neurotic effects, including benzene, toluene, hydrogen sulfide, and carbon disulfide, but regulatory monitoring focuses only on six “criteria pollutants” and in areas considered representative of the airshed, rather than industrialized areas where emissions are high (Ottinger, 2017). Fracking-impacted communities also show increased rates of visits to healthcare professionals and rates of hospitalization. Public anxieties over fracking have been well-documented, particularly around concerns over environmental degradation, such as water contamination, air pollution, and noise exposure (Adgate, Goldstein, & McKenzie, 2014; Boudet et al., 2014; Macnaghten, 2017; Sangaramoorthy, 2019). In the Pennsylvania Marcellus Shale region, residents show new medical symptoms after the development of unconventional methane gas development, and they also associate the symptoms with the development (Saber, 2014). However, these associations have been “minimally explored” (p. 6517).

Pipelines are certainly not exempt from the risks that other fracking infrastructures pose. Structural risks include landslides, leaks, and explosions (Lee et al., 2009; Han & Weng, 2010). Spills from pipelines can contaminate water supplies and ecosystems as well as threaten public health and local economies (Strube, Thiede, & Auch, 2021). Other risks include the release of toxic chemicals like hydrogen sulfide (Jianwen, Da, & Wenxing, 2014) and volatile organic compounds (Hendryx & Luo, 2020); soil corrosion (Malmasi, Fam & Mohebbi, 2010); noise pollution (Tupov, Tupov, & Skvortsov, 2018); and the leaks of methane, a potent greenhouse gas (Phillips et al., 2013), in addition to the continued use of fossil fuels driving climate change. Between 2010 and 2018, in Pennsylvania alone, the Pipeline and Hazardous Materials Safety Administration (PHMSA) identified 108 problem events related to gas distribution, amounting to approximately \$66 million dollars in damages (Caretta & McHenry, 2020).

Despite a range of documented impacts, environmental regulation and enforcement for fracking is minimal (Healy et al., 2019). The 2005 Energy Policy Act exempted hydraulic fracturing and directional drilling for methane gas from seven of fifteen environmental regulations, including the Clean Water Act 15 and the Safe Drinking Water Act (Malin et al., 2017). Fracking is solely regulated at the state level in all 30+ fracking states (Healy et al., 2019), in line with neoliberal policy trends of devolution and state preemption (Goho, 2012; Malin, 2014). As a result, there is no centralized database that reports damage from fracking, spills, or failures. In Pennsylvania alone, the NGO Public Herald discovered 2,309 previously unreported fracking complaints as a result of mismanaged record keeping and reporting in the state Department of Environmental Protection (Peltier, 2016). Even fracking chemicals themselves are not monitored because they are considered proprietary and thus are unknown or undisclosed (Fink, 2018; Kinchy & Schaffer, 2018). Particularly in Appalachia, politicians with a vested interest in the oil and gas industry, in partnership with influential energy lobbies, have paved the way for development through tax cuts and deregulation (Morrone et al., 2011).

In addition to the physical health impacts, there are also community health impacts. For example, “othering” (us vs. them) discourses and mobilizations can fracture communities as some oppose and others favor the industry (Soyer et al., 2020). Oil and gas development mobilizes residents through neoliberal strategies that pit neighbors against each other as some are willing to lease and others are not, forcing individuals to evaluate the costs and benefits to participate in extraction and accept the risks involved (Finewood & Stroup, 2012; Malin, 2014). Residents are ordered to “reframe their human needs and desires to parallel those of capital” by accepting development at their homes for the “greater good” through discourses of energy needs, patriotism, and job creation (Hudgins & Poole, 2014, p. 305). The socio-psychological impacts caused by othering and helplessness at the community level are directly related to the well-being of residents. Social scientists have explored how the social and economic impacts of fracking have generated vulnerability, disempowerment, and displacement (Perry, 2012; Willow et al., 2014). Uneven social, political, and economic power between stakeholders can stifle mobilization against these projects (Perry, 2012).

Several scholars have written about the boom-and-bust nature of oil and gas (e.g., Brown, Geertsens, & Krannich, 1989; Gilmore, 1976; Jacquet & Kay, 2014; Sangaramoorthy, 2019), a cyclical nature that significantly shapes the long-term impacts of industry to rural areas. The “boomtown” phenomenon describes the ways in which rural areas rapidly industrialize and populations grow as a result of the discovery of natural resources (England & Albrecht, 1984; Gilmore 1976; Willow & Wylie, 2014). The boom and bust pattern begins with intensified industrial activity at the outset of energy development, with large numbers of workers migrating to site communities; this influx strains public infrastructure and

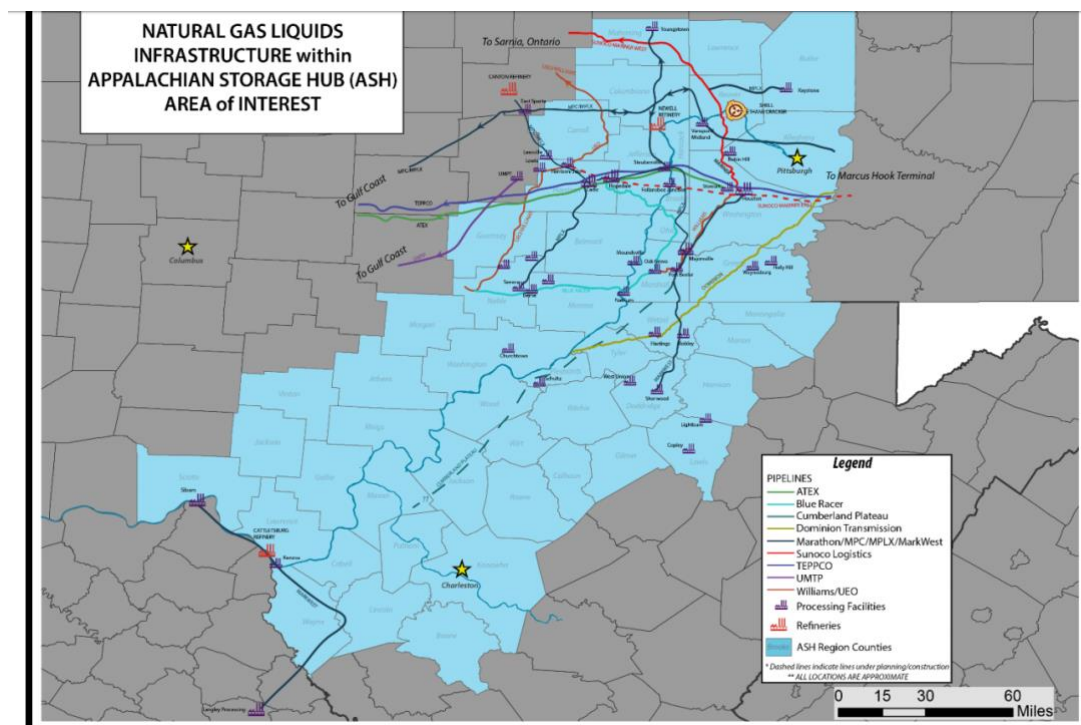
services in addition to bringing detrimental environmental and social impacts. Moreover, the arrival of male workers into rural towns for temporary and transitory work impacts rural community dynamics, including public health (Komarek & Cseh, 2017). When production stagnates and eventually declines, otherwise known as the “bust” phase, site communities struggle with job losses, poverty, environmental degradation, health impacts, and strained community relations (Sangaramoorthy, 2019). The negative consequences of development often outweigh the benefits with an overall decrease in community satisfaction (Anderson & Theodori, 2009; Willow & Wylie, 2014). Certain characteristics of the fracking process mark its unique boom-and-bust potential, such as the extensive infrastructure necessary to produce, process, and distribute gas, uncertain regulatory frameworks, and long-term environmental and health impacts (Jacquet, 2014; Sangaramoorthy, 2019; Stedman et al., 2012).

Perry (2012) demonstrates the ways that rapid social and economic change, through the fracking industry, impact daily lived experience and community dynamics in Bradford County, PA, a traditionally agricultural and rural place within the Marcellus Shale region. They find that the effects on residents include “depression, a sense of loss, fear, betrayal, guilt, and anger, and emotional highs and lows” (p. 89). West Virginia residents impacted by fracking have reported significant distress over the disruption of physical and natural landscapes, which create conflicting place meanings and contested identities (Sangaramoorthy et al., 2016). Perceptions of the impacts of fracking are place-based. As Sangaramoorthy et al. argue, though fracking is a global phenomenon, experiences with the fracking industry are very localized and informed by individual and collective sense of place. The relationship between the geographical effects of the fracking industry, particularly from pipelines, and the associated impacts to affected residents’ emotions and attachment to place remains underexplored. This research contributes to the linkages between energy geography and emotional geography, emphasizing how changes to place and landscape cause embodied impacts to humans in these landscapes.

This research is undertaken in light of the proposed Appalachian Petrochemical Hub (APH), a petrochemical corridor that would stretch along the Ohio River Valley from Beaver, PA to Catlettsburg, KY (**Figure 2**). This petrochemical complex would include five “cracker plants,” facilities that break methane gas liquid molecules to free ethylene and related chemicals which are the raw material used to produce (largely single-use) plastics. This would require six major pipelines and dozens of feeder lines. The Gulf Coast of Louisiana has a very similar petrochemical corridor that has been termed “Cancer Alley” (recently renamed to “Death Alley”) by residents and community organizers. This region of Louisiana, which houses over 150 petrochemical plants and refineries, ranks sixth in the nation for rates of cancer deaths (Castelleón, 2021). As the region is home to overwhelmingly poor African American and Latine communities, United Nations (UN) human rights experts have called for an end to the environmental racism



of the petrochemical corridor (United Nations, 2021). Ohio River organizers fear that a petrochemical corridor here could be even more deadly because of the way that the air settles in the valleys (Pokladnik, 2018). Valleys often experience air inversions, which causes air pollution to build up under a cold layer of air, which is itself trapped under warmer air. For instance, a 1948 air inversion event in Donora, PA killed twenty people and caused 7,000 others to become sick. In addition to its academic contributions, this research will be summarized for communities and organizers in the Valley who are directly impacted by the petrochemical expansion for use in testimonies, awareness campaigns, and organizing strategy.



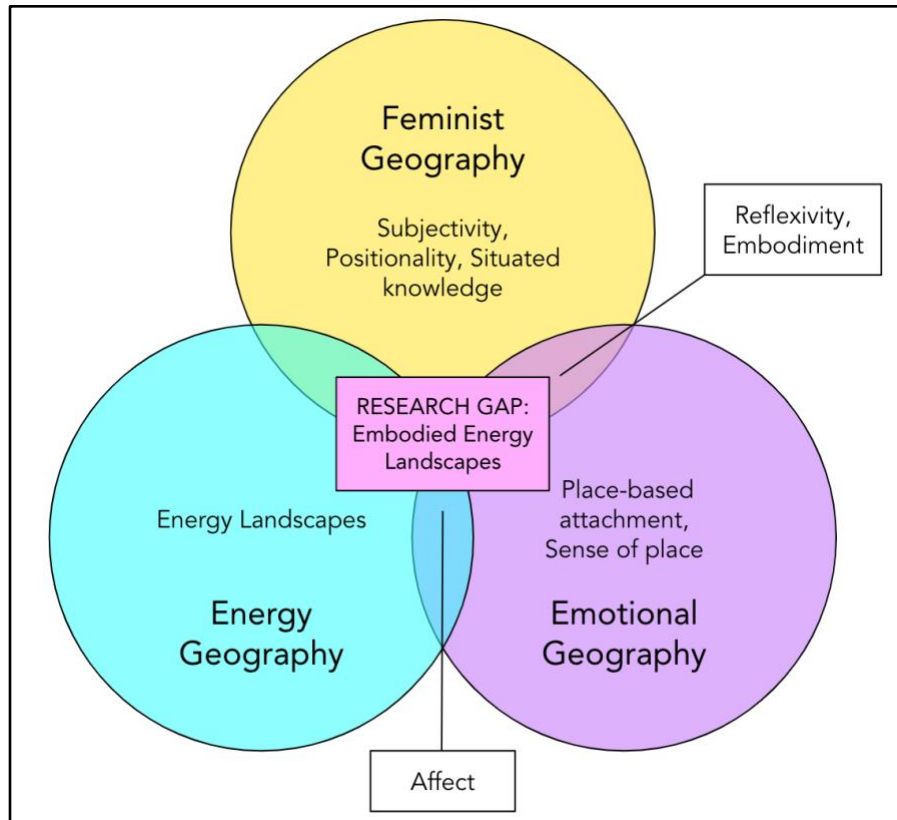
**Figure 2.** Proposed Appalachian Storage Hub. Image shows pipelines, processing facilities, and refineries associated with the project. Source: OVEC.

Residents' experiences of and concerns about the daily risks from pipelines and methane gas development are often unacknowledged or dismissed as uncredible or as anti-science by both industry proponents, scientists, and legislators (Eisenberg, 2015; Finewood & Stroup, 2012; Malin & DeMaster, 2016; McHenry, 2017). Moreover, Lave and Lutz (2014) argue that there is a rift between natural and technical scientists' description of fracking and its manageable impacts and social scientists' ringing of alarm bells around devastating environmental, social, and health impacts. Energy development vastly alters landscapes with industrial infrastructure which can significantly impact rural communities and their emotions (Caretta et al., 2021). And yet, energy development conversations are dominated by technical and economic analyses of the issue, sidelining embodied experiences. Technical and statistical research regarding energy development and its impacts is overrepresented in knowledge production and application,

and research that focuses on and uplifts lived experiences with industry are not valued and incorporated into policy discourse and decision-making around energy development (Caretta et al., 2021; Caretta & Carlson, 2022). As Healy et al. (2019) state, the cost-benefit approach to energy impact studies and assessments uphold a “narrow focus on biophysical impacts and an inherent blindness to social, cultural and justice-related impacts, even when impacts fall squarely within decision-makers’ jurisdiction” (p. 229). This research, using an emotional and embodied lens, aims to improve our understanding of the relationship between energy systems and lived experiences as well as raise questions about power and social relations in energy landscapes (Caretta et al., 2021).

## IV. Conceptual Framework

My research is situated largely within three subfields of geography: feminist geography, emotional geography, and energy geography. This conceptual framework reviews feminist geography and some of its key concepts including subjectivity, positionality, situated knowledges, and reflexivity, which contextualize and influence the understanding of knowledge and emotions as embodied. It then reviews literature in emotional geography and particularly the concepts of sense of place, place attachment, and embodiment, which inform understandings of the ways in which emotions and the broader landscape are inextricably linked. This thesis is also grounded in energy geography which utilizes socio-spatial theory to understand energy-society relationships. The relationship between extractive energy infrastructure and embodied emotions is an under-investigated link. The results from this research speak to the research gap at the intersection of feminist, emotional, and energy geography. **Figure 3** below illustrates the connections between these three fields of geography as well as the research gap that I look to contribute to with this research.



**Figure 3.** Conceptual Frame Map, linking concepts from Feminist, Emotional, and Energy Geographies

## 4.1 Feminist Geography

Feminist geography explores how, among other issues, gender and identity shape and are shaped by space and place (McDowell, 1997; Rose, 1993). Feminist scholars in the 1970s criticized the exclusion of women from geography within academia and the traditional domination of the discipline by (white) men, including the control over what was considered geographical scholarship (Rose, 1993). Feminist geography arose from the recognition that gender is an identity marker that significantly impacts the ways that people move through and perceive the world (Sharp, 2009). Early feminist geographers argued that women and men are differently positioned in the world and that their genders significantly differentiate their experiences of space and place, as a result of structural inequalities and oppression by patriarchal systems (McDowell, 1997). Feminist geographers emphasize that these differences are constructed, rather than inherent, and are embedded in power relations (Pratt, 1992).

According to Mohammad (2016), there have been three shifts within the field: from geographies of women (descriptive) to feminist geographies (theory), from a focus on cisgender equality to a focus on difference and diversity (intersectionality), and an epistemological shift that is sensitive to and pays

attention to power dynamics. Early feminist geographers focused on the historical role of women and women's contributions and to address the continual erasure of women and gender differences within the field of geography (England, 2006). Feminist geographers also began to study issues that were disregarded as private or personal, arguing that the personal and political are intertwined (Domosh, 1991; England, 1994; Rose, 1993). Since the rise of third wave feminism, feminist scholars, including feminist geographers, have critiqued the centrality and privileging of white, Western women within feminist theory and have argued against the homogenization of women (Mohanty, 1984). As England (2006) puts it, while there are many complexities and divergences in the field of feminist geography, "at the heart of [it] are analyses of the complexities of power, privilege, oppression, and representation" (p. 286).

Feminist epistemology has explored the ways in which gender influences what we consider to be "knowledge" (Anderson, 1995). Academia and Western science have historically favored knowledge that claims to be "scientific," "objective," and "empirical," central tenets of positivism. However, positivism is only one theory of knowledge that carries inherent assumptions about the knowledge producer, what they can know, and the ways in which they come to know it (Sprague & Kobrynowicz, 2006). Feminist scholars have problematized these assumptions inherent in knowledge production by demonstrating a theory of knowledge in which social position influences knowledge production. Moreover, feminist scholars have problematized the research process itself and the power relations inherent within the production of knowledge.

*Subjectivity* and *positionality* are two key concepts derived from feminist scholarship. Subjectivity addresses how people negotiate their sense of self in relation to their surroundings (Rose, 1997). Feminist geographers have rejected false dichotomies, including man-and-nature and mind-and-body, that reproduce masculinist notions of "objective" science (Harding, 1986; Longhurst, 1995). Rather, feminist knowledge production is grounded in the assertion that there is no singular truth or objective knowledge (Harding, 1986). Therefore, all knowledge is subjective and partial (Haraway, 1988). Donna Haraway advocates for "situated knowledges" given that academic neutrality does not exist and ignoring personal biases lacks responsibility and critique. Situated knowledges recognizes that all beings have agency and are actors in creating and expressing different realities that are impacted by power dynamics. In Haraway's situated knowledge, the social location of the knowledge producer impacts the knowledge they generate based on their identities, experiences, and perceptions of the world. This knowledge is more accurate and reliable than "objective" knowledge as it recognizes bias and positionality, rather than making a false claim at neutrality and empiricism.

Positionality addresses how researchers and research participants are always situated in particular worldviews and perceptions influenced by our identities, including race, class, gender, sexuality, nationality, and ability (England, 1994; Kobayashi, 2003; McDowell, 1992). In other words, people see and come to understand the world through varied and particularly embodied locations (England, 2006). Grounded in post-structural epistemology, feminist geography rejects that rational knowledge can or should be independent from the social position of the knower or devoid of emotion and separated from the body. Feminist scholars also recognize that the politics of knowledge production have and continue to restrict what and whose knowledge is recognized and institutionalized (Cope, 2002).

Feminist scholars also emphasize an attention to power dynamics in the field between researchers and participants, as well as the participatory or extractive nature of the research. A tenet of participatory research is the recognition that the production of knowledge is a basis for power and control (Maguire, 1996). Therefore, there is potential in collaborative research with community members to generate emancipatory or transformative change. By investigating an issue collaboratively, this may lead to an ability to transform it. Part of this transformative potential means recognizing power relations inherent in production of knowledge and actively working to mitigate those power dynamics by recognizing the subjectivity of the research participants and making space for their participation in the knowledge production process (Joyappa & Martin, 1996). The result is action with, rather than for, disempowered groups (p. 4). Feminist scholars have destabilized the notion of the researcher as the sole producer of knowledge, and suggest that knowledge is co-produced through the research process between researcher and participant (Joppaya & Martin, 2006). From that suggestion, *reflexivity* is another key concept to come out of feminist geography and feminist scholarship more broadly. Reflexivity aims to make transparent researcher biases in the process of knowledge production, as well as the relationship between the researcher and the participant (Mohammad, 2016). This self-reflection involves processing the ways in which aspects of the researcher's identity and experiences influence all aspects of research (England, 1994). However, it is also important to recognize that there are limits to reflexivity in that it can never result in full transparency or evade the spatial structures of power that position one person as interviewer and one person as interviewee (Rose, 1997; Smith, 2016).

Feminist scholars discourage the use of binaries such as masculine/feminine, mind/body, and objective/subjective (Sharp, 2009; Longhurst, 1995). Feminist geography emphasizes a particular focus on the body, again rooted in the idea that no one can be detached and disembodied from their research or knowledge (Longhurst, 1995). Not only does the study of bodies recognize positionalities, but it also allows for the incorporation and validation of emotional and embodied knowledges that have historically been

dismissed as irrational and subjective (Bondi, Davidson, & Smith, 2007). Emotional geography has expanded on the understanding of emotions and embodiment in relation to space and place.

## 4.2 Emotional Geography

Emotional geography emerged from feminist and relational geographies and analyzes the ways in which emotions are an epistemological source of knowledge as well as how emotions impact the research process, including through the emotions of the researchers themselves (e.g., Lund, 2012; Thien, 2005). Geography has historically been constructed as an emotionally barren field, in which spaces are ordered through positivist theory of science (Bondi et al., 2007). Emotions do not fit into this positivist ontology, as they are difficult to define, delineate, observe, and map, though they influence every aspect of life. The work of emotional geographers is both infused with and informed by emotions, in addition to a focus on doing work that is often emotional in nature. There has been a growing commitment to the work of centering emotions in both research and writing, in individual projects and broader disciplinary concerns. Emotional geography attempts to understand emotion both materially and conceptually through its “socio-spatial mediation and articulation” (Bondi et al., 2007, p. 3).

Emotional geography frameworks are used to analyze an array of socio-spatial contexts (e.g. Crewe et al., 2014; Kearney, 2009; Wright, 2012). Scholars of emotional geography demonstrate the ways in which the incorporation of emotions both expands research inquiries and challenges the epistemological norms of knowledge production by centering what is inherently subjective and intangible. They also reinforce the notion that emotions are relational both between people and between people and *place* to emphasize the geography of emotional geography and the spatiality of feelings (Wood & Smith, 2004). Emotional geography does not attempt to conceptualize emotions as discrete objects but rather explores how emotions are constructed by both people and place (Pile, 2010; Sharp, 2009; Sultana, 2011). Emotions locate people in networks of human and non-human relations that help to make sense of the world. “Embodied subjectivities” is a framing to describe how feelings are negotiated in the context of the events, relationships, and environments that exist in particular time-spaces (Sultana, 2011, p. 534). Feelings are also negotiated in relation to place itself.

### ***4.2a. Place attachment, sense of place, and place-based identity***

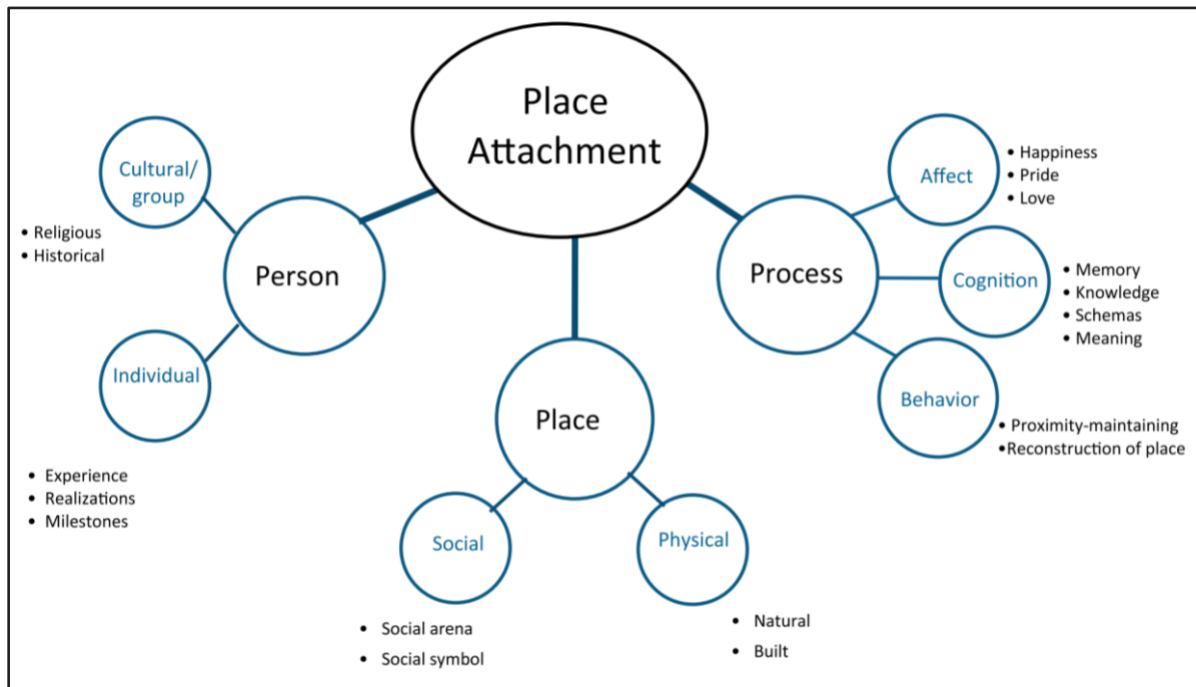
In geography, “place” is a site that is given meaning based on experiences, relationships, and emotions (Tuan, 1977). *Place-based attachment* and *sense of place* are a key lens through which to understand the relationship between the self, emotions, and the landscape. Place-based attachment is

generally defined as a person's or a community's love for or connection to their home environment, as well as the physical and/or emotional attachment that an individual or collective has with a particular place (Scannell & Gifford 2010; Willox et al., 2012). In addition to the personal dimensions of place attachment, including feelings about specific settings and connections to place, there are also community (sense of belonging) and natural environment (connection to non-human environment based on history or emotional response) dimensions (Raymond, Brown, & Weber, 2010).

In the 1970s, following the quantitative revolution and domination of positivism in geography, human geographers sought to re-emphasize humans as a center in geographical thought and explored place attachment through analysis of sense of place (Lewis, 1979; Relph, 1976; Tuan, 1979). Sense of place refers to the ways in which people form an attachment or emotional bond to and with place (Altman & Low, 2012) and the meanings associated or attributed to place over time (Relph, 1976). Sense of place is influenced by the depth of experience as well as the social relationships intertwined with a setting (Relph, 1976; Tuan, 1980). Yi-Fu Tuan, a foundational human geographer, used an analysis of the home to explore the varied dimensions of place through the body, mind, and spirit across multiple scales (1979). The concept of multiple scales has become a central concept in human geography and is used here to understand the relationship between the landscape, the home, and the self.

Place attachment and sense of place influence *place-based identity*, meaning the formation of individual identities within or through a connection to place (Scannell & Gifford 2010; Willox et al., 2012), the ways in which place provides meaning or purpose in life (Brown & Raymond, 2007), and the ways in which identities are attached to and situated within place (Willox et al., 2012). When sense of place and place attachment are threatened or disrupted, individuals may feel a loss of personal identity, cultural identity, and knowledge systems, resulting in feelings of “ecological grief” in which mental health is detrimentally impacted by place-based impacts (Cunsolo & Ellis, 2018, p. 276).

Scannell and Gifford (2010) provide a popular, tripartite framework for conceptualizing place attachment through the person (individual), psychological, and place to elucidate and analyze bonds between person and place (**Figure 4**). Place attachment has been used in a variety of fields including psychology and sociology. Diener and Hagen (2022) argue that there are a variety of epistemological, methodological, and theoretical frameworks to understand place attachment within the field of geography and that geographers in particular are well-suited to advance place attachment through an inherent focus on process and place. This research focuses more closely on understanding the relationships between the **built physical** environment and **social** components of place as well as the **affect, cognition, and behavior processes** related to place attachment.



**Figure 4.** Tripartite model of place attachment developed by Scannell and Gifford (2010)

There is a perception that rural Appalachia and Appalachians have a strong attachment to place (Barcus & Brunn, 2009). Importantly, however, this attachment is not a monolith, and the meaning, complexity, and relevance of an “Appalachian identity” is contested amongst scholars (Smith et al., 2010). Cooper, Knotts, and Livingston find that many people who live in Appalachia do not identify with the region (2010). A strong, place-based Appalachian identity is generally correlated with senior residents who have spent more of their life in the region and have had access to more education. The strongest regional affiliation is in Southern Appalachia, including eastern Tennessee, western North Carolina, Southwestern Virginia, eastern Kentucky, and southern West Virginia (Reed, 2018), outside of the study region for this thesis. Importantly, however, researchers in Appalachian contexts overlapping with my study region have demonstrated that extraction, including coal (Feng, 2020) and hydraulic fracturing (Morrone, Chadwick, & Kruse, 2015; Sangaramoorthy et al., 2016), disrupt attachment to sense of place, identity, and community. This disruption is not only an emotional and mental change, but often also a physical sensation. To better understand this physical element of change, I will make use of the concept of *embodiment*.

#### **4.2b. Embodiment**

The concept of *embodiment* has been used in a variety of fields, including psychology, sociology, and health, to understand how social impacts and injustices manifest through physical, bodily symptoms



and suffering (Healy et al., 2019). Within the field of emotional geographies, embodiment helps to explain the relationship between the landscape and the body as a linked geography. A number of feminist and emotional geographers have focused their studies on the body and emotions (e.g. Longhurst, 1995; Sharp, 2009). “Embodied emotions” are the physical sensations associated with emotional experiences; for example, feeling a “pit in your stomach” or lightheadedness during sudden emotional upheaval. Bennett (2004) shares a story of a woman who physically could not walk to where her cows were being slaughtered because her grief was so consuming. Davidson and Milligan (2004) argue that the body is the “first and foremost, most immediate and intimately felt geography” (p. 523) as the site of emotional experience and expression. They offer an “emotio-spatial hermeneutic” contending that emotions are only understandable in the context of the particular places in which they are experienced. Emotions therefore link the felt geographies of the mind and body with the broader social geographies of place.

Embodiment is related to situated knowledge as a critique of disembodied objectivity, or the “view from nowhere” (Nagel, 1989). Under positivism and objectivity, the presumed and unmarked white, western man was able to separate his knowledge from his embodiment. The same could not be said for, among others, women, racialized groups, disabled people, and other minoritized and oppressed peoples. Feminist and emotional geography scholars disagree with the belief that knowledge can be separated from the social position of the knower (Haraway, 1988); this social position includes the body and embodied emotions (Longhurst, 1995). A focus on situated knowledge and embodiment seeks to undo the presumed “mind-body dualism” and recognize that an objective mind cannot be separated from a subjective body. Moreover, a focus on embodiment is a deliberate choice to research the “private” or “personal,” including the body, the home, and lived experiences; thus it is a political choice to link the home and the body to broader geopolitics through the feminist understanding that the personal is political (e.g., Dyck, 2005; England, 1994; Oberhauser, 1995; Smith, 2012).

*Affect* and affectual geographies intersect and overlap with emotional geographies (Pile, 2010; Tolia-Kelly, 2006; Thien, 2005). Affect is inherent in the understanding of relational geography that space is not inert but rather is “active, dynamic, and composed of relations arising from flows and networks” (Cresswell, 2012, p. 219). Affect is the conceptualization of emotion outside of solely the personal or embodied. It emphasizes the relation between things as one body or object acts on another. Affect disrupts the idea that emotions are generated within the body and then emanate out toward other human and non-human beings or objects (Schmitz & Ahmed, 2014). Rather, affect illustrates how people are affected by and affect the people and things around them. While both affectual and emotional geography attend to the silencing of emotions in research and knowledge production, feminist geographers have critiqued affectual geography for being inattentive to issues of power and “historical memory” that impact the network flows

that affectual geographers study (Tolia-Kelly, 2006, p. 213). Affectual capacities are not equal because of disparate positions of power in encounters, and affectual geography can falsely construct emotions as universal and balanced interactions when power dynamics in fact heavily influences how emotions are constituted between two subjects. Emotional geography highlights the embodied emotional experience and the political materialities that “that resonate from and that are formed through emotions” (Tolia-Kelly, 2006, p. 213); emotions are relational and contextual experiences that are co-produced and intersubjective (Sultana, 2011). Emotions are not simply bound in a subject but move and reflect how a subject arrives at and exists in the world that already has affects and feelings structured and moving about the world in particular and patterned ways (Schmitz & Ahmed, 2014).

Rather than simply bringing emotions into accounts of the research process, emotions are data that can be used to understand power relations, geopolitical contexts, and the relationship between the body and the broader world, a world which includes the landscape, social relations, political dynamics, and cultural trends. The concepts of affect and embodied emotion are particularly relevant to research on energy geography and environmental (in)justice, systems which are imbued with geopolitical power and affectual capacity. Embodiment as an epistemological and methodological tool helps to make explicit the physical, mental, and emotional connections between technological infrastructure, the landscape, and the self.

### 4.3 Energy Geography

Energy geography has been defined as the study of energy development, transportation, and use patterns, and their influencing factors, using a spatial perspective (Solomon, Pasqualetti, & Luchsinger, 2004). Key topics in energy geographies include energy transitions, governance, justice, space, and landscape (Baka & Vaishnava, 2020). Critical geographical analyses include using socio-spatial theory to understand the energy-society relationship, geo-political and -economic analyses of changing global energy networks, geographical analyses of energy transitions, and spatial assessments of energy planning (Calvert, 2016). Energy geography does not view energy as an “empirical object” but rather as an underlying concept that is central to nature-society relations (Huber, 2015, p. 1).

*Energy landscapes* is a key theme of energy geographies, meaning the ways in which livelihoods, material and discursive landscapes, territoriality, and cultures are intertwined with energy systems (Baka & Vaishnava, 2020; Calvert, Greer, & Maddison-MacFadyen, 2019). Landscapes are not just a point in space; rather, they are the combinations of natural and cultural/social features across a space and the history of their interactions (Bridge et al., 2013). Some of the questions explored using this concept include how energy alters energy-society relations, how energy systems affect everyday life, and the controversial and

uneven ways that energy influences, among other things, politics and development (Bridge, 2018). Energy geographers have moved to conceptualize energy not as a resource or an environmental process but as a social relation influencing spatial identities and connections to place (Calvert, 2016).

Many energy geographers have also constructed energy as a political resource (e.g. Bridge & Gailing, 2020; Calvert, 2016). Energy production and use are weaponized to exert control over space and shift or maintain a balance of power, which has ethical and social implications that are unevenly spatially distributed, producing environmental and social injustice. Scholars encourage a simultaneous focus on place-specific contexts and local struggles as well as systemic analyses of energy dynamics. National political narratives about energy independence, access to resources, nationalism, etc., enable local dispossessions and environmental destruction (Perreault & Valdivia, 2010). In addition to displacement and dispossession, energy development can also lead to the “slow violence of landscape destruction, water contamination, and livelihood disruption” to both human and non-human populations (Huber, 2015, p. 4). “Slow violence” is a term coined by Robert Nixon (2011) to define gradual and “attritional” violence that is drawn out across time and space and not necessarily recognized or defined as violence (p. 2). Davies (2021) uses this framing to study environmental injustices in so-called “Cancer Alley” and understand the material reality of slow violence for residents impacted by the petrochemical industry. Studies of slow violence often intersect with studies on environmental toxicity and the resulting emotional experiences of fear and worry (e.g. Davies, 2021; Gutierrez, Powell, & Pendergrast, 2021; Mah & Wang, 2018). Slow violence can lead to feelings of entrapment and “stationary displacement” as residents are stuck in a place that has been stripped of its inhabitability and familiarity (Davies, 2019, p. 8).

Other energy geographers have emphasized the agency of space and place in shaping and forming how energy systems come to be (Bridge et al., 2013; Bridge, 2018). Energy systems are not simply located geographically, but they are constituted spatially. Energy investments are impacted by locationally-specific natural resources, institutions and territoriality, and historical path dependencies (Dahlmann, Kolk, & Lindeque, 2017). A relational view of energy also challenges the idea that energy is a technical and physical entity and demonstrates that energy is a multi-faceted issue (Broto & Baker, 2018). Moreover, a re-focusing on the materiality of energy processes re-emphasizes particularities that have been erased by discourses of national energy production (Bridge, 2018). One analytical tool for this is network analysis, which allows a “geographical approach to each of these moments as the networks of power beneath them” that also notes the spatiality of energy systems (Huber, 2015, p. 5).

Scholars have called for expanded research in areas of unconventional energy, including renewable energy and hydraulic fracturing (Baka & Vaishnava, 2020); these energies have been studied widely in

social sciences but only a small portion of that research uses a geographic analysis. Geographers are well positioned to understand and critique multi-scalar systems and interactions, including energy systems. In the case of hydraulic fracturing, major energy infrastructures travel through space and cross borders as pipeline networks are built up (Bridge, 2018), resulting in a necessity of a spatial lens to articulate a full view of these systems. Local, regional, national, and global scales all converge and intertwine into one process, resulting in many analytical dimensions regarding who is affected, who has capacity/agency to take action, and who bears responsibility (Bridge et al., 2013). As geographers have demonstrated for decades, space is socially produced, and this includes spaces of energy production and their resulting impacts (Bridge, 2018).

Studies of energy landscapes also invoke the cultural and emotional attachments that people have to material aspects of a setting. Two key concepts conveying these attachments are *topophilia* and *solastalgia*. Topophilia refers to one's love of place (Tuan, 1990), and solastalgia regards the distress resulting from environmental change impacting place attachment, or the pain/sickness caused by loss of solace or sense of home due to the state of one's home/territory (Albrecht, 2005; Albrecht et al., 2007). More succinctly, solastalgia is the "homesickness you have when you are still located" in a changing place (Albrecht, 2010, p. 227). These key concepts in emotional geographies center attachments to material forms and the consequences of their disruption. Scholars have studied the emotional geographies of both the presences and absences in landscapes impacted by extraction (e.g. Bailey & Osborne, 2020; Pini, Mayes, & McDonald, 2010). Extractive developments can cause shifts in place attachments and threaten emotional links to places that residents want to protect, in addition to deeply altering the landscape itself. Despite the framing of energy issues as primarily economic and technical, the emotional consequences of such decisions play a central role in how people experience identity and place.

Ey, Sherval, and Hodge (2017) contend that the felt and emotive aspects of extractive industry are significantly underexplored and that extractive industry has problematically been represented as an emotionless field. Rohse, Day, and Llewellyn (2020) advocate for a synthesizing of energy geography and emotional geography, with the potential to improve our understanding of how energy systems interact with lived experiences, an essential but overlooked aspect of energy production. Energy research has been dominated by technical disciplines, even though energy questions are not only economic and technical but indeed also social and political. The purpose of this approach is both to reveal the emotions of impacted communities about aspects of the energy system as well as the "atmospheres and affects arising within and out of the energy system" (p. 136), emphasizing the agency of the energy system in the production of space. My research follows this call for a synthesized analysis by exploring the emotional geography of the oil and gas buildout in the Ohio River Valley.

In summary, feminist geographical concepts of subjectivity, positionality, situated knowledges, and reflexivity influence emotional geography and the understanding of knowledge and emotions as embodied. Emotional geography also influences understandings of sense of place and place-based attachment as emotions and the landscape are inextricably linked. These linkages are impacted by energy geography and energy landscapes, which may disrupt one's topophilia, or love of place, and generate solastalgia, or grief over loss of place. However, the relationship between extractive energy infrastructure and embodiment is an under-investigated linkage. Using concepts from feminist, emotional, and energy geographies, this study investigates that linkage by adding to the research gap identified and using key concepts illustrated in **Figure 3**.

## V. Methodology

The following section outlines how feminist and social constructivist epistemology have shaped my research methodology, including my understandings of positionality and reflexivity. In this research, I employ a multi-method qualitative approach, as presented in the 'Methods' section.

### 5.1 Epistemology

My research is situated within feminist and social constructivist epistemology. Feminist epistemology rejects the idea that there is one, singular, objective truth (Harding, 1986). Objectivity, an epistemology underlying much of Western science, suggests that researchers can be detached and disembodied from the subject of the research as well as participants and assumes mind-body and logic-emotion dualisms (Clement, 2019; Smith, 2021). This objectivity is supposedly held by the unmarked white, western, male body, against which those holding marginalized identities are marked (Longhurst, 1995). Feminist scholars challenge the assumption of objectivity by arguing that all researchers are positioned through specific ideological and embodied standpoints (England, 2006). Moreover, identities are historically produced and shift; thus, identities are not fixed but shifting through time and context (Mani, 1990; Mohanty, 1984)

All knowledge is subjective and partial, informed by an interconnected array of individual and collective identities, experiences, locations, powers, and bodies (Haraway, 1988; Mani, 1990; Mohanty, 1984). Situated knowledges, through a combination of individuals' partial and contextual perspectives, allow for a construction of knowledge that is closer to an objective account (Haraway, 1988). Furthermore, feminist scholars recognize that all knowledge is constructed through researcher's biases, ontological and ideological beliefs, and political standpoints (England, 2006). This assertion is aligned with a focus on the

body (Haraway, 1988). Knowledge production is altered by positionality and embodied standpoints, and acknowledging that subjectivity actually enhances the objectivity of the research.

A social constructivist epistemology holds that individuals develop subjective meanings and understandings of the world based on their varied and multiple experiences (Creswell & Creswell, 2017). As a result, researchers embrace complexity, rather than attempting to define narrow meanings, and rely on the research participants' views and experiences. These multiple meanings contribute to a complex and arguably more complete understanding of, in this case, the embodied emotions resulting from living near pipelines. The social constructionist approach also emphasizes that emotions, in addition to reflecting individual embodied responses to an event or object, also give insight into social processes and larger structural phenomena (Bennett, 2004).

Feminist epistemology also recognizes the unequal power dynamics at play within the research process itself (England, 1994); these research dynamics influence both the process and the data generated. Interactions between researcher and participant are an affectual space as they exchange ideas and emotions (Nagar, 2014). The researcher and participants are both situated and influence the production of knowledge through their positionality, but these positions historically are not created equal. Feminist scholars have challenged traditional knowledge production by attempting to develop approaches to research that are more equitable and inclusive. Reflexivity can help to mitigate this power dynamic, though it can never truly equalize and make fully transparent the researcher-researched relationship (Dodgson, 2019). Reflexivity can help to position the researcher as a witness to rather than an authority of knowledge production (Bondi, 2014). This reflexivity is a constant process of checking-in throughout the research process, reflecting on the ways that the researcher's identities and positions within power structures impact how the research process is conducted and how research participants interact with that process, as well as the ways in which the research process is affecting the researcher themselves. Due to the emotional nature of my research topic, it was especially important for me to be consistently reflecting on the ways I conducted myself in the research process, and how this research positively or negatively affected both the research participants and myself. When researching emotions, it is important to be especially intentional and responsive to participants. Researchers examine the social context of the research and their own status in the research process through a reflexive examination of their positionality (England, 1994).

## 5.2 Positionality

Understanding researcher positionality is a key tenet of feminist epistemology in order to understand power dynamics between researcher and participants within the research process as well as to

evaluate the impacts of researcher positionality on the research process and results (England, 1994). To interrogate positionality is a practice and process of considering the researcher's social position, often through understandings of identity, in order to evaluate how these positionings impact both the research process and the interpretation of data (England, 1994, Moser, 2008). Positionality has often been construed as an uncritical and obligatory disclosure of identities (e.g., race, class, gender, etc.) (Emirbayer & Desmond, 2012; Fisher, 2015; Kobayashi, 2003; Kohl & McCutcheon, 2015). Feminist scholars have and continue to develop models through which positionality is incorporated more substantively in research analysis and dissemination (Mani, 1990). The identities that proved most relevant to this research were my race, gender, geography of origin and residence, status as an academic, and stance on the oil and gas industry.

I argue that I have operated from a hybrid insider-outsider position during the research process that is fluid and contextual (Carling, Erdal, & Ezzati, 2014; Smith, 2016). Historically, being an outsider has been constructed as an ideal because research is inherently more objective the farther a researcher is from the material (Creswell & Creswell, 2017). This problematic assumption again reifies a false claim to objectivity and blurs other relevant identities and subjectivities that influence a researcher's approach to and motivation with their research. Moreover, it creates a false insider-outsider dichotomy, as identities are multifaceted and individuals may connect and disconnect because of these intersecting identities (Moser, 2008). Insider-outsider status is fluid and can change based on a variety of factors including location and the specific participants (Elwood & Martin, 2000; Huisman, 2008). Rather than an insider-outsider dichotomy, positionality is often a continuum (Breen, 2007); researchers negotiate complex identities that intertwine with the identities of their participants and, particularly with qualitative research, are often invested in ways that obfuscate any objective or neutral position as an outsider (Dwyer & Buckle, 2009).

As critical geographers have argued, race always matters and whiteness is an important factor even in predominantly white spaces (Mollett and Faria, 2013). Race is a crucial aspect of identity that heavily influences how we move through and perceive the world. The popularity of *Hillbilly Elegy*, the presidential election of 2016, and more recent news cycles concerning West Virginia's U.S. Senator Joe Manchin have all contributed to ongoing stereotypes of the white working class generally and the Appalachian white working class in particular as angry, backwards, and uneducated (Carey, 2021; Rittenour et al., 2020; Vance, 2016). Scholars have sought to broaden images of Appalachia through exploring the diversity of its residents (e.g. Catte, 2018; McCarroll & Harkins, 2019). This research engages in complicating the Appalachian narrative through a focus on the consequences of extraction in states constructed as loving fossil fuels.

At the same time, this research largely captures the narratives of white residents in the Ohio River Valley in relation to industry; this is a partial and situated perspective. Being a white researcher in a predominantly white state positioned me as an insider with most of the participants, who were also white. Our shared identity as white people means that both I and the research participants view the world through a particular and limited subjectivity, which affects both the ways in which I framed my research and interview questions and the ways in which participants heard and responded to the questions. Few scholars have engaged with the intersection of whiteness and racial capitalism when it comes to those who actually live in proximity to pipelines and other gas infrastructures (e.g., Bosworth, 2021). While an analysis of racial capitalism and ecologies is beyond the scope of this thesis, it is important to understand this research is framed through, largely, white understandings and experiences of place-based identity, place attachment, and embodied emotions.

On occasion, a shared racial identity created space for participants to comment on what they presumed to be shared sentiments, including on issues around race and racism. This created a deeply discomforting research environment for me in which my obligations as a researcher and my personal beliefs clashed. I have no revelations or guidance to any researchers faced with similar challenges, which begs the question of what boundaries researchers should and should not be able to create in the research environment. There were also times when my presumed gender afforded a closeness with participants who identified with women, and instances in which misogynistic undertones affected my comfort and disposition in the research environment. While I don't feel that these moments significantly impacted my ability to continue with the interviews and analyze the data, they are relevant to share as examples of the ways in which negotiating positionality is a reciprocal interaction in the research process.

My geographies of origin and residence became relevant in the research project. Originally from Virginia, I have lived along the Ohio River Valley in Ohio, West Virginia, and Pennsylvania over the last three years. The fact that I was not born and raised in this area afforded a degree of outsider status, but my residency and familiarity with the area prior to arriving as a student at WVU afforded a degree of insider status, as I am familiar with broader regional dynamics and geography. At the same time, I have lived in cities, including Morgantown and Pittsburgh, and am not from a rural area. This created a degree of distance in the interviews, particularly in moments when residents expressed resentment toward urban areas, sentiments shared in other explorations of rural resident attitudes toward urban centers and residents (e.g., Cramer, 2016).

My status as a graduate student at West Virginia University (WVU) also positioned me as an outsider in some ways. Some participants were skeptical of me due to the belief that WVU holds a pro-



industry stance given the energy-related research funded and conducted at the institution, including around a potential Appalachian petrochemical corridor (e.g., Carter et al., 2017). Other participants were skeptical of any transformative potential resulting from the research. Several residents that I contacted declined to participate based on their experiences of participating in multiple studies with no benefit to them. While I aim for this research to illuminate the realities of living with the oil and gas industry and to be relevant for participants' and organizers' aims, I also share their skepticism. While I believe in the importance and relevance of these stories, I continue to wrestle with my own beliefs about the extractive nature of research. One way in which I seek to engage with and mitigate this skepticism is to work closely with other activists and organizations to determine ways in which this research can be of use in presentations, reports, and other materials, as discussed in the "Dissemination" section of the Methods chapter.

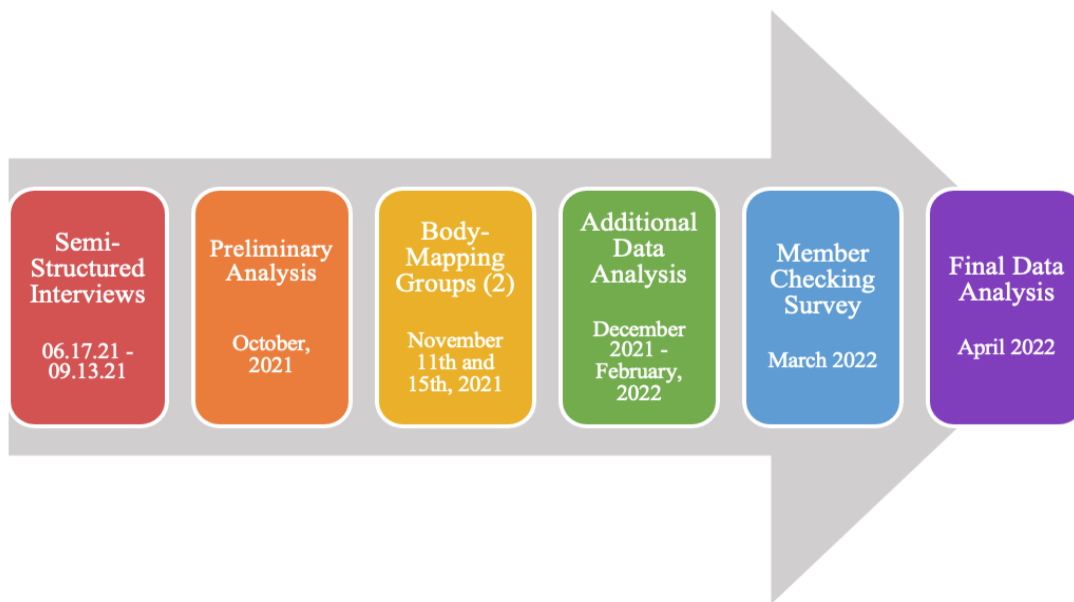
There are ways in which I was an outsider to this research in that I am not directly affected by issues of oil and gas extraction as a resident. This afforded some advantage, as often participants were eager to share their experiences to those who might get their story out to a broader audience. At the same time, I was drawn to do this research as someone who has been involved in pipeline and petrochemical organizing, particularly in Appalachia. This is not a disclaimer but rather a grounding through which to understand my approach to and position with this research. My experiences granted a degree of insider positioning as someone who had a shared vocabulary and more active involvement with movement work. Most often, when participants questioned my position on industry or aims with the research, it was to determine whether I was a supporter of industry and/or a skeptic of their experiences. In one interview, the interviewees questioned whether I would take a neutral stance on industry, presumably skeptical of "activist" research. In both of these scenarios, I reassured participants that, while I had my own opinions on industry, the aim of this research was to understand the range of experiences that residents had with industry, rather than to look for one experience in particular. At the same time, when participants were aware of my personal opinions about industry, it largely seemed to afford a degree of respect and rapport from most participants.

Researchers and participants engage in reciprocal and affectual interactions. Thus, both the research participants and the researcher are impacted by the research process. In interviews and focus groups, I aimed to reciprocate vulnerability and empathy where possible, as well as to engage in conversation in ways that mitigated power dynamics associated with researcher-researched relationships (England, 1994). In several interviews, participants would cry or tear up, which I often reciprocated in response to the painful stories they shared. I believe that this shared vulnerability worked to establish rapport and erode the hierarchical nature of interviews. Moreover, several interviewees shared that they felt "lightened" or that it was good to get these stories "off their chest;" I don't share this in a self-aggrandizing way, but rather to say that these

interviews, even around heavy subjects, can be positive experiences for participants through the creation of an interview space with reciprocity and emotional care.

The knowledge generated in this research process has been co-created with participants, as they have chronicled their experiences in response to research questions, and I have analyzed the findings. They have also participated in validating the results through member checking (discussed in the Methods chapter). I have conducted an iterative and inductive coding process through the analysis of transcripts, described below. Even so, this research is shaped by my own interest in extractive industry, particularly in the Appalachian context, and its impacts to fenceline communities. My previous experiences talking with affected residents and organizers has shaped my interest in place attachment, relationships to home, and embodied impacts related to this industry. The co-creation of knowledge with affected residents through this prior interest does not imply unreliable research, but rather, acknowledges my own positionality and subjectivity in relation to the subject and the ways in which it frames my research questions and analysis. Residents' perspectives and beliefs are centered, not my own. Reflexivity has been crucial for understanding the shifting nature of my insider-outsider position as well as my own subjectivity throughout this research process. More than just disclosing identifiers, reflexivity is an ongoing process of thinking through positionality. Part of the way I have thought through these nuances is through the use of a field diary, as discussed in the 'Methods' section.

## VI. Methods



**Figure 5.** Timeline Schematic for Data Collection and Analysis from June 2021 through April 2022

Before I explain my methods, it is important to state that this research was conducted during the COVID-19 pandemic, which undeniably affected the results of this research. The influence of the ongoing pandemic for interviewee participation and the framing of their responses cannot be fully known, but it is an important context through which to understand the methods and results. As discussed later, this research was moved from in-person to online due to the rise of a new and more dangerous COVID variant mid-way through the summer of 2021 which coincided with the lifting of mask mandates in many parts of the country.

This research uses two sequential qualitative methods: semi-structured interviews and body-mapping. In the first phase of this research, I conducted 24 interviews across the Ohio River Valley, four of which had two participants, for a total of 28 interviewees. The interviews revealed narratives of the emotional consequences of living near pipelines which were used to shape guiding questions for the two body mapping groups, which had a total of eight participants. This qualitative approach is advantageous in that the integration of data from both interviewing and body-mapping yielded more complex and nuanced insights than the results from one method alone (Creswell & Creswell, 2017). Qualitative methods are well-suited for exploring and understanding contextual and personal aspects of an issue, such as the emotional geography of pipelines, and are better suited for interpretive and inductive analysis (Flick, 2013).

I had planned to conduct site visits for scoping and interviews, but due to significant difficulty in recruiting, I was not able to do those trips. This presented two challenges, the first in gaining momentum with snowball sampling and recruitment (discussed below). The second was a challenge of building rapport with participants, which was particularly important due to the sensitive nature of the material discussed in the interviews. Rapport regards the balance between building sufficient trust with participants to engage in deep conversation while also maintaining sufficient distance of respect for the participants due to the uneven positionalities between researcher and participant (Guillemin & Heggen, 2009). Rapport is critical for building a research relationship based in respect and trust which are important for the richness of stories participants share and narrate (Weller, 2017). While I found that I was still able to share a level of respect and trust in interviews, the absence of scoping visits meant that I could not build the relationships that I had originally intended.

## 6.1 Sampling

I used a combination of theoretical and snowball sampling in this research. Theoretical sampling involves setting criteria through which to recruit interview participants, with flexibility in changing criteria as a result of developments throughout the research process (Curtis et al., 2000). In this research, the

participant sample was defined as residents of the Ohio River Valley who live in close enough proximity to a pipeline that it could affect their daily life. A distance limit from the pipeline was too restrictive, particularly as I spoke with participants that have moved because of oil and gas. If someone asked whether they qualified for the study, my response was simply “if your day-to-day life is affected, then you qualify.” This justification was used given precedent set by other fracking and extraction studies which do not make use of a distant limit (Caretta et al., 2021; Perry, 2012; Sangaramoorthy et al., 2016) due to the widespread impact caused by these infrastructures at the community level, which also impact place attachment and place-based identity.

I initially recruited for four study locations: Huntington, West Virginia; Moundsville, West Virginia; St. Clairsville, Ohio; and Beaver, Pennsylvania. These specific localities were chosen because of the heavy presence of the oil and gas industry as well the fact that they are targeted for development in proposals for an Appalachian petrochemical corridor. Research specific to these communities is crucial in light of this potential buildout. I recruited through several organizations that work in the Ohio River Valley region around oil and gas extraction and petrochemical development, as well as through social media by posting to Facebook groups and sharing on Twitter along with my committee members. I also contacted people who had responded to a survey conducted by Dr. Caretta and Dr. Carlson in the fall of 2020. This survey was used to investigate property value impacts and lived experiences related to oil and gas pipelines in Ohio, West Virginia, and Pennsylvania as a follow-up to interviews conducted around the state of West Virginia in the summer of 2020. Finally, I attended a music concert in the Moundsville area with a community gatekeeper to try to recruit. All told, these strategies yielded seven initial participants.

From there, I employed snowball sampling, a commonly used method in which initial research participants act as gatekeepers to other contacts. My last question in each interview was, “Is there anyone else you think that I could talk to for this research?” The hope was that, through this question, research participants would be continually recruited throughout the research process (Handcock and Gile, 2011). Because this is a sensitive topic and interview participation may expose people to vulnerabilities, participants vetting me to other potential interviewees was often important, particularly because I was not able to do scoping visits. Snowball sampling has proven to be an effective method for other research in the region related to oil and gas development (Caretta et al., 2021; Turley & Caretta, 2020). Given this prior success, I was surprised at the difficulty of employing this sampling strategy and gaining recruitment momentum. Only six interviewees in total referred me to another participant. Because some people shared multiple contacts, I was able to reach a total of twenty four interview participants.

Because of the difficulty in recruitment, I chose to expand my study area to the general tri-state region of Ohio, Pennsylvania, and West Virginia, rather than the bounds of the four specified locations. This allowed me to interview people in southwestern and south-central Pennsylvania and northeastern Ohio who did not fit into the bounds of the original study area. This expansion was enabled through a transition from in-person to digital interviews as a result of both the geographic dispersion of participants and the rise of the COVID-19 Delta variant. During the time of this research, this COVID variant posed safety risks that I deemed to be unacceptable as I felt that I could not ask participants to wear masks in their homes. I share these challenges to push against the “illusion of a linear clarity” through my research process (Harrowell, Davies, & Disney, 2018:231), which was often frustrating and confusing as I attempted to reach out to participants with whom I assumed I would be able to connect more easily due to my number of contacts and connections in the region.

## 6.2 Interviewing

I employed semi-structured interviews to collect qualitative data regarding residents’ lived experiences near pipeline infrastructure. As mentioned above, I initially conducted interviews face-to-face. While I was masked, interviewees typically were not, regardless of whether indoors or outdoors. Halfway through the process, I switched to phone or video interviews. In total, twelve interviews were conducted face-to-face, nine were conducted over the phone, and three were conducted on Zoom or another video application.

Semi-structured interviews have proven to be an effective method for geographical research (Longhurst, 2003). The interviewer uses a set of predetermined questions to elicit information from a research participant, but participants have the opportunity to create in-depth answers to those questions they perceive as important to them and their experiences (Creswell & Creswell, 2017). This interview style is more flexible and emphasizes interviewees’ own perspectives (Bryman, 2016) more than a rigid interview guide. Semi-structured interviews are particularly effective for exploring and understanding environmental risks and fears (Baxter and Eyles, 1999; Sultana, 2009), as well as emotional geography (e.g. Collis, 2016; Pini et al., 2010). Through a dialogue between interviewer and interviewee, the researcher can gain valuable, though partial, insight into the emotions and opinions of participants and their life experiences. In the in-person interviews, there were also opportunities for brief walking tours of the area to observe and document the physical changes to the landscape as well as to prompt additional discussion.

The switch from in-person to digital interviews had some impact on researcher-participant interactions and the ability to collect data. While in-person interviewing is generally regarded as the default

method (Dimond et al., 2012), phone interviews have been used in a range of studies and generally do not yield substantially different results in analysis when performed well (Burke & Miller, 2001; Curasi, 2001; Sturges & Hanrahan, 2004). Recent studies have found online platforms like Zoom to be useful for conducting qualitative interviews, and video interviews may be less daunting and preferable for some participants (Archibald et al., 2019; Fielding & Fielding, 2011; Weller, 2017). In some instances, video calls may be preferred over phone calls as they allow participants and researchers to observe body language. Of course, there are also some disadvantages to online interviews. Technical issues can result in false starts to the interview, poor audio or video quality leads to interruptions and backtracking, and parts of the interview can be cut off as a result of frustrating technical difficulties (Weller, 2017). Luckily, technological issues only showed up for one interviewee, whose audio cut out over Zoom at times, and one body-mapping participant, discussed in the section on body-mapping below.

In general, I found that, while still informative, the digital interviews were more challenging due to the inability to see the space of the home, its proximity to infrastructure, and the presence of the industry on the landscape. Seeing these things in person would often prompt additional questions and thicker description from interviewees (Deakin & Wakefield, 2014). I also found that digital interviews typically were shorter in length, with participants giving briefer answers. That being said, the interview guide translated reasonably well to a digital format, and the data collected from the interviews contributed equally important information for analysis as that of in-person interviews, consistent with other researcher experiences (Weller, 2017).

The interview guide was designed using data analysis from Dr. Caretta's and Dr. Carlson's research in summer of 2020 to further investigate questions of embodiment and energy geography as specific elements of pipeline development. The questions of the interview guide were designed to minimize pre-framing or leading as well as to be flexible for interviewees and their different positionalities [Appendix A]. The first portion of the guide is focused on gathering **background** information, including the location and timeline of whatever infrastructure was located nearby. There are also questions about changes to quality of life, relationships, and participation in organizing.

The second section deals with the **home**. Some of the questions asked include: [1] When did the first changes start to happen here as a result of the pipeline? [2] How has the landscape around your home changed? [3] Has the pipeline affected how you feel about your home? [4] Has the pipeline impacted how you feel about your community? The third section deals with **emotion** and specifically emotional changes through the lens of pipelines. Some of the questions asked include: [1] How do you visualize the pipeline? [2] What concerns do you have about the pipeline? [3] How does the pipeline affect your day-to-day life?

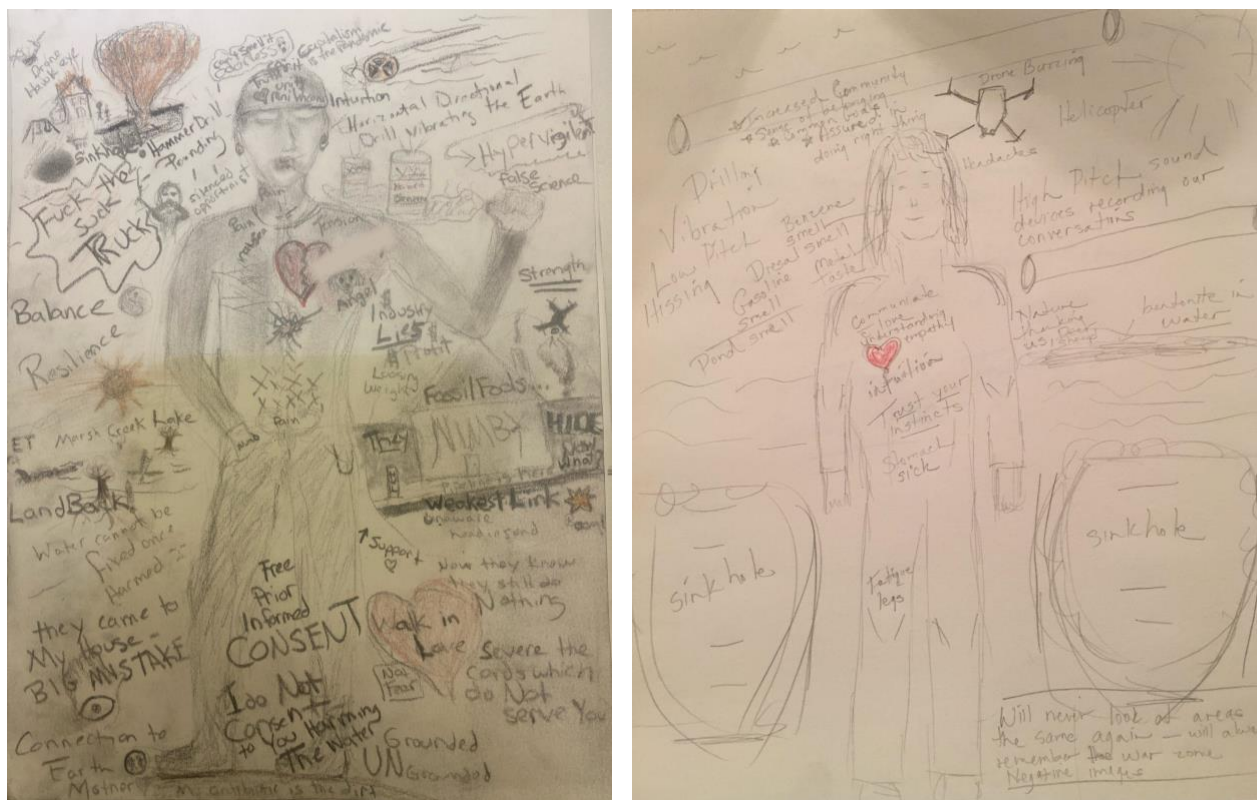
[4] What is your gut feeling about living near the pipeline? [5] Has the pipeline affected your physical health in any way? The final closing section contains a couple of wrap-up questions, including questions about dissemination and recruitment. In-person interviews lasted between 60 and 105 minutes, while digital interviews lasted between 60 and 90 minutes.

### 6.3 Body Mapping

Body-mapping is a method used to study embodiment and embodied emotions. It is a hands-on, participatory method that asks research participants to draw or trace their body and to then add their emotions and experiences based on researcher prompts and questions (de Jager et al., 2016; Zaragocin & Caretta 2020). The method shares traits of both focus groups and workshops, in that it is structured around interviewer questions and directed by the interviewer, but it also treats participants as experts and includes activity-based work that generates visual data as well as verbal discussion (Caretta & Vacchelli, 2015). Because this data is already triangulated between several participants, some scholars consider these group interview data to be more reliable (Montell, 1999).

This method is grounded in understandings of embodiment and the ways that lived experiences are manifested in physical sensations and emotions (Moss & Dyck, 2003). Through this method, emotions are more directly incorporated into the research process (Holland, 2007). It was first developed for studies of identity and health in the Global South to both gather data and encourage advocacy, while often providing therapeutic opportunities to participants (MacCormack & Draper, 1987; MacGregor, 2009; de Jager et al., 2016). It has since been used particularly in studies of health (e.g. Lys et al., 2018; Tarr & Thomas, 2011) and social work (e.g. Rivas-Quarneti, Movilla-Fernández, & Magalhães, 2018; Skop, 2016). The method has been used in a limited number of geographical studies, largely in Latin American and Caribbean contexts and especially in Ecuador, in order to understand, for example, where participants feel that mining activity affects their bodies and what their emotional and physical reactions are to the activity (Bayón & Torres, 2019; Cruz, 2017; Zaragocin & Caretta, 2020). Because this method is grounded in the “ontological unity between bodies and territories” (Zaragocin & Caretta, 2020, p. 1), it is an important, hands-on method

to understanding these connections. Some examples of the body-mapping exercises generated in this study are shown in the figures below.



**Figure 6.** Two examples of body maps produced in this research. Both are from the first body-mapping group conducted on November 11, 2021. A name has been blurred on the left-hand image for confidentiality.

Body mapping is essential to answering the questions about embodied emotions and the relationship between changes in the physical landscape and changes to the self. For this research, due to the same recruitment and COVID challenges as mentioned above, I had to translate the body-mapping activity to an online Zoom format. In the Zoom, I asked participants to draw an outline of their body with pencil and paper and then used a series of prompt questions (**Appendix B**), similar to how I would do in an in-person group. I used three sections of prompt questions, a set about senses, a set about feelings, and a set of relational questions. After each section, I asked participants to share back what they had drawn and to relate and discuss their drawings.

The guiding questions were generated, using both preliminary results from the interviews as well as data from the research in the summer of 2020, to prompt respondents to think about the relationship between pipeline and other fracked gas infrastructure, the landscape, and their own bodies and emotions. This was particularly important given the general difficulty of generating data from interviews about emotional and embodied experiences (Zaragocin & Caretta 2020; Caretta et al., 2020). Participants were



recruited from the survey conducted in the fall of 2020 as well as from both the summer 2020 interview participants and the interviewees in this research. Because the questions for the body-mapping group were different, interviewees participating in the body-mapping groups added methodological depth, functioning as a two-part interview.

I conducted two Zoom groups, each of which lasted about 105 minutes. In both groups, I emphasized that while participants would remain anonymous in my results and analysis, I could not guarantee confidentiality due to the nature of the group interview. Group size was limited to no more than five participants in order to ensure that everyone had the opportunity to share their drawings and opinions that were important to them (Hopkins, 2007). The first group had three participants, two from central Pennsylvania (summer '21 interviewees) and one from the eastern panhandle of West Virginia (summer '20 interviewee). The two participants from central Pennsylvania knew each other. There are a number of studies around focus groups in which participants knew each other (Tonkiss, 2004), and the focus group conducted in the fall of 2020 included participants who knew each other. In this context, prior participant interaction did not have a negative effect on participant engagement and may have helped to build rapport among interviewees as there was some established trust between interviewees and in my intentions as a researcher. The body-mapping method for this group translated relatively well. Though there was some awkwardness in trying to show the drawings over the Zoom screen, the participants were able to share and discuss their drawings effectively.

The second group consisted of five participants, including one couple. The couple and one other participant were from neighboring counties in Ohio and knew each other (summer '21 interviewees); the other two participants were from neighboring counties in northern West Virginia but did not know each other (summer '20 interviewees). In this group, there were more challenges: one participant was unable to connect to audio and participated in a one-on-one interview the next day to share back their answers. Another participant joined an hour late and missed the first two sections of the session. Additionally, the activity itself did not translate as smoothly. I emphasized to participants that their artistic ability or accuracy was not the central focus of the task, but the participants chose to write their answers rather than draw a body-map. While this unfortunately did not generate a visual dataset, through coding it was determined that this interview yielded similarly rich interview data and thus was determined to still be a useful exercise for analysis. Other studies have found guided, reflective journaling paired with group discussions to be a powerful tool for understanding (changes in) perception, attitudes, and understanding (Dunlap, 2006; Jarvis & Baloyi, 2020; Riley-Douchet & Wilson, 1997). I asked participants to send me pictures of their maps and/or notes for hand coding, and recorded the groups for transcription and analysis.

## 6.4 Field Diary

The interview is not only an opportunity to gather information by asking questions and engaging in dialogue, but it is also a site of participant observation (Elwood & Martin, 2000; Oberhauser, 1997). A field diary serves as a tool for participant observation that allows the researcher to document notes and reflections that are later used for data analysis (Watson & Till, 2010). It is a space to record notes and information as well as to note ideas and interpretations for further exploration and analysis, including connections to theory and possible codes (discussed below). It is also a space to reflect upon the research process itself and the interactions therein. It can include contextual observations not captured in the interview recordings. These notes aid in reflexivity both during the data collection process as well as during data analysis and dissemination.

This field diary was important for documentation of observations both during and after participant interaction in both interviews and focus groups, particularly for those elements that were not captured in and transferred to audio records and transcripts. This tool for observation was necessary for reflexivity, crucial in feminist epistemology and methodology. The field diary was also important for generating codes by hand in interview observations, particularly for more theoretical codes relating what was shared in interviews and focus groups with the literature. My field diary consisted of both manual and digital notes. I carried a journal with me for both in-person and online interviews, during which I would record notes. These notes were compiled into an online document in order to group relevant notes together, such as ideas for codes, possible themes for analysis, and potential research contacts.

## 6.5 Data Analysis

I recorded all interviews and body-mapping groups and transcribed them digitally, then used the qualitative data analysis software NVivo 12 for coding. Coding is categorizing strategy common in qualitative research with which to distill data into key themes, note patterns of connection and relationships, and develop possible insights and refine ideas through analysis (Cope, 2005; Watson & Till, 2010). It is also useful in creating big-picture themes that correlate to the conceptual framework and epistemologies of my research project (Cope & Kurtz, 2016). In my analysis I used a combination of hand coding and software analysis, both of which served to validate one another and support a more comprehensive analysis (Baxter & Eyles, 1997).

I first read through the transcripts to manually identify recurring and interesting aspects/themes of the data. Through this process I generated an initial coding manual of themes and key phrases with which to categorize the data, which I refined throughout the coding process. This initial read is an important step

for inductive analysis in which ideas are generated that “fit” the data (Cope & Kurtz, 2016: 652), rather than pre-conceived notions that are generated from a theory or hypothesis (Thornberg & Charmaz, 2013). Though it is inevitable that I bring my knowledge of emotional and energy geographies to the analysis (Kelle, 2014), inductive coding helps to mitigate bias and presumptions in the analysis in order to remain open to participants’ experiences and definitions which may vary significantly from my own researcher expectations.

My coding manual contains a combination of organizational categories, substantive categories derived from participants, and theoretical categories generated from the literature (Maxwell & Chmiel, 2014; Rose, 1982). This code manual was reviewed by Dr. Shinn and Dr. Carlson and further edited and refined throughout the coding process. This review helps to mitigate some of the challenges associated with being the sole investigator and analyst of the collected data. Through the creation of the coding manual I identified eight broad themes in the data: [1] place-based identity, [2] community, [3] company, [4] government, [5] home, [6] concerns, and [7] emotion. Within these eight themes are a number of codes and concepts. For example, “community” is broken into three subcategories: “community changes,” “neighbors,” and “economy.” In addition to these broader codes, there are also specific codes within each subcategory. For example, “neighbors” includes “improved relationship,” “worsened relationship,” and “unchanged relationship.”

From this coding manual, I used thematic coding with text searches to capture quotes with specific words that were relevant to a theme. For example, under the Concerns theme, I searched for terms like “leak,” “explosion,” “slip,” and “erosion.” I also used a form of narrative analysis to hand-code for important quotes and stories that don’t necessarily come out of a text search because of the verbiage used. This coding method captures the context of a statement and its appearance in a larger narrative in order to better represent how information is being interpreted or framed by the speaker (Wiles, Rosenberg, & Kearns, 2005). For example, under the same Concerns theme, I used narrative analysis to hand-code for interview sections in which interviewees make reference to energy landscapes. I also used hand coding on the physical maps created in the body mapping groups (when provided), as well as my interview notes. This method of hand-coding and narrative analysis is essential in a social constructivist epistemology, in order to reflect the ways that participants construct and interpret their realities.

## 6.6 Validation and Member-Checking

As Baxter and Eyles (1997) state, there are a range of strategies for ensuring rigor and validity in research, including the use of multiple methods, the presentation of verbatim quotes, discussions of analysis

procedures, revisits to and verification by respondents, and rationale for verification of findings. Validity in qualitative research spans a continuum between a positivist and constructivist view (Lincoln, Lynham, & Guba, 2011). Through my lens of feminist epistemology, validity is not used in the sense of objective knowledge or truth, but in the sense of credibility that those living in proximity to pipelines and other oil and gas infrastructures would recognize the descriptions and conclusions of this research (Baxter & Eyles, 1997), and those not sharing in the experience can understand it. This understanding of validity and triangulation emphasizes my responsibility as a researcher to interpret contradictions and silences in different data sources and to critically reflect on multiple possible meanings (Elwood, 2010).

Data triangulation is often part of a mixed-methods approach that involves investigation into inconsistencies between different data sets and confirmation of preliminary conclusions (Bryman, 2016). Triangulation is often accomplished through the use of multiple methods to overcome the deficiencies of each (Cho & Trent, 2006). The combination of interview data and body-mapping along with member-checking all contribute to a more nuanced and complex understanding of the topic of study and serve to validate or complicate the other data sets, while still recognizing that all knowledge is partial and that ways of knowing produce particular realities (Elwood, 2010). Member checking also serves as a component of validation through the interaction between research inquiry and research participants (Lincoln & Guba, 1985; Lincoln et al., 2011). Member checking confirms the accuracy of participants' constructions, while triangulation verifies facts collected across data sources (Cho & Trent, 2006).

Member-checking involves testing preliminary data interpretations with research participants from whom the data was generated (Lincoln & Guba, 1986). Part of member-checking involves returning to participants the transcriptions of their interview to comment on the accuracy of the transcript (Koelsch, 2013). This informal member-checking is an important part of feminist epistemology, increasing participation in the study and mitigating the power differential in knowledge production. More formal member-checking involves the presentation of a report of preliminary findings to research participants for feedback (Lincoln & Guba, 1986).

In member checking, participants comment on researcher interpretations and analysis to see if they recognize the meanings and interpretations in relation to their own experiences (Baxter & Eyles, 1997). In order to do member checking for this project, I created a twelve-question survey that I shared with participants via email in an effort to verify and validate the findings in this research [**Appendix C**]. This form of member checking was not a tool of data collection but strictly of analysis validation and was not used in additional coding. The questions used a Likert scale that asked participants to state how much they agreed with a variety of analytical conclusions. Participants were asked their agreement with statements

such as, “I do not feel valued by the gas industry and gas company(s).” These questions were delivered in a Google form and interviewees also had the opportunity to share other thoughts in an open comment section at the end of the survey. I received responses from 20 of the 24 interviews and all three of the body mapping participants who did not participate in interviews. The results of this survey show that, on average, 80-90% of participants somewhat agree or strongly agree with each of my research findings. The full results from this survey are seen in **Appendix D**.

## 6.7 Dissemination

For many research participants and organizers, a journal article is an ineffective form of communication of research results and often reifies the power dynamic between academia and local communities (Mackenzie, Christensen, & Turner, 2015). Returning results is an iterative activity and I intend to have the result dissemination and advocacy efforts informed by my audiences and context. This continued returning of results is also part of the participant validation process in which findings are discussed and debated. Significance and relevance are not inherent in data (Flick, 1998) and meanings attributed through interpretation are dependent on both personal and political context (Scheurich, 1997). Thus, dissemination is an on-going conversation with research participants and communities (Barnes et al., 2003).

In addition to the creation of a Master’s thesis from this research, the results from data collection and analysis will be summarized in a report and distributed to several organizations in the Ohio River Valley for their use in petrochemical organizing. In collaboration with these organizations, I will also conduct dissemination presentations, either online or in person, to share results back to both participants and members of the affected communities as well as organizers and educators in the petrochemical field. I will be available to work with collaborators on further dissemination methods as requested.

## VII. Results

This chapter incorporates research findings from interviews, field diary observations, and body-mapping group data. Sections 2-4 are organized by the research questions the project originally set out to answer. The first section helps to ground the research results through the concept of energy terrain and how these manifest for the 31 research participants. As discussed in the conceptual framework, energy geography frames energy systems as spatially constituted and emphasizes the ways in which infrastructures expand and entangle through space. As a result, there are multiple dimensions at which people are affected. Energy terrain is an idea that both framed participant responses to interview questions and expanded the

parameters of the study to include other oil and gas infrastructures in addition to pipelines, which were not part of the original research questions but emerged as important during the research process.

The second and third sections of the chapter address the first research question, *how have residents' sense of belonging and place-based identity shifted as a result of pipeline development?* The fourth section addresses the second research question, *how are these changes manifested through embodied emotions?* It is important to note that these boundaries are not rigid, as place-based identity and sense of place are intertwined, changes to sense of place and place-based identity are emotionally embodied, and these embodied experiences shift senses of belonging and identity.

## 7.1 Energy Terrain: *"It's just embedded in our community and you can't really escape it"*

While the original focus of this research was on the impact of pipelines, half of the research participants were also impacted by other types of oil and gas infrastructure such as gas wells, compressor stations, and metering and regulation stations. For those participants, it was often difficult to speak solely about pipelines, given that methane gas infrastructures are interconnected and people are often affected by more than one site. Thus, the nature of the interviews was expanded to consider this infrastructure as part of a broader energy terrain. There were also a number of participants who were impacted by other forms of energy extraction and production, including mines and power lines, which influenced the perceptions of the participants:

*The electric power line is something we're more aware of because it's visible. And because we've thought over the years about what electromagnetic radiation might be doing to us and other things. So the pipeline, once it was all said and done, the reclamation was done, was invisible. (Interview 9)*

Though the pipeline may have been more physically disruptive during construction, it is of less concern for this participant due to its "invisibility." For other participants, however, the invisibility of the physical infrastructure causes anxiety over being unable to detect problems before accidents or health impacts have caused irreversible damage.

Some participants were impacted not just by the infrastructure closest to their homes, but also the presence of industry throughout the community, reflecting the concept of "energy landscapes" discussed in the conceptual framework. They could see the development at their jobs, at doctors offices, when shopping, and throughout their days. A few participants described the inability to escape from the awareness of and proximity to oil and gas, as shared by this interviewee:

*It seemed like wherever I was working or shopping or going, there was construction all around me all the time. So where I lived, we had a [horizontal directional] drill site 800 feet from me, and then I would drive to work in [the next town], close by. And I'd have an easement on the property at my job. And then I go shopping later, and I have an easement at the shopping center. So it just seemed like, wherever I would go, it was kind of following me. It's just embedded in our community and you can't really escape it. (Interview 20)*

The thoughts shared by this participant indicate a multitude of ways in which these infrastructures can affect everyday life, not just at the site of the home, but throughout the energy landscapes constituted by sprawling energy terrain.

A handful of participants described the development as an “intrusion” or an “invasion,” and a number of individuals felt that there was no way to escape from this industry anywhere in the Ohio River Valley. They felt that their area had been transformed from a rural and agricultural place to an industrial one. One resident described the “spaghetti” network of pipelines and well pads all over the county, “just one after another after another” (Interview 7). Another resident described the well pad at her parent’s house as “the alien landing pad” (Interview 16). This imagery speaks to a broad network of intrusion that is expansive beyond the site of the home.

As stated in Chapter III, this research is undertaken in light of a proposed petrochemical corridor in the Ohio River Valley. While these petrochemical hubs were not a focus of the research, some participants had both an awareness and resentment of the fact that much of this extraction is for consumption in international energy and plastics markets, and not for the benefit of local people. Some felt that rural areas are treated unfairly in these energy landscapes and are targeted for buildout while people in cities, receiving the gas, know nothing about the rural experience. As one participant stated, “*They do pick remote areas, but in remote areas, there's still people living there*” (BM2 Participant 2). The all-encompassing, “cradle-to-grave” impacts from industry as well as the disregard felt by local people is summarized well by this interviewee:

*None of this is to benefit Pennsylvania residents. I think if it's not to benefit us, it should not be going under our homes, and should not be going through our communities. You know, the whole process of fracking is so toxic from the wells where it's extracted to then transported through the pipeline, and then stored and then shipped, and then the little pellets, plastic pellets that are then all ending up in the ocean, where they're at the cracker plants, and so the whole process from beginning to end is just so toxic and destructive. (Interview 20)*

This quote also speaks to the concerns of some participants who may have experienced less of the day-to-day consequences of close proximity to infrastructure, but were concerned about the perpetuation of the fossil fuel industry generally through the buildout of pipelines and other components, contributing to

greenhouse gas emissions, climate change, and continued human health consequences. As one participant described, it's "*a constant reminder that we're heading in the wrong direction*" (Interview 15). Half of interviewees were explicitly concerned about the connection between the buildout and the general consequences of fossil fuel use.

In addition to concerns about climate change, participants also expressed concerns about the social transformation resulting from these industrial energy landscapes:

*I know they are just huge proponents of the cracker plant. And I'm just thinking, just try to get the big picture, it's going to really mess up this part of the country. Not just pollution, but the population increase, the impact on housing, we are not prepared. These small towns are not ready for that kind of thing and socially, I mean, we know what the impacts have been on places like Cambridge where the crime level went up because of all these guys who want to let loose on the weekend and have big parties. It's difficult, it's really difficult (Interview 8)*

In sum, these findings on energy landscapes reveal that how participants perceive the buildout of industry is influenced not only by the infrastructure closest to them, but also by broader systemic understandings of the landscape of energy production and consumption from regional to global scales. Given the frequency with which participants were affected by energy structures beyond pipelines, I welcomed interviewees to speak about any and all methane gas development affecting them, as well as to share about their experiences with other forms of energy. This is an important context within which I analyzed the place-based research questions.

## 7.2 Place-Based Identity: "*Why doesn't our community matter? It doesn't. We're expendable.*"

Overall, the buildout of oil and gas infrastructure either temporarily or permanently altered the majority of participants' place-based identity, or the ways in which place provides meaning and purpose in life. These alterations manifested through changes in community and day-to-day life, shifts in personal identity and roles, and feelings about oneself as a result of treatment by energy companies and government agencies.

### 7.2a. *Community and Day-to-Day Life*

Participants were asked to reflect upon how their relationships with neighbors and with their community had or had not changed as a result of the pipelines and industry. The majority of participants' neighborly relationships were not damaged, either because they were not particularly close beforehand or because the participants understood that everyone was trying to make the best out of a bad situation.



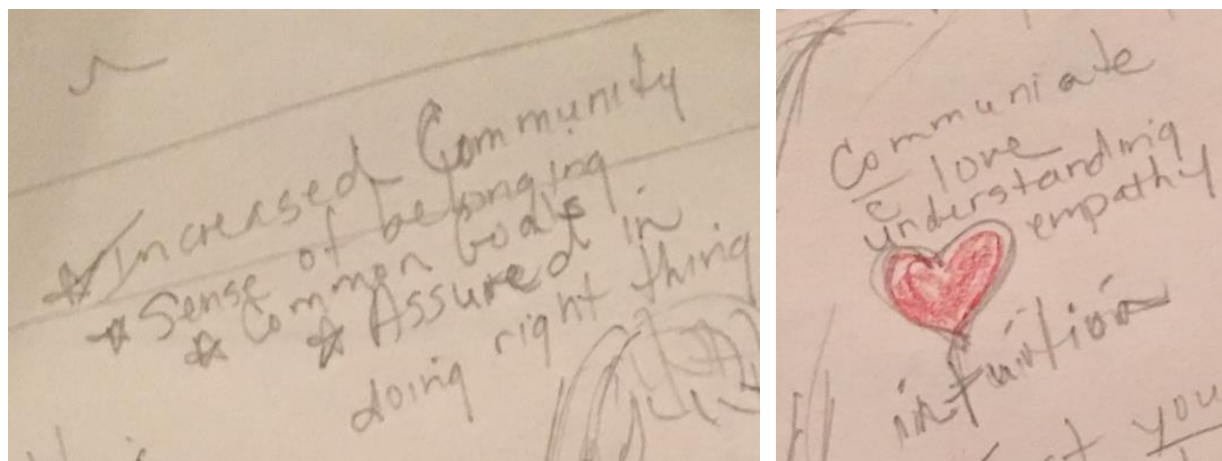
However, a fourth of participants had relationships with neighbors and relatives that were negatively impacted as a result of infrastructure buildout. Most often this was due to the fact that neighbors were displeased or apathetic about some participants standing against industry, and participants felt resentment toward neighbors who accepted money and/or did not put up a fight. Moreover, half of participants noted detrimental impacts to their community from the buildout through division and mistrust in the community, as well as fights over signing leases. Most participants blamed the companies for the disruption to and worsened relationships in their communities:

*[The land men] go to school for it and they're trained to manipulate. And trusting people, most are around here, they used to be. People were very trusting, people would give you the shirt off their back, now nobody trusts anybody because of the things that they've done. It was a great community once, and everybody is suspicious of everything now because the gas company ruined it for everyone. (Interview 4)*

The disruption to relationships, as shared by this participant, impacted some participants' identities as members of a community, as well as their beliefs about community identity.

A few participants experienced positive impacts to their community from the buildout, in the sense that the local community became more bonded together, and some participants reported positively-changed relationships with their neighbors. Because of their involvement and opposition efforts, neighbors were brought closer together and "unified", and people made new friends through this work:

*I've learned a lot from a lot of amazing connections and brilliant people, and I'm forever grateful for that. As we say in the Mariner East, like I would not have picked any of these friends out if I was hanging out or whatever. I've got the most eclectic group of friends. This terrible pipeline, this terrible stuff has brought me some of the best friends in my life for probably forever, so there is a positive. (BM1 Participant 2)*



**Figure 7.** Body Map drawings from BM2, Participant 1. The image on the left reads “Increased Community, Sense of Belonging, Common Goals, Assured in doing the right thing.” The image on the right reads “Communicate in love and understanding, empathy, intuition” with a red heart. These images reflect positive changes to the community for this participant.

This experience demonstrates the ways in which place-based identities can sometimes be shifted in multiple and complex ways, as these same participants both formed strong relationships and were unhappy that they were forced into these fights.

Two-thirds of participants reported negative changes in their day-to-day life to varying degrees. Some of these changes include a) constant traffic; b) light and noise pollution; c) smell and air pollution; d) barriers to uses of their home; e) decreased ability to go outside; f) avoiding certain businesses and areas; and g) being hyper-aware of people near their homes. One interviewee shared that they had not slept in their bedroom for ten years because of the noise and light pollution from the pump station across the road from their home (Interview 4). Another interviewee had a person living in a tent across from their house for a year in order to direct truck traffic (Interview 7). The culmination of these disruptions is felt in the loss shared by this participant:

*I used to want to make a video. I come home at night and the fireflies are all going off, there's no noise. Take it to the market and say, this is where your organic vegetables are coming from. Just a two minute little diddy. But you can't do that anymore, or you can't feel like it's as perfect as it was. (Interview 1)*

For this participant, the meaning of an agricultural, rural life, which they had wanted to share with others, was taken from them as a result of industrial development.

Though the impacts to community relationships and day-to-day life are varied and at times contradictory, for a majority of participants, their personal and community identities are indeed affected by the pipeline and industrial buildout.

## 7.2b Personal Identity and Roles

Two thirds of participants were actively or had been involved in some form of an opposition organizing effort against industry. For the majority of these participants, this was their first reported experience with organizing. The participants had mixed experiences in organizing, both in feeling frustrated by a lack of community participation and pride in the efforts taken and friends made. A majority of participants had taken on new roles and identities, particularly in opposition work, though most of these participants had never identified as political people before; they became activists because they were directly affected by these industries, rather than because of a pre-existing political belief. Interviewees joined the staff of nonprofit organizations; became citizen monitors and documenters; ran for office; and worked to organize and unify their communities. Others took on educational roles, often based on their previous experiences with industry, through giving testimony and presentations to government agencies and communities; speaking to news outlets; writing articles and newsletters; serving as a point person for questions and finding information; and using their home as a space to see and learn about the oil and gas industry. These new roles brought an increased sense of community responsibility for many:

*I feel that I have more of a responsibility to be a leader in the community, and also to be a watchdog and then report the issues to the township and my community. I feel a greater sense of responsibility, and leadership, I guess. Those would be the two best words, leadership and responsibility. (Interview 20)*

This new responsibility also contributes to an altered sense of place-based identity as residents experience their communities in a different way.

A third of participants engaged in some form of documentation, including photography, recording daily experiences and symptoms, and communicating with and reporting to the company<sup>2</sup> and government agencies. Some individuals conducted monitoring efforts around construction sites, their homes, and sites of significant environmental concern through site visits and the use of drones, air monitors, and Geiger counters. Many of these participants felt the pressure to always see and document what happens. Some participants felt that this documentation empowered them to fight back against the development; one interviewee who identified as a “watchdog” said they are able to stand up against companies with their data

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<sup>2</sup> Throughout this thesis, I use “the company” as a general phrase given that participants have interacted with a wide variety of gas companies as well as subcontractors, who are generally viewed as part of the company. These companies include but are not limited to: Blue Racer Midstream, Chevron, Energy Transfer Partners, Equitrans, EQT, Kinder-Morgan, MarkWest, Rice Energy, Spectra Energy, Sunoco, TC Energy (formerly TransCanada), and Williams. Participants described similar experiences, regardless of company, and thus the companies are not specified from participant to participant. This is also done to maintain a degree of anonymity, given that some participants frequently interact with company representatives and may be recognized by their statements.

and to validate peoples' experiences. Others, however, expressed feeling consumed with an obligation to document and report in a way that disrupted their day-to-day life, and sometimes felt like it was all "to no avail," a sentiment shared by this participant:

*It will take your life because our life is consumed in documentation, phone calls, odors, sounds, recording things, calling the EPA. We don't have a day without gas and oil. Not a day. We don't get a day. We had three weeks away from here and it was the best three weeks. It's disheartening.* (Interview 12)

This quote captures the ways in which these new roles can be an undue strain on day-to-day life. Some participants felt both empowered and burdened with the responsibility of documentation. For all participants involved in this effort, their place-based identity was altered as they now viewed their homes and towns as sites to be monitored and recorded.

A third of participants commented directly on the changes in their personality as a result of industry development. Some participants shared that they stick to themselves more and are less trusting. However, others, who were involved in opposition movements, stated that they are more likely to engage with people in their community and participate in movement spaces. Each of these participants also stated that they felt more assured and strengthened in that they were fighting for what they believe is right. At the same time, these interviewees experienced moments of feeling "disoriented" and "ungrounded" (Interview 15), emphasizing the way in which these infrastructures de-stabilize residents' sense of place and identity. One participant was even considering a career change as a result of the influence of industry in the healthcare field and the lack of information available to residents about potential health consequences from methane gas infrastructure:

*It's making me rethink my whole career. I've been an LPN now for 14 years. Everything that I see going on, I'm just so done, I'm so over this, I'm so done with this. This isn't how I live my life, I can't perpetuate this misinformation to my patients...I can't let real information or true information be pushed to the wayside.* (Interview 16)

As discussed in Section 1, energy landscapes touch multiple aspects of residents' lives, and this includes the multiple ways and settings in which place-based identity is shifted.

For a majority of participants, an obligation to take on new roles, as well as shifts in their personalities, demonstrate the potential power of industry over place-based identity, particularly, though not exclusively, for those who are opposed to industry.

### 7.2c Company and Government Treatment

The way that residents were treated by the companies and government authorities often disrupted their place-based identity and sense of belonging by causing residents to feel disrespected, unimportant, and “expendable” (Interview 12). Three-fourths of participants felt that the company did not care about the residents, land, or the environment, and that they did whatever they wanted. Some saw corporate greed, rather than necessity, as the sole motivator for much of this buildout and the decision-making impacting communities. A handful of participants were particularly bothered by the companies’ apparent notion that money would solve any issue, as captured by one interviewee:

*He said, “We don't care about your tree. We'll pay for them.” As if that was the only issue. It was clear that they had no sense of the value of land and what was on the land, it was all money, money, money, right. It's all profit, profit, profit. (Interview 8)*

This participant, who was heavily involved in conservation efforts, found this attitude antithetical to his own place-based identity and thus was disturbed by this new attitude with and treatment of the area.

There was often a lack of information available to the community and thus participants felt their communities were left in the dark, not knowing what was going on around them or how to navigate industry. Often, people found out about the coming activity through the visual changes; companies and government agencies rarely informed local residents about construction and new development. Residents were sometimes scared by loud noises and smoke, unsure of whether a pipe had failed, posing an immediate danger. During and after construction, residents did not have access to updated information about maintenance and any issues that arose with the pipe. There were times when even community officials were not informed about the company’s doings. This again left residents feeling unimportant and unconsidered.

Interviewees remarked on what they felt was an unchecked power of industry, with the ability to control narratives surrounding development through resident intimidation as well as to evade regulation. The vast majority of participants felt that there was a lack of accountability and oversight for these companies, and that government regulations were either insufficient or unenforced. This lack was often attributed to the perception that officials are corrupted by money and power from the industry. As a result, participants felt the responsibility to keep the pressure on and do their own monitoring, rather than counting on the regulators to “do their jobs.” Many participants expressed the feeling that regulatory agencies and government officials are “bought and sold” by the oil and gas companies, and that there is a revolving door between the companies and the government agencies:

*It's like you scratch my back, I'll scratch yours. I'll give tax money for this pipeline going through your county, how much money do you want? You tell the government you approve of this. It's the*

*old boys game, in my opinion. They get their way. Big money speaks. Would I like to see change? I'd like to see a lot of things change. But do I think it will? Probably not (Interview 19)*

Even when industries did meet standards and regulations, some residents still felt that these standards were unjust in the first place and that they need to be changed to protect the safety of residents as well as the environment. One couple participated in a sound study and learned that their decibel reading was 53.6 dB, up from 30 dB before the infrastructure was built, and that this was compliant with the FERC limit of 55 dB. Workers were required to wear earplugs when approaching that 53.6 dB structure, but this couple had to listen to that noise 24/7. When they received the results from a company representative, the participant said:

*So you're giving me your results, is that supposed to make me feel better that you're compliant? It doesn't. It doesn't change the fact that I still have to listen to your 53.6 [decibels] then, every day. I listen to that, you don't. I do. And you get a paycheck from it. It's changed our lives. (Interview 12)*

This quote captures how, in addition to the physical change in the landscape, this resident's place attachment is also disrupted by the notion that this change is "compliant" and acceptable.

Many participants reported feeling ignored and disregarded not only by the companies but also by government and regulatory officials and systems, and that they were "expendable" through the eyes of these institutions. One participant was told that if there were not 10 houses affected by an issue, their elected official would not do anything about it (Interview 13). Another resident shared anger that the FDA required Neutrogena® to pull sunscreen products off of shelves because they had a trace of benzene, but it was acceptable for them to breathe in benzene emissions from a compressor station every day; this left them asking, *Why doesn't our life matter? Why doesn't our community matter? It doesn't. We're expendable (Interview 12).*

Residents were sent through administrative run-around between different agencies and often had no regular contact with people who have the power to make changes. Some participants felt like they were constantly having to prove their experiences, often through meticulous record-keeping and reporting. When they would report issues, many times, the blame was shifted to mining, or cleaning supplies, or other unrelated circumstances, as shared by this participant whose neighborhood has several VOC monitors:

*This is the past 7 days. So we spiked up to 1.6 thousand [parts per billion]. [Interview 12] spiked to 1.6 thousand. Usually you see a pattern where everybody spikes at the same time. The head of the EPA said we all smoke and we all have gas cans in our garage [laughs]. And I said, well then we all smoke at the same time. (Interview 11)*

For a majority of participants, their treatment by these institutions negatively impacted their place-based identity, causing them to feel ignored, disregarded, and expendable. This culminated in negative beliefs not only about these entities but about themselves and their worth to those in power, something that was disheartening for those participants who had not previously experienced or perceived this kind of treatment. In summary, pipelines and gas industry buildout have the ability to significantly and negatively impact place-based identity for those residents who are impacted by the infrastructure.

### 7.3 Sense of Place and Place Attachment: *“You always feel like you're on alert”*

The majority of interviewees identified as local to the area while about a third identified as transplants or outsiders. Interviewees reported a range of reasons that brought them to their home and location. Some of the most frequently reported were the beauty of and connection to the rural landscape, a love of nature, family, the land and the features of the home, and livelihood:

*Like many West Virginians, I have a special attachment to the land and the area and just the comfort of being where I'm from...it's just the sentimental attachment, some of us have an attachment to family and learning about it and knowing about it and being where we were. So for me it's that family attachment, that familiar, comfortable feeling of the mountains around me and what I know and what I'm used to. (Interview 17)*

For a majority of participants, the industry buildout had disrupted or shifted their sense of place and place attachment. Some of the ways this manifested were altered feelings of home, decreased feelings of safety and security, and impactful alterations to the landscape.

#### **7.3a Feelings of Home**

A fourth of participants did not feel that the infrastructure affected their feelings about their home and often cited that this was due to the distance from the infrastructure and the sense that it was far enough away to not worry in the day-to-day. Only one couple reported any positive change to their feelings of home, in that the pipeline corridor opened up a view with which to see birds. However, the vast majority of participants reported that industry development negatively affected how they felt about their home. Some avoided their homes due to the disruption, choosing to spend more time in town or visiting friends. Others felt that their homes were tainted because of the industrial buildout, as shared by this participant:

*We've got a stocked bass pond up on the hill, there's pastures, there's caves. It's just, you know, there's nut trees and the wildlife. I mean, it's just, it's a bit of magic. But it's almost like a shroud that's been laid across it. (Interview 18)*

Because many participants felt a special connection to the natural beauty and rural landscape, for them it was particularly upsetting to see this development.

Most participants had been in their homes for upwards of 20 years. They had invested time into building and renovating their homes, cultivating farms and gardens, raising children and grandchildren, and developing a deep attachment. The industrial buildout near their homes was painful for a majority of participants who felt a sense of loss of what their homes used to be. One participant shared that the company had staked out parts of the woods that their dogs were buried in (Interview 4). Another participant watched the destruction at their sister's home down the road:

*There were several guys with chainsaws, I mean just sawing trees down to beat the band. And there were a couple of oak trees that had been there. Her kids grew up here, they're in their early 30s now. [On those trees] there they had a rope swing, the kids would swing out into the ravine and back and forth with. And they'd cut those two trees down and it was really sickening when we saw that they were doing that. (Interview 22)*

For these participants, this development has harmed their emotional bond to their homes and the surrounding land.

When asked about whether the industry buildout affected their future with their home, participants gave three general responses. For some, the development of infrastructure had no influence over future choices about their home, most often due to age, the proximity to family, or investments and commitments to the home. The second group of participants considered leaving because of the buildout, but made the decision to stay and accept the infrastructure, again often due to age and family. The third, and largest, group of participants wanted to move and get away from industry. Some were actively looking at their options, but others felt trapped because there was no way they could sell their home and afford to move. Two interviewees had already moved once from previous homes to get away from the industry and were still impacted by fracking and pipelines; their experiences validate the concern shared by many that it is impossible to get away from industry anywhere in the region. The feelings shared by this participant capture the difficult circumstances that residents are forced into, having to choose between a place that they love and a potentially less harmful alternative:

*You can't ever get away from this industry. If you live anywhere in Pennsylvania, Ohio, or West Virginia, you're not getting away from this industry. So what you have to look at is you have to go, okay, how can I limit my exposure to it or how can I get a little further away from it? It's like picking the lesser of two evils. Do I want to leave my fantastic neighbors who will, when I'm on vacation, come to my house and take care of my animals and I never have to worry about anything? (Interview 7)*



Overall, participants' feeling of and attachment to their homes were substantially and negatively altered by the buildout of industry, as evidenced by the desire of many to move from their homes.

### **7.3b Safety and Security**

Participants listed a range of concerns about pipelines and associated infrastructures, the vast majority of which had to do with safety and security. Almost all participants named structural concerns about pipelines and other oil and gas infrastructure; only three interviewees stated that they felt confident about the installation of the pipeline. These concerns included sinkholes, slips amid the steep terrain, pipe deterioration, and long-term, consistent maintenance. One resident reported over 40 sinkholes in their town, including one in their neighbor that was the size of a bus (Interview 20). Another shared that their neighbor's home had been destroyed by a mudslide from a pipeline work site, with workers waking them up in the middle of the night to evacuate their homes (Interview 17).

All participants mentioned the risk of leaks and explosions from pipelines. For some participants, they were aware of but not preoccupied with this possibility. However, others report living with a daily fear. Some participants had visited sites that had exploded, including a participant who visited the site of the Revolution Pipeline explosion and saw the “*massive steel tower just crumbled over melted, and a gigantic crater*” (Interview 23). This is an image that was hard to shake when it came to their own proximity. A few participants had scares themselves; one resident experienced a gas leak so large they could smell it from within three miles of their home (Interview 16). This quote from one of the participants who was most heavily involved in documentation and monitoring captures the sense of unease felt by a majority of participants:

*I always have to be on the lookout and I always have to be concerned about a leak. So for instance, the materials, ethane, butane, and propane, they're colorless, they're odorless. Ethane especially stays low to the ground, so you wouldn't be able to smell anything. But you may see fog, if conditions allow that. So for instance, in my backfield, I have four acres, and a lot of times we get fog in the back. And I'll look at that and go, 'Oh my God, is that fog? Or is this a pipeline leak?' ... It's a constant visual looking for a leak or auditory listening for changes in the environment. You always feel like you're on alert. (Interview 20)*

As discussed in Section 2, several interviewees used imagery of war to describe their experiences, including viewing the pipelines as a “bomb” and feeling a sense of invasion or “army mobilization” from the onslaught of trucks, workers, and equipment (Interview 20). While this was not a feeling shared by every

participant, it was a very powerful disruption that left some participants with a completely altered sense of safety in their homes:

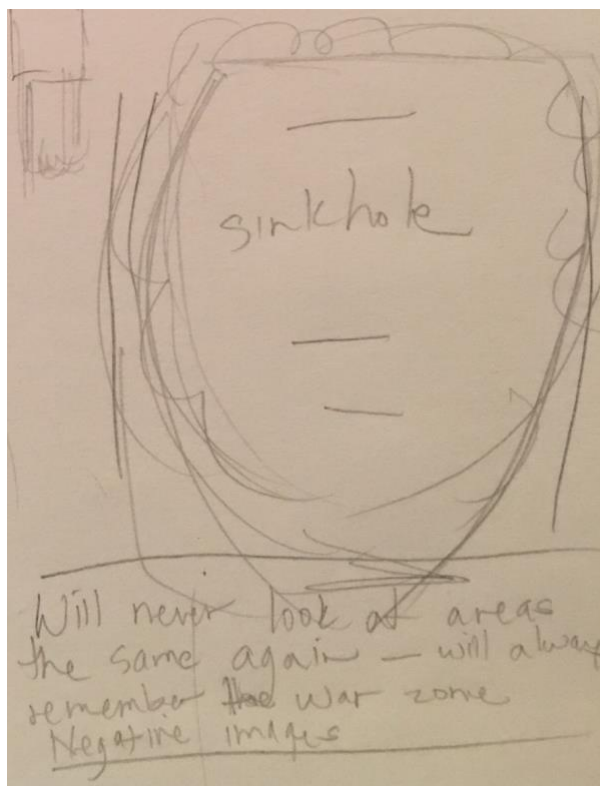
*It's almost like going through a war, and you will always picture what happened during that war time. So I will never ever look at the landscape again, and when I see those areas, I will always think of the pipes underneath, the bombs that are under us. That we're still at war, but now it's just not visible. It's underneath us. (BM1 Participant 1)*

The perceived loss of safety from a potential failure was powerfully felt by participants and a driving factor for many who wished to leave their home.

Health was another overriding concern for a majority of participants, again contributing to the shift from feeling safe to unsafe in their homes. Half of participants reported that they had already experienced health effects from oil and gas infrastructure. These health impacts included burning eyes, nose, and throat; dry mouth/nose and nosebleeds; congestion; headaches; shortness of breath; fatigue; nausea; sleep loss; itchy skin and skin issues; hair loss; endocrine disruption; increased stress and tension; depression and anxiety; and gastrointestinal issues. One participant shared that, when they contracted COVID, they would have to sleep with a washcloth over their face to try to keep the chemicals from a compressor station from burning their lungs (Interview 11). Another participant shared the emotional impacts of the day-to-day health impacts:

*[My grandkids] even noticed the smell like, 'ooh, it stinks Mimi.' I even have days when they have stayed with us that they wake up with headaches. You know, when a three year old tells you, 'it hurts right here,' he doesn't even know what a headache is. That breaks your heart that your grandkids in your home are getting sick from what they're inflicting on you. And they don't care. (Interview 12)*

These symptoms, and the feeling that the companies and regulators “don’t care,” had completely altered this participant’s place attachment: “We could get in the car and drive away from here right now and not look back. And we loved it here.”



**Figure 8.** Drawing from BM1 Participant 1 of a sinkhole with text underneath that reads, “Will never look at areas the same again - will always remember the war zone. Negative images.”

These health effects were largely attributed to compressor stations and gas wells, though a few participants identified leaking pipelines as the source of some of these challenges. Some participants would regularly have to leave their homes and wait for their symptoms to subside, or just to get an escape from the smells and sounds; one couple was driven from their home when their VOC monitors were reading levels over 70,000 parts per billion. Participants feared that they had already been or would eventually be affected by the radioactivity, carcinogens, and other toxins coming from extraction and transmission, producing long-term illnesses without being able to prove the cause. One participant drove past a flaring event and their Geiger counter gave a reading high enough to “call the government,” according to its instructional card, producing a sense of panic in the participant (Interview 23). Another participant’s father had developed myoepithelial carcinoma, a very rare and aggressive cancer. As they tried to determine the cause of this cancer, which has very few guidelines for treatment, they began to have suspicions about the oil and gas industry:

*I’m not aware of myoepithelial carcinoma coming from Round Up or those types of herbicides, pesticides, whatever it might be that he was using. So again, I’ve gone through all these things. Coal miner, used herbicides at the farm, Agent Orange. But, nothing except for rare cancers happening around these gas wells, that’s what really made me start to think about how my dad got this rare cancer. (Interview 16)*

This fear of illness worked against residents’ sense of place and place attachment as they felt an increasing desire to leave and sense that their life could end prematurely in this energy landscape.

A majority of participants had significant concerns about air and water due to both health and environmental consequences. Air pollution from construction and emissions, especially from compressor stations and leaking wells, impacted residents' ability to even breathe in their homes. One participant shared that during pipeline construction, workers filled potholes with a white powder called “mine dust.” It never solidified, and for a year, residents could not go outside without wearing a bandana or another covering. They brought this dust to a meeting with officials from the governor’s office:

*I gathered up a jar of this white dust that we had been breathing for the past two years..at the end of the meeting, I shoved it into the belly of one of the representatives from Governor Justice. And I said, ‘this is what we’ve been breathing. Open it up and shake it a little bit and see what I’m talking about.’ (Interview 18)*

This resident’s story captures the anger of many participants at the living conditions they are burdened with as well as the attitude of government officials, who often dismiss their concerns. This jar of dust is not only a physical and undeniable manifestation of construction impacts, but it also represents a completely altered sense of place as even the air around their home has changed.

Residents had experienced well water contamination from construction and leaks, and they were concerned about water body contamination through sedimentation, spills, and radiation. Several interviewees either had to buy bottled water or get water delivered with a water buffalo, even though part of the appeal of the rural area is having a well water source. While some were afraid of health consequences in the future, others had already seen the deleterious effects of drinking contaminated water. One participant shared that they blamed the company for their wife's death. Their well water was infiltrated with bacteria during construction, and she would use baby wipes rather than bathe with contaminated water; she died of blood sepsis from a urinary tract infection (Interview 21). Another resident had officials from the company and Department of Environmental Protection over after their well was contaminated, and their sentiments capture the feelings from many participants worried about contamination:

*I probably had over 100 people and as we're talking we all get thirsty. I offer them water from the tap. No, 'if you've got bottled water I'll take it,' but no one wants to touch this water. So regardless of what they print on paper, it's suspect because the final test is, 'have a glass.' All you gotta do is take 8 ounces, and you would prove to me that this is fine. You don't need all these fancy tests. But I know what happened to me from a sip, go ahead. (Interview 4)*

This again shows that residents know the truth of their experiences, and that their sense of place has been changed through their experiences and interactions with the landscape.

In addition to the structural and environmental changes in the landscape, the buildout also brought social disruption through an influx of laborers, which caused some people to feel less safe. Participants had mixed experiences with the construction and operations workers. Three participants reported having a positive experience interacting with workers, including one interviewee who actually received help working on closing his roof before a storm (Interview 10). The majority of participants, however, had negative interactions with workers, having experiences of being surveilled, harassed, and restricted during construction, sometimes with police presence, as well as seeing the impacts of the “man camps” that pop up as out-of-state workers travel with the company. Not only did the physical structures disrupt the sense of safety that residents felt, but also the new social interactions and tensions that participants faced, as shared by this interviewee:

*[She] had gone back [on the well pad] the last time when they were actually getting the soil and the air samples. The EQT person came and was arguing with them and kicking them out. And he actually ended up following them all day long. Wherever they went, he went. They pulled in the gas station, he'd pull in the gas station. (Interview 16)*

Place attachment is influenced not only by personal and environmental factors, but also by community dimensions. These shifts in community dimensions as residents interacted with unfamiliar, and at times

hostile, workers and people supportive of the industry had weakened the sense of familiarity and safety for a majority of participants.

Safety and familiarity are a crucial aspect of sense of place and place attachment for many of these participants, and an element that has been directly altered by the awareness of and proximity to pipeline buildout and industrial development.

### **7.3c. Landscape**

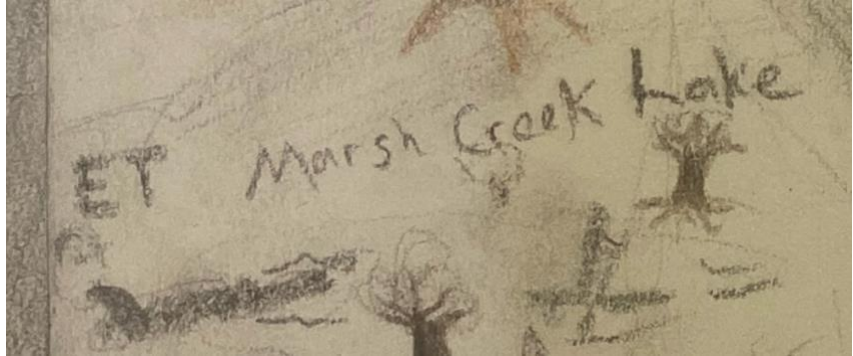
Natural environmental dimensions are a significant component influencing sense of place and place attachment. Participants were asked to comment on whether and how the landscape around their home had changed. Some of the most noticeable changes for residents were the alterations to slope and topography and the maintenance of access paths. The clearings needed for construction and operation were often described as “cuts” or “slices” through the landscape. These cuts served as reminders for many of the participants of the movement of gas under the ground. The frustrations shared by this participant reflect how, for some, the land could not be adequately or fully restored after this development:

*The whole earth changed in my backyard, the whole slope has changed. [They] moved 200,000 cubic yards [of soil] over 18.4 acres. Then they put it back how they figured it was through maps from 1950, with the thing you call LiDAR on their bulldozer. Well, LiDAR just does that, it lies, because I have pictures from before and after. This area was flat before, I could sit on my back porch and look out to the woodline and shoot 330 yards. That means a lot to me, like I said I'm a deer hunter. Rainy day or snowy day, you don't want to go anywhere, you can just sit on the porch and watch your field. I can't see it anymore, the hillside is a swamp. And the woods changed, they cut paths through it, swaths. Everything has changed here because of industry. It's just, it's going to be a permanent scar where you live, forever, in your lifetime. (Interview 4)*

This quote also captures the conflict between residential, place-based knowledge and the technical knowledge used by companies and government. Residents have cultivated a deep connection to and familiarity with the landscape over many years. The upheaval of this familiarity through the industry buildout was irreparable for some participants.

A majority of participants expressed what might be considered “environmentalist” concerns. Some residents farmed and gardened, which was interrupted or halted by the construction and threatened by the alteration of soil ecology. One of the most discussed changes was the impact to forested areas and the consequences of this fragmentation for wildlife and ecosystem health. The changes to these features of the landscape, and the ways in which residents could use the space, impacted their attachment to the area, often through feelings of loss. This body-mapping participant drew a metaphorical picture of the pipeline company's head to demonstrate how they felt the company treated the landscape:

*This is Energy Transfer's head. Alright, so that's Energy Transfer, who's building the pipeline, and they're puking into my lake. Because they kind of puked their crap, industrial waste into it and still is not cleaned up. My lake's harmed, ecology is harmed, and I just think of all the little animals and things that have passed because of this or have been affected. And they didn't ask for it. (BM1 Participant 2)*



Because many participants felt a strong attachment to the landscape, the ways in which they believed the companies had treated the landscape could feel like a personal offense.

The culmination of damaged feelings of home, a loss in feelings of safety and security, and disruptions to the landscape served to rupture a majority of the participant's place attachment and destabilize their sense of place, as their emotional bonds to and with place were weakened and, in some cases, completely altered.

#### 7.4. Embodied Emotions: *You can feel it, you can smell it, you can see it. It's enormous. And it's overwhelming*

As discussed in Chapter IV, embodied emotions are the physical sensations associated with emotional experiences and helps to explain the relationship between the body and the landscape as a linked geography. Embodied emotions here are explored through the feelings of participants when thinking about the pipeline and through the memories they carry with each of their senses.

Regardless of the participant's ultimate thoughts about living in proximity to pipelines, the process of construction and operation was an emotional experience for almost all participants. For some, the disturbance of this industry produces emotional instability, as shared by one participant:

*The emotional part of it has been really difficult. You go from anger and you're going to fight this, to crying because it's hopeless and depressing. This winter, it was depressing. [Interview 12] and I have cried together. I mean, when you've lived somewhere for 48 years, it's bad... There's anxiety, there's depression, there's just every emotion, anger, every emotion you can think of, you go through, related to all this. (Interview 11)*

The emotional upheaval from this development left some residents with “uncontrollable” emotions that manifested not only mentally but physically. Participants reported stress and muscle tension, headaches triggered by high emotions, and physical and mental exhaustion.

When asked what feelings they experienced in regards to the pipeline, one of the most common responses was fear. Residents lived with fear and anxiety about a possible explosion or leak while seeing and hearing about tragic incidents around the region, like when a well head exploded in the county next to Interview 13, who lived with a well head 525 feet from their home: *“that’s a fear my family and I live with.”* One participant shared that it was “too disturbing” to visit the parks near them because of the destruction from the pipelines and compressor stations and the fear of being “poisoned” (BM2 Participant 3). For some participants, this fear was not only a thought in the back of their heads but a controlling factor in their lives, driving them to leave their homes temporarily or permanently, and distracting them from being able to function in their day-to-day activities.

Some of the other most common responses were stress, anger, frustration, sadness and grief, and disappointment. Participants shared that they *“mourn the loss of [their] home”* (Interview 11), and that they even got irritated with their family members because they were so frustrated; *“it affects every part of your life”* (Interview 12). Residents were disappointed and uncertain about their future with their home, preventing them from doing projects that they’ve wanted to do. One participant, who was heavily affected by pollution and disruption from a compressor station, shared an overwhelming emotional shift in their feelings toward their home and landscape:

*How do I feel about the landscape? I just put, I hate it. I don't want to be here anymore. I don't want to be in this. I used to love driving down the lane to come home. And now it's nothing but anxiety. When you make that turn to come down the lane, it's just anxiety. Is it going to be a good smelling day? Is it a bad smelling day? How many times are they gonna blow off today? Am I going to have to call to report today? Do I need to talk to this person today? Are the neighbors gonna call me today? And, you know, I don't want to talk about it sometimes. I just can't. And I feel bad because there's days all I can do is cry. That's all I do, is cry.* (BM2 Participant 1)

This testimony demonstrates the involuntary physical reactions that some participants experienced in times of emotional distress as a result of this infrastructure.

Two participants shared particularly powerful stories of grief. The first shared that they had a disabled daughter who lived a few towns over. For two years, during construction, the roads were too difficult to drive and their daughter was not able to visit and vice versa. Their daughter passed two years into construction, and they shared:

*I think about all those wasted days that we used to go for walks, and she used to bring my grandson out. He was the one that would creek walk with me. And she's gone. And he's gone because he had to move away...it affects, in a whole bunch of ways, ways that you don't even expect it to hit you (Interview 18)*

The other participant shared that they lost their dog to cancer, after being her caretaker for a year and a half. This participant was heavily involved in an oppositional pipeline fight, and they shared that the hardest part of the fight was losing her:

*I always have this guilt inside of me that how much of this stuff I've brought home, all this like time I've spent away from her, like, how many of those minutes could I have had? Is this worth it? I've learned to, I've learned what unconditional love is through this. Because she supported me through all this. (BM1 Participant 2)*



**Figure 9.** Drawing from BM1 Participant 2 with a red, broken heart image on their chest, as well as a drawing of their dog's face with the word "Angel" written underneath.

These stories are particularly powerful examples of the ways in which this industry buildout can bring grief in multiple dimensions and the ways in which, as

Interview 12 highlighted, this industry can affect "every aspect" of a resident's life.

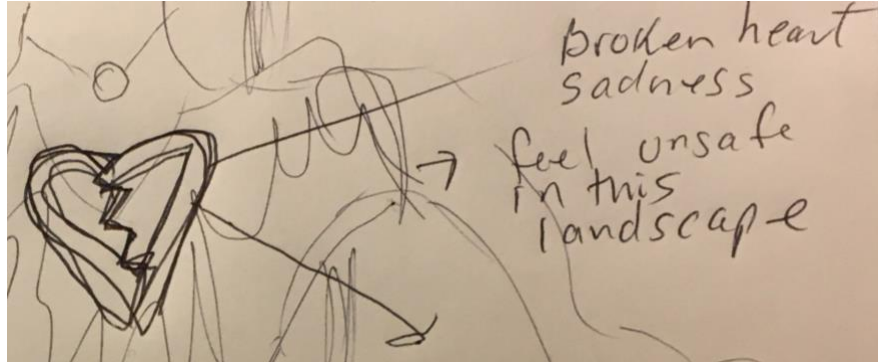
When asked what their "gut feelings" were about living near a pipeline, half of interviewees expressed the feeling that it is not safe and that it has "potential of catastrophe" (Interview 1). Some participants shared that they were physically nauseous and weak seeing the influence of industry and being near infrastructure:

*So like, you used to go to that park and enjoy it, and now I just look at this pavilion, and it just makes me nauseous. You see the influence of Sunoco, Energy Transfer all around you, between this structure and this fire company who got this fire truck. (Interview 20)*

This quote reflects a feeling shared by several participants that, when the companies contributed money and gifts to communities, it was often for ulterior motives of cementing their power and influence. Part of the reason that this person feels nauseous when seeing these structures, is knowing what they ultimately meant for their home and community.



Others shared feelings of mental disturbance and the psychological impacts of their experiences with industry and living within the incineration zone, to the point of feeling like they were being driven “insane” (Interview 18). Several participants expressed a feeling of being much more nervous and on edge, even at their homes. A few went so far as to say that they were “heartbroken.” One participant was so desperate for a respite from the disruption that they actually walked in front of a tractor trailer one day to force them to stop, even “if just for a moment” (Interview 18). This quote reflects the ways in which these thoughts would not leave many of the residents:



**Figure 10.** Drawing from BM2 Participant 3 with a broken heart on the chest and text that reads, “broken heart, sadness, feel unsafe in this landscape.”

*It's fine with me if there's never any problem with it, if it never pollutes, if it never leaks, if it never ruptures. But when I'm living here, I'll never stop having that in the back of my mind. (Interview 17)*

This sensation of inescapable thoughts about the pipeline captures the ways in which these emotions and feelings were subconsciously rooted for some participants. The feeling for many participants that these emotions are inescapable and uncontrollable highlights the ways in which the landscape is a constant reminder for participants and that the geography of their home and community is inextricably linked to their embodied emotions and sensations.

#### **7.4a Senses**

In the body-mapping groups specifically and in some interviews, participants were asked to think about the pipeline and infrastructure buildout through each of their senses. First, participants were asked to describe how they visualize the pipeline, and what some of the most memorable images from the industry buildout were. Interviewees often referenced the size of the pipe and machinery, disruption and destruction from construction, and the bright lights from the construction and fracking pads. One participant purchased hula-hoops of the same diameter as the pipeline across from their home and said that the “most striking thing” was to hold it in front of themselves and see the size in relation to their own body (Interview 17). Other strong images included seeing spills, explosions, and the invasion of industry into a rural area:

*The strongest image I would have would be the well pad explosion and leak that lasted for 20 days. I went down several times and witnessed, I could actually see the leak. And then, by chance, I was on the ridge above the site almost a month later, when they were flaring it to finally cap it. I'd never seen anything like it. You could see huge plumes of smoke and the whole sky was pulsing red and pink. If there's one image that sticks out, what I've experienced here, it's that one. (BM2 Participant 3)*



Catastrophic events and experiences in which participants recognized their own scale in comparison to these infrastructures were powerful images even for those participants who were the most at peace with their proximity.

Half of participants reported being affected by smells, including fumes from the compressors, leaking gas smells, and smells from trucks during construction and transportation. Even though deep-well fracked gas does not have a smell, participants could still sense a change in the air. Multiple participants were told by friends and acquaintances that they themselves smelled from the pollutants. One participant's turning point in their feelings about the industry came through the sickening smell:

*I was taking trash down to my cans, I keep them down by the highway, and I walked right around on that turn where you and I just walked [by the garage]. And I smelled those emissions, they were so strong, it took me to my knees, and I was nauseous, almost ready to throw up. That's what really culminated it all. I said this ain't right, this ain't just oil laying up in here. (Interview 13)*



**Figure 12.** Drawing from BM1 Participant 1 showing arrows drawn to their nose and mouth that say, respectively, "Benzene smell, Diesel [sic] smell, Gasoline smell, Pond smell," and "Metal taste." In reference to sound, the participant wrote "Drilling, Vibration, Low Pitch, Hissing."



*structural presence. You can feel it, you can smell it, you can see it. It's enormous. And it's overwhelming.* (Interview 16)

This quote captures that some residents were not only mentally but also physically aware of these infrastructures and the potential consequences they carry. Though not the case for all participants, for a majority of participants, the landscape and the self were a linked geography through the embodied emotional responses that residents experienced and carried as a result of an altered place-based identity, sense of place, and place attachment.

Overall, the buildout of oil and gas infrastructure has significantly affected residents' place-based identity, sense of place, and place attachment. The ways in which place provides meaning and purpose have been altered through negative changes in community and day-to-day life, new roles and identities from an obligation to resist this buildout, and negative beliefs about oneself and one's worth as a result of treatment by industry and government agents. Residents' attachment to their homes have largely been negatively affected and worsened, in part due to a lost sense of safety and familiarity. Changes to the landscape, often viewed negatively by residents, have damaged participants' place attachment and sense of place, which is manifested in their embodied emotions. For a majority of participants, the linked geographies of the home, landscape, and self produced a physical and highly emotional response to the methane gas buildout in the region.

## **VIII. Discussion**

This thesis speaks to the research gap identified in Chapter IV at the intersection of feminist, emotional, and energy geographies through an investigation of the ways in which fracked gas pipelines and associated energy infrastructures have impacted place-based identity, sense of place, and place attachment for community residents living in close proximity to these systems. This thesis contributes to studies of feminist, emotional, and energy geographies more broadly through a discussion of the ways in which changes to landscape as a result of extractive industry result in place disruption for residents. Further, this research adds to studies of energy geographies by exploring the understudied concept of fracked energy landscapes through the case of the Marcellus shale in Appalachia. This research also adds to the developing subject of embodied energy geographies through a novel analysis of both oil and gas energy extraction as well as energy production infrastructure and its impacts on embodied experiences of the self, home, and landscape. The following discussion articulates the contributions of the findings for these literatures and is separated into the three central conceptual themes that emerged from the results of this research: place disruption, fracked energy landscapes, and embodied energy geographies.

## 1. Fracked Energy Terrain

This study has used a spatial lens to analyze and explore the impacts of geographically dispersed and interconnected oil and gas infrastructures for impacted residents. A spatial lens is a necessary framing for studies of the fracked gas industry as pipeline networks and major infrastructures occupy, expand through, and entangle in space (Bridge, 2018). I advance this spatial understanding with the addition of the term “energy terrain” to more fully capture the spatially expansive, physically interconnected infrastructure of energy systems, as well as the embodied impacts this infrastructure has for residents. This concept reflects the ways in which participants are encompassed by a multitude of oil and gas infrastructures at various scales, including pipelines, gas wells, compressor stations, and metering and regulation stations. The physical connections between different energy infrastructures are material reflections of interconnected, systemic social, cultural, and embodied impacts to residents. As such, the term energy terrain captures both these physical and representational aspects.

Participants discussed individual infrastructures as part of a broader energy system and used imagery of “invasive landscapes” in rural areas (Meng, 2014). They described the “spiderweb” of pipeline networks under the surface. By using this imagery, residents unsettled the image of the infrastructure promoted by industry as “safe, silent, and unseen” (Bond, 2015). Moreover, participants remarked on the ways in which the energy terrain touches multiple aspects of their day-to-day life, including home, work, and even grocery shopping, emphasizing the varied and interconnected scales of impact including the body, home, community, and region.

Participants felt that their area had been transformed from a rural and agricultural place to an industrial one. This echoes findings from other research in the Marcellus region that the installation process and expansive magnitude of pipeline networks and other fracking infrastructure have transformed rural communities into industrial sites (Caretta & McHenry, 2020; Caretta et al., 2021; Sangaramoorthy, 2018). The participants in this study have borne witness to the transformation of the natural landscape through the construction of energy systems and the necessary components for the flow of gas. Moreover, they commented upon how this sprawl disrupts and harms their own place attachments and identities, as well as social dynamics in their communities. Their accounts mirror the observations by other scholars of the detrimental natural, social, and cultural impacts of energy sprawl in the Marcellus shale region for local residents and communities (Jacquet et al., 2018; Caretta et al., 2021).

This research emphasizes the local materiality of energy processes that can be erased or invisibilized by attention to national energy production discourses (Bridge, 2018). Technological zones are a physical representation of global political and economic interests, and though fracking is a global

phenomenon, its impacts and people's experiences with industry are highly localized and informed by their sense of place (Sangaramoorthy et al., 2016). In energy production, local, regional, national, and global scales interact and intertwine in ways that lead us to question who is affected, who has the agency to take action, and who bears responsibility (Bridge et al., 2013). In this research, approximately 70% of participants had taken on new roles as a result of industry buildout, including joining organizations and becoming documenters and monitors, and expressed a degree of agency and responsibility for changing the conditions. At the same time, a number of those participants felt burdened with an undue responsibility to protect themselves and their communities, which they felt should rest on the companies and regulators at the local, state, and federal levels. The mismatched scales of energy production decision-making and community impact often left residents feeling disregarded, even as they put effort into their new roles to combat the impacts of industry.

This study of fracked energy landscapes is an important contribution to the localized experiences of global fossil fuel production. National political narratives about energy independence, access to resources, nationalism, etc., enable local dispossessions and environmental destruction (e.g., Perreault & Valdivia, 2010; Healy et al., 2019). As a result, scholars encourage a simultaneous focus on place-specific contexts and local struggles as well as systemic analyses of energy dynamics and networks of power (Huber, 2015). In the case of this research project, participants reported feeling powerless against the Goliath of energy corporations. These fights were not only about the physical disruptions near the home, but also about broader dynamics of power and the lack of political authority for rural communities in protecting their own health and wellbeing. This echoes scholarship around other pipeline fights that are manifestations of broader geopolitical conflicts and struggles (Huber et al., 2015; Johnson & Derrick, 2012; Wilson, 2012). The networks of fracked gas production and distribution also reinforce the construction of the Appalachian region as a "sacrifice zone" for national and international energy and petrochemical use. Local residents perceived and resisted the ways in which they felt they had been deemed "expendable" in this petro-economy. In so doing, they echo the finding from elsewhere that energy systems are physical representations of exclusion, marginalization, and uneven influence over political and economic systems (Bridge, 2018).

This study engages the concept of energy landscapes by interrogating how energy systems affect everyday life (Bridge, 2018). Participants listed off a range of everyday consequences including pollution, traffic, barriers to the use of their home, hyper-vigilance around their home, and avoiding areas of their community. I have added the term energy terrain to this body of work to more fully capture the ways in which these daily impacts are spatially distributed and interconnected. This is underscored by the ways in which participants felt these impacts in both the immediate environment of their home but also in their

wider communities as they moved through space to avoid industry infrastructure and influence. Moreover, this research supports the understanding of energy not as an object but as a central concept to nature-society relations which influences spatial identities and connection to place (Huber, 2015; Calvert, 2016). As one participant stated, this industry can touch every aspect of a person's life. More than simply a resource for extraction and consumption, for fenceline communities, energy is an affectual agent that can become a central force in their lives.

This work advances energy geography through a conceptualization of energy terrain and the ways in which interconnected physical infrastructures create and represent multiple scales of impact for affected communities. The use of a spatial lens expands our understanding of the detrimental impacts of energy sprawl and the transformation of rural landscapes into industrial sites. These industrial sites are representations of global political and economic processes and interests that have highly localized and unjust impacts. These impacts are felt through the construction of the Ohio River Valley as a sacrifice zone and the feeling from many residents that they have been treated as expendable. Energy becomes an affectual agent in these energy landscapes as a manifestation of broader geopolitical struggles and a central force in day-to-day life for some participants. Energy terrain is a useful concept for future studies in understanding energy infrastructures as an interconnected network both materially and representationally for impacted residents.

## 2. Place Disruption

The first research question of this project asked how residents' sense of place, place attachment, and place-based identity have shifted as a result of pipeline development. The results of this research indicate that all three of these concepts can be either temporarily or permanently altered, detrimentally, by the disruptions caused by oil and gas buildout. As a result, I advance the argument that the combination of these place-based shifts can be summarized through the notion of *place disruption*. Place disruption as a concept allows for clearer articulation of how these varied and interconnected place-based aspects are experienced and understood by residents.

As defined in Chapter IV, place identity is understood as the ways in which identities are attached to and situated within place (Wilcox et al., 2012) and how place provides meaning and purpose (Brown & Raymond, 2007). Singh (2013) articulates that peoples' sense of self are intertwined with their biophysical environment, and emotional geographers have established that a bond with a location impacts thoughts, emotions, and connections (Relph, 1976; Dando, 2022). Place attachment and sense of place refer to a

person's or community's love for and connection to their home environment, which includes personal, community, and natural environment dimensions (Scannell & Gifford, 2010; Raymond et al., 2010).

Place disruption can result in grief for the emotional investment in and personal memories of place, and this grief contributes to an unstable sense of self (Hummon, 1992; Twigger-Ross & Uzzell, 1996). This grief is evident in participants' expressions of "mourning" their home and the embodied emotions of grief, depression, sadness, anger, and fear that they experience. Familiarity is an important cognitive component of place attachment (Fullilove, 1996), and participants' familiarity with their home environments was disrupted through both the built physical structure and new social arrangements with an influx of workers and division in the community around industry. For many, the buildout of energy infrastructure can unsettle the home as a symbol of security (Diener & Hagen, 2020), leaving residents with an altered sense of home and self.

This research supports the findings of Cunsolo and Ellis (2018) that when sense of place and place attachment are disrupted, individuals can feel a loss of personal identity and resulting "ecological grief" in which mental health is detrimentally affected by place-based impacts. As Fried (1963) concludes, grief is not limited to the death of a person but can also result from the loss of an important place. Participants expressed feelings of solastalgia, sharing the pain from a loss in their sense of home as a result of disrupted attachments to material landscapes (Albrecht, 2005). The vast majority of participants reported that the industry buildout negatively affected how they feel about their homes, leading some to avoid their homes as much as possible. After being in their homes for decades, residents grieved the loss of what their homes used to be and desired to move altogether. Some residents also expressed a broader grief for the natural world and the environmental consequences from the industry, as well as worries and fears over systemic consequences of climate change. Thus, residents may face solastalgia at multiple scales due to their experiences with one or more points in the network of physical infrastructure responsible for climate chaos and ecological harm.

My research demonstrates that pipelines and other fracked gas infrastructures have the affectual, emotional capacity to cause place disruption for impacted residents, leading residents to feel emotions of frustration, anger, stress, anxiety, sadness, grief, disappointment, and fear. This is consistent with findings from other researchers that disruption to place can result in emotions of anxiety, loss, and a feeling of displacement (Bonaiuto, Breakwell, & Cano, 1996; Brown & Perkins, 1992; Devine-Wright, 2009; Fried, 2000). As argued in Section 3 of Chapter VII, the majority of participants believed that their communities had been negatively impacted by the industrial buildout as manifested through division and mistrust, altering their beliefs about community identity. Most participants reported negative changes in day-to-day



life from a range of disruptions for which they blamed industry. These disruptions in day-to-day life negatively impacted participants' attachments to their homes and communities and manifested in a sense of loss for what was once a quiet, rural landscape.

Place disruption can include the actual disruptive event, triggering negative emotions, as well as pre-disruption anticipation of possible futures and post-disruption coping through forming new place attachments, possibly through relocation (Brown & Perkins, 1992). This framing allows for recognition of psychological disruption before any actual physical change (Devine-Wright, 2009). I argue that this conception of place disruption is important for understanding the impacts of energy terrain on residents' place attachment. Participants reported a range of concerns around safety and security, including leaks, explosions, sinkholes, current and future health effects, air and water pollution, and social disruption. Safety and familiarity, core elements to sense of place and place attachments, were directly altered by proximity to and awareness of the oil and gas development. Residents were simultaneously experiencing multiple stages of pre-, current, and post-disruption. They were dealing with the consequences of active construction sites and the influx of workers; they were anticipating potential future disasters like explosions and rare illnesses; and they were coping with the aftermath of the disruption as they saw the "cuts" across the landscape. This conceptualization of place disruption furthers our understanding of the affectual, emotional capacity of energy infrastructure both spatially and temporally.

My findings regarding place disruption as a result of oil and gas infrastructure buildout are consistent with other studies regarding coal mining and fracking in the Appalachian region (Feng, 2020; Morrone et al., 2015; Sangaramoorthy et al., 2016). Sangaramoorthy et al. (2016) found that residents affected by fracking in Doddridge County, WV expressed similar feelings of helplessness, grief, and distress as those shared by participants in this study due to the disruption to their sense of place. Their study also finds that residents felt increasing stress and uncertainty about the future as a result of perceived environmental and health impacts. Their and other studies have found that experiences with fracking contribute to fragmented identities and a feeling of loss of control (Perry, 2012; Willow, 2014). This research expands our understanding of these impacts through the use of place disruption, which has not been explicitly centered in energy geography. The use of place disruption here emphasizes the connection between place-based and emotional impacts through energy development. Moreover, I add to these studies by including a focus on pipelines and other sites of energy production, including compressor stations. Analyses of these sites contribute to our understanding of the damage of industry not only from fracking but also from the associated, necessary infrastructures which are rarely of explicit attention in studies of the industry. This expands our understanding of the spatial extent of the damage beyond the well pad to a distributed energy terrain.

This research utilizes embodiment as an analytical lens and engages with the concept of “slow violence,” coined by Robert Nixon (2011) to explore the ways in which place disruption is not only an emotional and mental change but it is also a physical sensation. Some toxic events can be instantaneous and visible, such as the Union Carbide explosion in Bhopal, India (Fortun, 2009). However, in other cases, toxicity can be uncertain and difficult to measure, as is the case for communities in Cancer Alley on the Gulf Coast of the United States, who are surrounded by petrochemical plants (Davies, 2021). Huber (2015) argues that energy development can generate slow violence for both human and non-human populations through landscape destruction, water contamination, and livelihood impacts. Scholars of slow violence have called for a research agenda that engages with the ongoing nature of “temporally scattered damage” (Davies 2021:22).

This research directly focuses on the sensory experiences of impacted residents in order to explore the embodied place disruption of the oil and gas industry. As Willow and Wylie (2014) articulate, initial concerns about unconventional energy development for impacted communities are evident through sensory experiences as residents note odors and discoloration which could reveal, for example, the presence of hazardous spills or pollution. Though much of Nixon’s original theorization conceptualized pollution as “spectacle deficient” (47), slow violence is not inherently invisible and in fact is often a material reality for residents impacted by it, as shown by Davies’ (2021) ethnography in Cancer Alley. Similar to his findings, in this research, slow violence is an everyday reality for participants who could see, hear, smell, taste, and feel the toxicity and pollution from the industrial buildout. In my findings, residents saw their family members and neighbors coming down with rare illnesses and could count the number of cancer cases on their roads. Some scholars have argued that fracking and pipelines are a unique threat due to their invisibility (e.g., Davidson, 2018). However, Davies directs us to ask an important question: “invisible to whom?” (29). This slow violence is not invisible for the residents who are impacted by it; rather, the violence is *invisibilized* by corporate and government powers who seek to delegitimize and disregard residents’ experiences. The participants in this research demonstrated the ways in which they detected and documented instances of pollution as well as their associated symptoms; these events and infrastructures were very visible to many of them. My results also show that most participants reported feeling disrespected or “expendable” as a result of the perceived treatment by companies and government and the ways in which their experiences have been disregarded. Beliefs about corruption, inadequate regulations, and dismissal of their own experiences and observations left participants feeling disheartened and devalued, which also contributes to place disruption through a loss of personal identity and sense of place.

Slow violence allows us to understand and expand what causes harm and suffering to include not only immediate and vivid forms of harm but also incremental, cumulative damage intersected and informed

by social, political, economic, and environmental injustices (Davies 2021). The case of the Ohio River Valley is an interesting setting in which to explore this concept, given the multiple intersections of privilege and oppression as resident populations are predominantly white, rural, and lower-to-middle class (Caretta & McHenry, 2020; U.S. Census Bureau, 2021). Studies of slow violence related to the petrochemical and gas industry have largely focused on Cancer Alley and the Global South (e.g., Davies, 2018, 2019; Navas, D'Alisa, & Martínez-Alier, 2022). This study is unique in its analysis of the slow violence of oil and gas in the Appalachian context. Moreover, Gutierrez, Powell, & Pendergrast (2021) argue that, while race and racialization have played a central role in environmental justice scholarship, there is also a need to explore “the environment at the intersections of rural communities, class, and [whiteness]” (p. 78), particularly in light of calls for a “just transition” and research on fracking in predominantly white communities (Gullion, 2015; Pearson, 2017; Simonelli, 2014) alongside the rise of white supremacy movements globally. While it is beyond the scope of this study to explore an in-depth analysis of whiteness and just transition, this research is an important contribution to how environmental injustice manifests in the Ohio River Valley and prompts further inquiry, as discussed in Chapter IX.

Participants in this study, similarly to other fenceline communities including petrochemical and fracked landscapes, found that their embodied knowledges of slow violence were challenged by a need for scientific “proof” (Davies, 2021; Gullion, 2015; McHenry, 2017; Ottinger, 2017). Community concerns are often construed as anti-development or anti-science by both scientists, legislators, and industry advocates (Eisenberg, 2015; McHenry, 2017), leading marginalized and fenceline groups confront a disconnect between their lived experiences and the resources through which to talk about them (Ottinger, 2017; Pohlhaus, 2012). I argue that this disconnect between embodied knowledge and scientific proof contributes to a sense of place disruption.

Place disruption captures the ways in which place-based identity, place attachment, and sense of places are all detrimentally altered for participants by the energy terrains of the Ohio River Valley. The participants in this study reported experiencing a form of stationary displacement, resulting from ecological grief and a loss of familiarity and safety, as they confront slow violence and dismissal of their embodied knowledge. Place disruption is an important concept for further inquiry toward understanding the whole of place-based impacts to impacted residents and communities. This disruption manifests through embodied emotional experiences.

### 3. Embodied Energy Geography

This research has explored the linked geographies of the home, landscape, and self through the lens of embodied emotions. Embodiment has been used to understand how the spectrum of socio-environmental injustices from the energy cycle manifest through physical, bodily symptoms and suffering (Healy et al., 2019) and to explain the relationship between the landscape and the body as a linked geography. As historian Joy Parr puts it, “our senses are the conduits through which knowledge of technology and the environment flow” (2010, p. 1). In this study, embodied energy injustice is understood as the impacts to the body and self as a result of the energy extraction and production chain, with a particular focus on emotions.

A focus on embodied emotions is a deliberate focus on the “personal” experiences of the body, home, and lived experiences, linking the home and body to broader geopolitics (Dyck, 2005; England, 1994). As Wright (2012) argues, this attention to emotions allows us to understand material reality and the politics of inclusion and exclusion. Other scholars have explored how energy systems are imbued with geopolitical power and affectual capacity (Rohse et al., 2020). Embodiment as a concept makes explicit the mental, physical, and emotional connections between infrastructure, the landscape, and the self. Emotional geography also emphasizes issues of power and imbalance in the construction of emotions between two subjects (Tolia-Kelly, 2006). Therefore, I center the emotional affectual capacity of energy systems through the idea of embodied energy geographies, emphasizing the unequal power relations and affectual capacities between energy systems, global actors in energy production, and impacted residents.

This study echoes the work of other scholars in demonstrating that changes to the landscape impact residents through the sensation of embodied emotions, linking the landscape and body as interconnected geographical scales (Bennett, 2004; Davidson & Milligan, 2004). Chapter IV outlines that emotional geography conceives of emotions as relational both between people and between people and place (Wood & Smith, 2004); emotions can be understood as a “connective tissue” to link the “experiential geographies” of the human body and mind to “broader social geographies of place” (Davidson & Milligan, 2004: 524). As shown in Section 4 of Chapter VII, the process of construction and operation generated emotions for almost all participants. The emotions shared by participants mirror those expressed by residents of Bradford County, PA regarding the impacts of fracking (Perry, 2012). In both cases, residents reported feeling depression, fear, anger, and emotional instability. This research shows that these emotions can be controlling factors in residents’ lives, resulting in psychological impacts as they live on edge and in fear. Some participants shared powerful stories that capture the ways in which these infrastructures can generate emotion and grief in multiple dimensions and ways, affecting “every aspect” of a resident’s life. The oil and gas buildout impacted residents through each of their senses and affected their feelings about place and

their surroundings. Residents were both mentally and physically aware of the energy terrain, reflecting a linked geography of the home, landscape, and self.

In this research, I aimed to investigate both the emotions of impacted communities as a result of energy systems as well as the emotional, affectual capacity of the energy system in the production of space (Rohse et al., 2020). This relational view challenges the understanding of energy as solely a technical or physical entity (Broto & Baker, 2018). Ey, Sherval, and Hodge (2017) argue that there is a “striking” lack of engagement with the felt and emotive aspects of the extractive sector. This research contributes empirical data about how oil and gas buildout, like other aspects of the extractive sector, is “imbued with (and shaped by) emotions” (2). In particular, the use of the body mapping method allowed participants to articulate the relational and emotional aspects of the oil and gas buildout through a distinct focus on the senses, feelings, and relations in a combination of drawing, journaling, and peer-to-peer sharing. Through this method, participants were able to focus directly on their bodies and make explicit the connections between the body, the self, and the landscape in ways that augmented the results from the interviews.

The results of this research support the arguments held in emotional geography and political ecology that the human body is always related to and interconnected with other “bodies,” including technological entities (Hayes-Conroy & Hayes-Conroy, 2013). This study exemplifies the argument from affectual geography that space is composed of relations arising from networks and that people affect and are affected by the people and things around them (Cresswell, 2012; Schmitz & Ahmed, 2014). This research also expands our understanding of energy system affect through a focus on embodied emotion. Specifically, these findings support an understanding of the emotional affectual capacities of energy infrastructures and networks in disrupting or altering place attachment and sense of place. This capacity results in embodied emotions of fear, anger, and grief as residents express feelings of being on edge in their homes and communities, always on the lookout for a spill or worried for their future health.

This research and its focus on social, personal, and embodied impacts emphasizes the notion that extraction is not only physical removal and production processes but also social processes and power relations at both a local and global scale that maintain exploitative systems (Johnson et al., 2021). Meng (2018) argues that when fracking occurs in a place, society is “fully entangled” with technology, environment, economy, and landscape, and interactions shift as the industry develops. Sovacool et al. (2017) argue that policymakers focus on technology and economics for energy solutions when in fact the problems are more deeply rooted in social, political, and cultural questions. To ignore the social dimensions of energy systems is to make those dimensions “appear natural or normal” (ibid). My research demonstrates the ways in which pipelines, compressor stations, well pads, and other infrastructures, in addition to their

material impacts, also become symbols of unfairness and marginalization for some participants who feel that they have been disregarded in the gas production process. This symbolism is captured by the comparison of the pipeline pathways to “bombs” as constant visual reminders not only of their physical presence, but also the social and emotional upheaval.

This thesis also makes a unique contribution to the study of emotional energy geographies by focusing in large part on the buildout of pipeline networks in the Ohio River Valley. While a number of studies have contributed to the emerging theorization of emotional energy geographies through explorations of mining (e.g., Bailey & Osborne, 2020; Feng, 2020; Pini et al., 2010; Rohse et al., 2020) and fracking (e.g., Davidson, 2018; Sangaramoorthy et al., 2016; Morrone et al., 2015; Perry, 2012; Turley & Caretta, 2020), very few studies have included an explicit focus on pipelines. Notable exceptions include a case study of resistance against the Chad-Cameroon Oil Pipeline (Murrey, 2016). Murrey focuses on “slow dissent” against experiences of violence resulting from exclusion and oppression resulting from an oil pipeline (224). Murrey situates their study within broader geopolitical struggles of capital accumulation and explores defiance to the pipeline through emotional geographies of anger and shame. Another exception is Graybill’s (2013) analysis of the ecological homeland of Sakhalin Island, Russia, which is threatened by transnational hydrocarbon extraction. Graybill explores emotions related to resource use to explore place as an embodied site of attachment and the production of identity; they argue that researching emotions related to resources matters as these emotions shape perceptions about resource access, quality, and longevity. This research also explores the ways in which place as a transformed site of industrial extraction can lead to embodied shifts in attachment and identity as participants take on new roles and respond to a perceived lack of company and regulatory responsibility. This study expands upon the emotional energy geographies of pipelines through an explicit focus on energy landscapes. This study’s focus on pipelines extends the focus of emotional energy geographies beyond just sites of extraction to multiple sites along the energy production chain. Sites of gas transport, including pipelines, compressor stations, and metering and regulation stations, all have the capacity to disrupt residents’ place-based identity, sense of place, and place attachment.

This research answers the call to engage, prioritize, and emphasize the emotional aspect of energy extraction. The extractive industry has problematically been represented as “‘rational, ‘economic,’ and emotionless space” (Ey et al., 2017, p.1), and lived experiences have been overlooked in the scholarship of energy production (Rohse et al., 2020). Emotions have been regarded as apart from economics (Anderson & Smith, 2001), but resource extraction practices which have underpinned the global economy are also social relations that are laced with power and sites of “immense contestation over value, identity, and place” (Ey et al., 2017, p. 2). Thus, conflicts over resources are “as much about property rights and entitlements

as they are about embodied emotion, feeling, and lived experience related to the resource” (Sultana, 2011, p. 164). This research engages in the gap between energy and emotional geographies by interrogating the process of place disruption as a result of expansive energy terrains, and how changes to place and landscape as a result of fracking industry result in embodied harms to residents. In doing so, this study helps fill the gap in social science analysis of the central Appalachian gas sector in general and particularly with pipelines (Turley & Caretta, 2020). Moving forward, embodied energy geography is a critical framework for investigating the political, social, cultural, and lived impacts of the energy lifecycle.

## **IX. Conclusion**

This research has explored how unconventional oil and gas infrastructure in the Ohio River Valley impacts residents’ relationship to the home and self through embodied emotions. By centering embodied emotions, this research responds to a gap at the intersection of emotional and energy geographies. The findings highlight that pipelines and other fracked gas infrastructures have the affectual capacity to significantly disrupt place attachment and alter place identity for impacted residents, manifested through embodied emotions of fear, stress, anger, frustration, sadness, and disappointment. Participants described both physical and psychological impacts from the industry buildout which felt inescapable or uncontrollable as well as a multitude of sensory impacts. The ways in which place provides meaning and purpose through place-based identity and place attachment have been affected by detrimental changes in community and day-to-day life, a burden to protect oneself from the negative impacts of industry, altered feelings of home and safety, destruction to the landscape, and negative beliefs about one’s worth as a result of treatment by industry and government agencies. Participants understood the linked geographies of the home, landscape, and self through embodied emotions. Moreover, participants invoked the concepts of energy landscapes and energy terrain when discussing the multiple scales and sites of impact from industry buildout, as well as the geographically diffuse and interconnected infrastructures of the methane gas supply chain (de Rijke, 2018).

This research aligns with other studies at the intersection of emotional and extreme energy geographies (Graybill, 2013; Murrey, 2016; Perry, 2012; Rohse et al., 2020; Sangaramoorthy et al., 2016; Turley & Caretta, 2020). This thesis answers the call put forward by several scholars (e.g. Ey et al., 2017; Rohse et al., 2020) to engage and prioritize analyses of emotion, identity, and place into studies of extractive industry. This research supports the work of Cunsolo and Ellis (2018) and Scannell and Gifford (2010) through an analysis of the intersection of place-based attachment and embodied emotions as a result of place disruption through both physical industrial buildout as well as new social arrangements. Additionally, this research uses embodiment and slow violence as a framework to understand the emotional impacts of

the oil and gas industry in the Ohio River Valley (Nixon, 2011; Davies, 2021). Slow violence is a salient framework for understanding the lived experiences of fenceline communities in the Ohio River Valley through a focus on temporally and geographically scattered damage as well as alienation and displacement through environmental degradation (Jackson, 2011).

This research expands on studies of energy landscapes (Bridge, 2018) through an explicit focus on pipelines, compressor stations, and other infrastructures associated with methane gas production and distribution. Moreover, I develop a spatial lens to the study of energy systems through the concept of energy terrains as a way to analyze multiple compounding, connected, and distributed infrastructures, expanding our understanding of the spatial extent of damage. This research employs a relational view of energy to emphasize the energy system's affectual capacity in impacted communities (Broto & Baker, 2018; Calvert, 2016; Huber, 2015). Overall, my research findings address the research gap at the intersection of emotional and energy geographies through a focus on embodied experiences of the self, home, and landscape in relation to the oil and gas buildout. This research complicates the understanding of national energy production discourses as primarily technological and economic issues through a focus on the localized impacts and manifestations of power, marginalization, and influence (Bridge et al., 2013; Perreault & Valdivia, 2010; Sangaramoorthy et al., 2016; Willow & Wylie, 2014).

There were several limitations that arose during the course of this research. As established in Chapter VI (Methods), the ongoing COVID-19 pandemic limited recruitment to virtual methods and played a part in preventing scoping visits. While the virtual mode of research allowed for an expanded study area, it also impacted research results in ways that cannot be fully known. Additionally, as was previously stated in Chapter VI, recruitment proved difficult as snowball sampling techniques did not yield the expected number of contacts. In part, this may be due to non-disclosure agreements, which are used by companies after contamination and settlements take place, making it impossible to talk to those populations (Vasi et al., 2015). Additionally, during the period of data collection, the Ohio Valley Environmental Coalition (OVEC) was embroiled in conflict over unionization, and ultimately dissolved in the fall of 2021. As a result, they were unavailable as anticipated for support with recruitment.

The synthesis of emotional and energy geography is crucial in improving our understanding of these fossil fuel systems and their intersections with everyday life. A focus on the embodied impacts of the energy system can aid in addressing regulatory and policy gaps by expanding the scope of energy decision-making processes to include, consider, and center the lived experiences of affected communities. By visibilizing inequities and injustices, these embodied impacts “can enter the terrain of contestation” (Mouffe, 2000, p. 33-4). A focus on emotions allows us to explore possibilities of “different stances,



relations, and potentialities” (Ey et al., 2017, p.13). An understanding of the emotive experiences of energy is central to redirecting attention toward energy injustices and disrupting the slow violence of extraction. This research is of particular importance due to the threat of a petrochemical buildout in the Ohio River Valley. Further studies regarding the embodied emotions and experiences of communities in the Marcellus shale as a result of oil and gas infrastructure are essential in decision-making processes and mobilizations around environmental injustice. Moreover, understanding the emotions and affects arising from energy systems is essential in crafting policies and strategies to achieve energy system change, including decarbonization, in a just and equitable way. Analyses using feminist and emotional geographies as a theoretical entry point to link multi-scalar impacts are critical in understanding the comprehensive impacts and justice implications of extreme energy.

## Appendix A: Interview Guide

### Background/Self

1. How long have you lived here?
2. Why did you choose to live here? What drew you to this place?
3. When did you first hear about hydraulic fracturing? When did you first hear about the pipeline?
4. How did you feel when you first learned that a pipeline would be coming through?
5. Where is the pipeline in relation to your home?
6. Did you lease to the pipeline or was the land taken through eminent domain?
  - a. How did you make that decision?
7. Can you give me some examples of how your life has improved or worsened because of the pipeline?
8. Have you been involved in any organizing against the pipeline?
  - a. Is this something that you had previously done?
9. Have your relationships with neighbors or community members been affected?

### Home

10. When did the first changes start to happen here as a result of the pipeline?
  - a. What did those look like?
11. How has the landscape around your home changed?
  - a. Have you noticed any (visual) changes in your community?
12. Has the pipeline affected how you feel about your home?
  - a. Can you give me an example of how your feelings have changed? E.g. backyard, front porch, living room
13. Has the pipeline impacted your future with your home?
14. Has the pipeline affected how you feel about your community?
  - a. Can you give an example of how your community or town feels different to you because of the pipeline?

### Emotion

15. When you think about the pipeline, what exactly are you thinking about?
  - a. How do you visualize the pipeline?
  - b. When you think about the pipeline under the ground, how do you think about it?
16. What concerns do you have about the pipeline?
  - a. What concerns did you have before the pipeline?
17. How does the pipeline affect your day-to-day life?
  - a. Have there been changes to your daily routine? Can you give an example of these changes?
18. Has the pipeline impacted your physical health in any way?
  - a. Did you notice any changes to your body during construction?
  - b. Have you noticed any changes to your body now that the pipeline is operational?
19. When thinking about the pipeline, what feelings do you experience? Can you give examples?
  - a. Has the pipeline affected your stress level?
  - b. Can you tell me about how your stress level has changed?

20. What is your gut feeling about living near the pipeline?

**Closing**

21. What do you think should change about the way pipelines are approved and constructed, if anything?

a. Do you think there's a way for benefits to be equally shared with community members?  
How?

22. What do you want people to know about your experience and how it has affected you?

23. How do you think this research should be disseminated?

24. Is there anyone else you think I should talk to for this research?

## Appendix B: Body-Mapping Guide

We are going to use the body as a starting point to understand how the buildout of industry affects your lived experiences. In body mapping, you will fill the drawing of your body with symbols, images, and colors to depict your experiences with industry.

### Senses

1. What images have you seen that stand out?
2. What sounds can you recall?
3. What smells or tastes can you recall?
4. How has this experience affected how you communicate?
5. How has this experience affected the way that you think or your perceptions?

### Feelings

1. What physical changes have you experienced in your body?
  - a. Any specific marks on or internal in your body related to past or current health?
  - b. Draw places where you feel stress, anger, frustration, calm, etc.
2. How has this affected how you feel about yourself?
3. How has this affected how you feel about others around you, including neighbors and community members?
4. How has this affected how you feel about the landscape around you?

### Relational

1. Are there places you are less likely or more likely to go to as a result of industry buildout?
  - a. Are there places where you do not feel welcomed or feel welcomed as a result of industry buildout ?
2. Are there things you are more or less likely to do now than prior to industry?
3. If you could pick one image or moment that encapsulates your experience with industry buildout, what would it be?

### Closing

1. Body scanning - are there any other experiences that you haven't drawn that you'd like to represent?
2. As you look at your map, what is important for the public to know about your experiences?

## Appendix C: Member Checking Survey

Thank you for taking the time to respond to this survey! The purpose of this survey is to verify the findings of my research in order to assess their validity. The following statements broadly reflect what I have found, based on the predominant views of participants. Please share how much you agree with each statement based on your own experiences with the oil and gas industry buildout. Your answers will remain CONFIDENTIAL and ANONYMOUS.

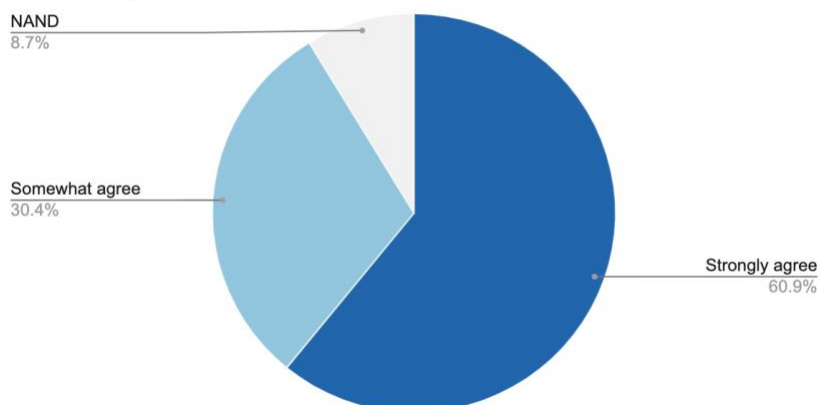
1. The dynamics of my community have changed as a result of industry buildout.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
  
2. My daily life has been negatively impacted by my proximity to gas infrastructure.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
  
3. I do not feel valued by the gas industry and gas company(s).
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
  
4. I do not feel valued by government.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:

5. I have taken on new roles or activities in my community as a result of industry buildout (e.g. joining an organization, documenting and monitoring, making reports to companies or regulators).
  - a. Yes
  - b. No
  - c. Unsure
  - d. Other:
6. My relationship with my home has been negatively impacted by my proximity to gas infrastructure.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
7. I feel less safe in my home due to my proximity to gas infrastructure.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
8. I am concerned about my health in relation to gas infrastructure, including gas wells, compressor stations, and pipelines.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
9. Changes to landscape as a result of gas industry buildout have negatively impacted my feelings of home (e.g. visible pipeline paths, impacts forests or fields, changes to slope).
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:

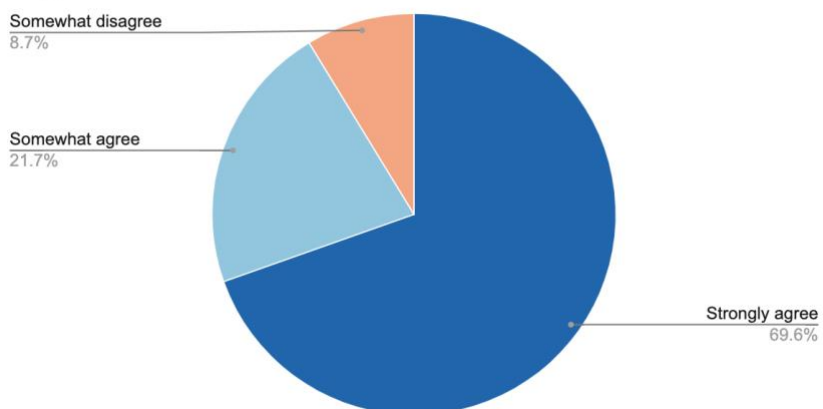
10. At any point in time, including during construction, which of the following emotions have you experienced as a result of gas industry buildout? (Check all that apply)
- a. Anger
  - b. Anxiety
  - c. Disappointment
  - d. Fear
  - e. Frustration
  - f. Sadness/Grief
  - g. Stress
  - h. Other:
11. At any point in time, including during construction, which of your senses have been impacted by gas industry buildout? (Check all that apply)
- a. Sight (visual impacts, e.g. seeing construction, machinery, spills or other incidents; light pollution)
  - b. Smell (e.g. fumes from compressor stations or gas wells, diesel smells from traffic, leaks)
  - c. Sound (e.g. traffic noise, construction noise, operation noise from compressor stations or wells, blow downs)
  - d. Taste (e.g. metal taste, chemical taste)
  - e. Touch (e.g. vibration from fracking or construction)
  - f. Other:
12. I am concerned about broader impacts from the gas industry beyond the site of my home (e.g. fossil fuel usage, economic impacts, population changes and social impacts, and/or changes from rural to industrial landscapes)
- a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
  - f. Other:
13. Please use this space if you would like to elaborate on any of your answers above.

## Appendix D: Member Checking Survey Results

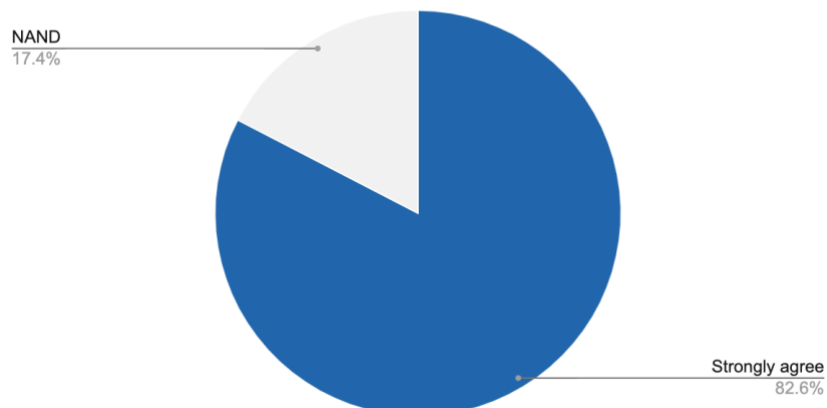
Q1: The dynamics of my community have changed as a result of industry buildout.



Q2: My daily life has been negatively impacted by my proximity to gas infrastructure.

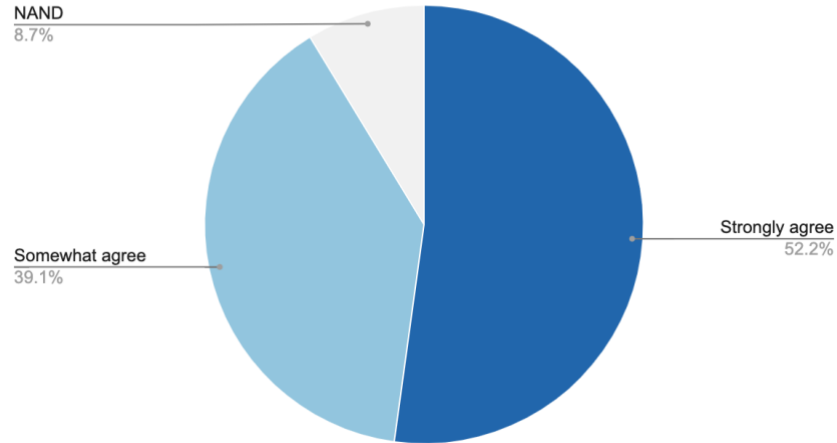


Q3: I do not feel valued by the gas industry and gas company(s).

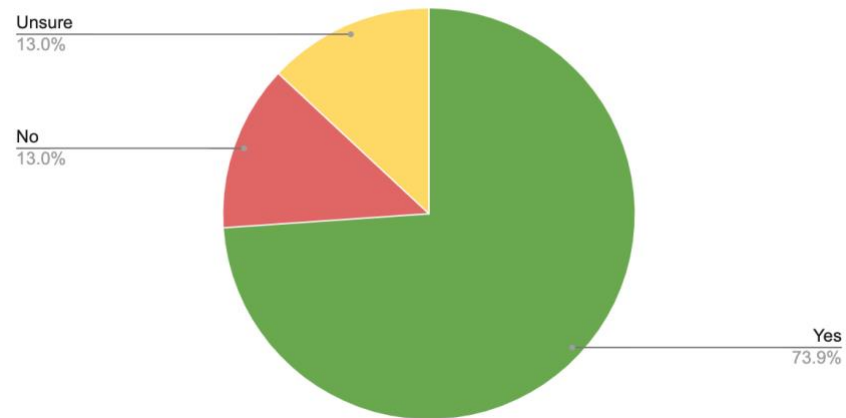




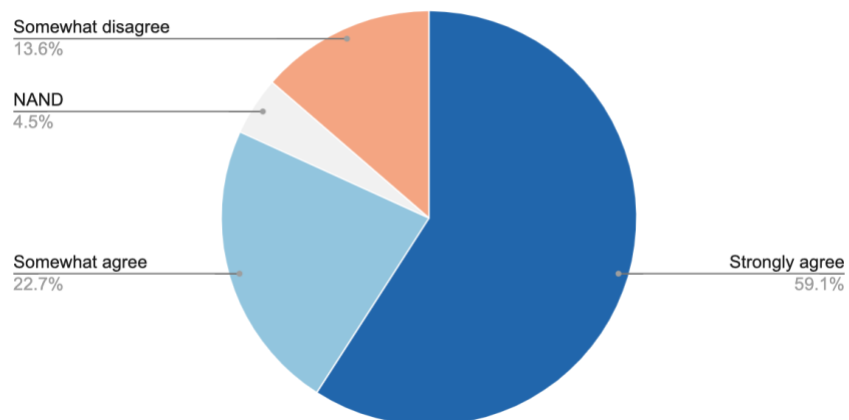
**Q4: I do not feel valued by government.**



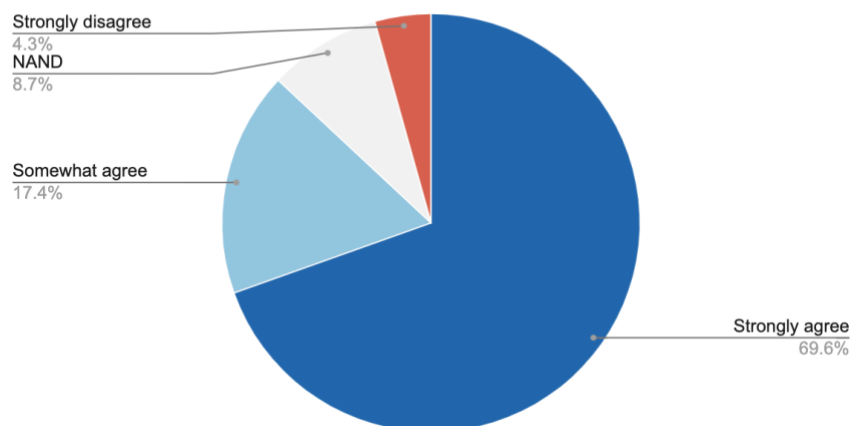
**Q5: I have taken on new roles or activities in my community as a result of industry buildout**



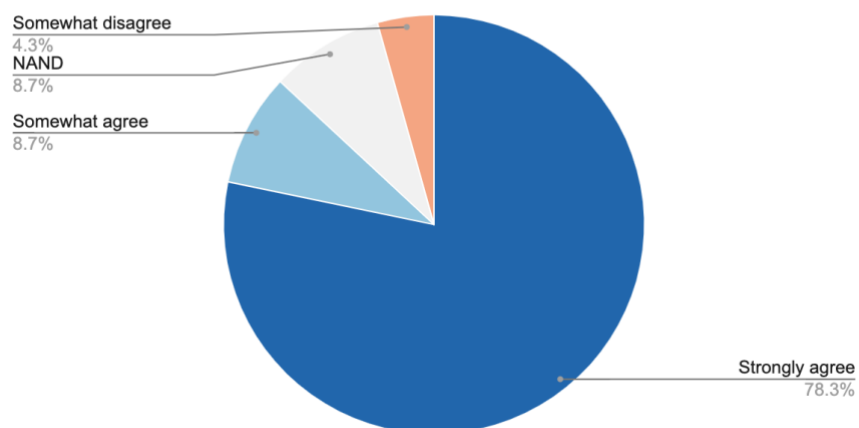
**Q6: My relationship with my home/property has been negatively impacted by my proximity to gas infrastructure.**



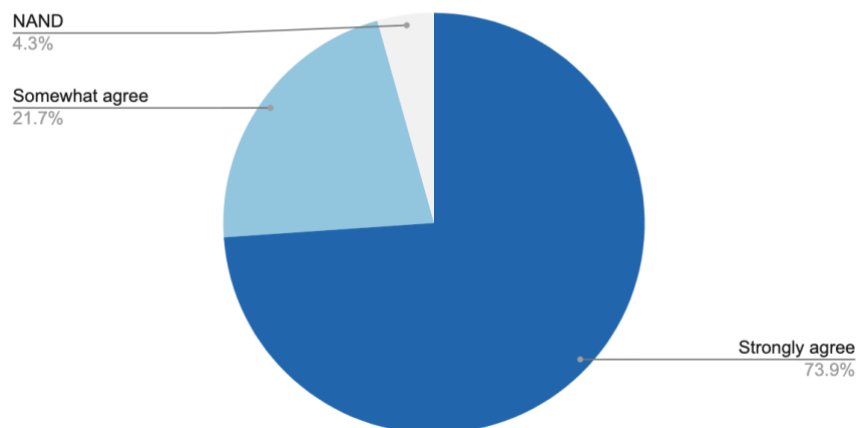
**Q7: I feel less safe in my home due to my proximity to gas infrastructure.**



**Q8: I am concerned about my health in relation to gas infrastructure.**

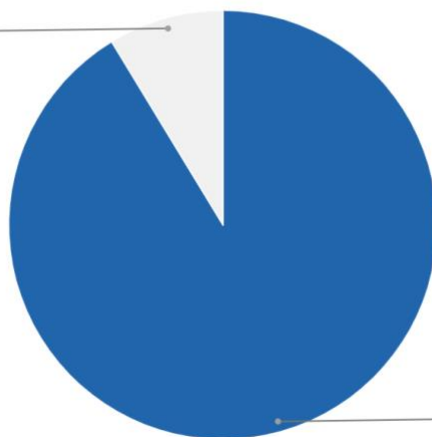


**Q9: Changes to landscape as a result of gas industry buildout have negatively impacted my feelings of home.**



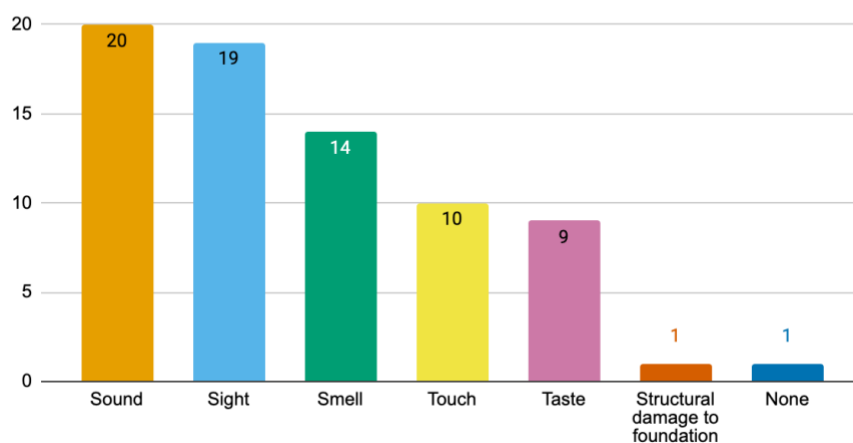
Q10: I am concerned about broader impacts from the gas industry beyond the site of my home.

NAND  
8.7%

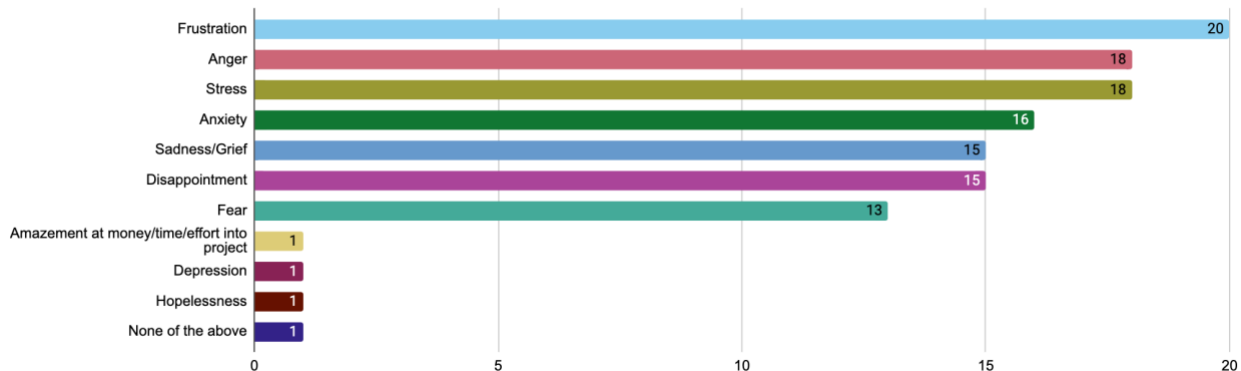


Strongly agree  
91.3%

Q11: At any point in time, which of your senses have been impacted by gas industry buildout?



Q12: At any point in time, which of the following emotions have you experienced as a result of industry buildout?



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