

Fracking on Federal Lands:

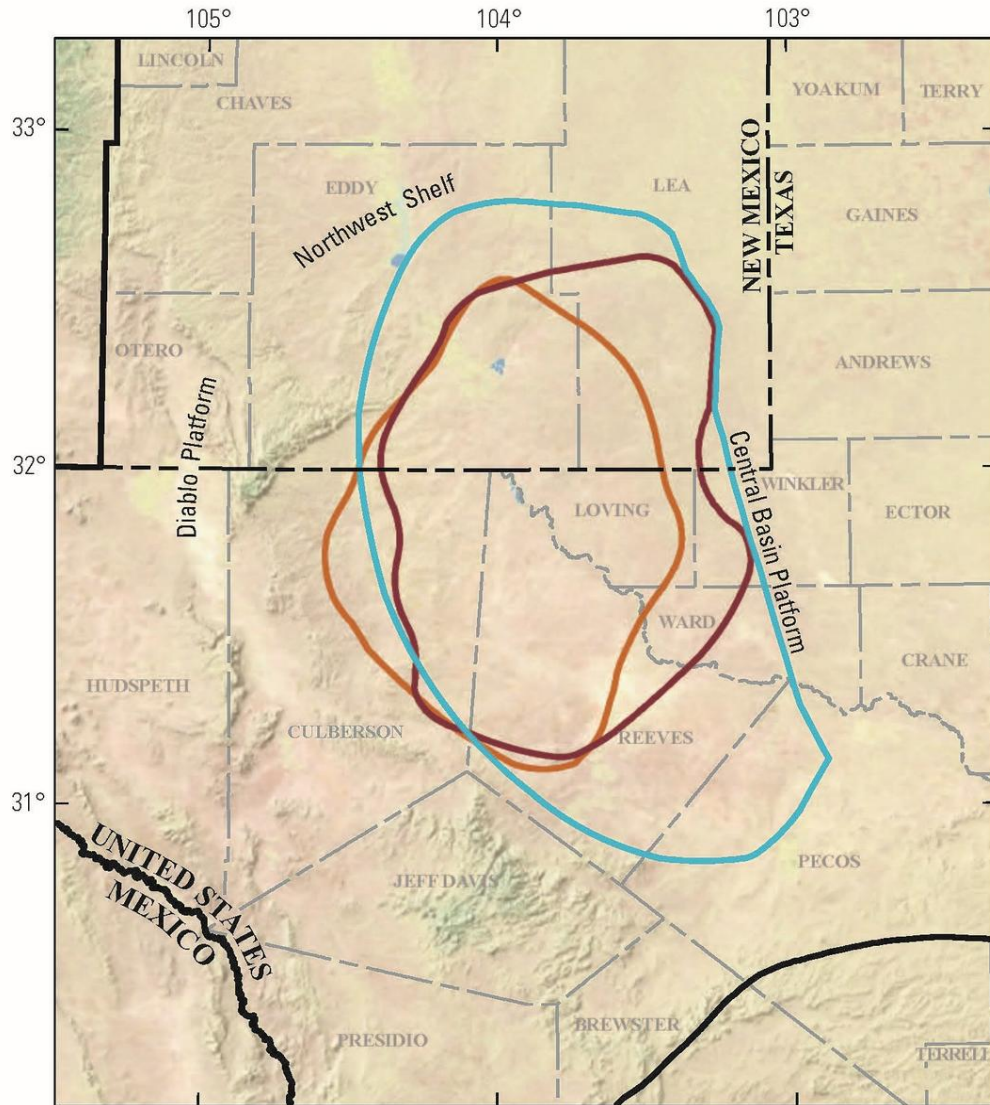
An overview of the costs and benefits of fracking:

The Permian Basin Example

Siet Wright

Faculty Advisor and Editor:

Elizabeth McVicker, Ph.D., J.D.



Base map from U.S. Department of the Interior National Park Service

0 15 30 MILES
0 15 30 KILOMETERS

EXPLANATION

- Third Bone Spring Continuous Oil AU
- Second Bone Spring Continuous Oil AU
- First Bone Spring Continuous Oil AU
- Lower Avalon Shale Continuous Oil AU
- Upper Avalon Shale Continuous Oil AU
- Permian Basin Province boundary (part)



Permian Basin Province boundary is shown in plum.

[30]

Introduction

This article addresses whether or not the federal government is violating multiple regulations and laws by leasing to oil and gas operations on federal land. It will discuss the federal laws enacted to protect the natural resources of this country as well as the costs and benefits of fracking for gas in the arid west. The article provides an overview of fracking practices and emphasizes the implications of mining freshwater on climate change. Chronic wildfires, seasonal flooding, loss of crop and livestock and citizens' wellbeing are by-products of the fracking-induced drought. Local economies are destroyed; wildlife is threatened to extinction; the personal and professional lives of many community members are at stake. This article relies on multiple resources: water law and environmental law texts, government websites, newspapers, scholarly reviewed energy and climate journals and publications by organizations that work to create climate justice.

Fracking for Natural Gas

Water is the most critical ingredient used in the mining method of hydraulic fracturing of shale bed methane, known as "fracking" [7, 8, 9]. The process requires thousands of gallons of water per gas well [7, 8, 9]. Because water alone is not sufficient to fracture the shale bed, proppants and hundreds of chemicals are inserted into the water to prevent corrosion of machinery and to lubricate fracture penetration to enable deeper fracturing. Added to the fracking water is a cocktail of potassium and solvents to keep the chemicals flowing freely in the water [6, 7]. Mining millions of gallons of water a day in the arid west creates a saline wastewater byproduct. Fracking for natural gas is an unsustainable business model.

Fracking for methane in order to create a stockpile of the gas has been an energy strategy of many leaders of the developed countries for several years [24, 22]. The strategy brings with it the risk of environmental destruction in the form of rapid aridification, wildfires, increased flooding, longer lasting weather episodes and more landslides [20]. Nevertheless, methane is marketed as a renewable energy source by some oil and gas companies because there could be an infinite supply underground [16].

Fracking is the act of inserting chemical laden water under high pressure beneath Earth's crust to mine the methane trapped in shale rock beds. The energy product uses nine times the amount of water to mine the gas it produces and creates nine gallons of wastewater with each gallon of methane extracted [7]. Fracking is the most recent and common mining method for natural gas extraction in the US and is quickly spreading in popularity in the oil and gas industry worldwide [20].

Federal Leases of Land to Oil and Gas Companies

The federal government leases land to mining companies for fracking natural gas on public land. A 2018 decision by the United States Department of Interior to open the Permian Basin oil and gas reserves in Texas and New Mexico to fracking and pumping could have serious environmental implications as regards climate change.

The Bureau of Land Management (BLM) currently leases our public lands to oil and gas companies for gas extraction by fracking. By leasing public lands to private oil and gas companies, the federal government is not compliant with the Public Trust Doctrine nor with water regulations and environmental laws enacted by the federal government. Despite scientific proof of the identified causes of climate change and how fossil fuel extraction exacerbates it, the federal government continues to lease federal land to oil and gas operations which depend upon the use of freshwater in an arid climate to produce more and more fossil fuels.

In September 2018, a federal lease sale conducted by the BLM in southeast New Mexico in the Permian Basin grossed almost a billion dollars, coming in at \$967 million. The *Albuquerque Journal* noted that the sum more than tripled the total bids of all lease auctions for all of 2017, and more than doubled the previous record [28]. According to the U.S. Geological Survey, the Permian Basin has billions of untapped barrels of oil and an estimated 281 trillion cubic feet of methane reserves trapped in the shale [30].

Up through the COVID-19 disruptions in the spring of 2020, the federal and state governments made a great deal of money from methane extraction from corporate leases of federal land. For this reason, environmental laws have largely been ignored, overlooked, changed or written in ways that would explicitly exclude fracking water from water protections. This is a violation of the Public Trust Doctrine that assures the government will

hold public lands for the free and unimpeded use of the public [24]. Government leased lands for oil and gas operations negates the Public Trust Doctrine. The public lands, meant to be held for the people for recreational or commercial purposes, are now a commodity for private interests. Our laws which codified an assurance that these resources will be protected are now ignored or gutted [24]. Science has shown that if all the methane currently stockpiled in the US were to be burned and consumed, the temperature of Earth will accelerate rapidly, threatening the existence of most forms of life including humans [1, 19]. Multiple cleaner alternatives for energy security exist other than fossil fuels. Our government needs to respond to the wellbeing of its citizens in a more resilient, publicly focused manner.

Losses caused by climate change have rippling effects that begin in rural areas like the Permian Basin with a gas well that pumps groundwater, deposits polluted water on the ground and leaves toxic chemicals in drinking water [14]. The water table loss around the cone of depression on each well is immediately apparent and affects the adjacent forests and trees that begin to brown, inviting insects and blight [24]. With dead standing trees, wildfire dashes across the landscape destroying ecosystems for miles.

Snowmelt and summer monsoon rains wash away the soil and cause flooding and landslides. Farmland is lost, ranchland is lost; homes, lives, businesses, culture, wildlife, beauty and community are lost. Preventing fracking on federal land will preserve groundwater and reduce the effects of localized climate change and restore the economies of small businesspeople who rely on the land for their livelihoods.

Water Creates Power

All social/economic energy thrives with water, whether for hydroelectricity, cleaning coal, fracking for gas or any of our industrial endeavors. Water is the critical ingredient in all energy production [20]. Without water, there is no energy and no power.

Industrial water usage is how nations have gained wealth, built machines, and fed millions of people [13]. Water is the life blood of all industry and sustains the economy. Water controls the budget of the government and the strategic systems of every governmental agency; the actions of our government are predicated on the belief that there will always be enough clean water.

Earth has only 1% of freshwater available for life-sustaining activities, most of it used for industrial, mining and agricultural purposes [15]. Industrial usage is the largest consumer of this precious resource at 77% [15]. Meanwhile, more than a billion humans have no access to clean water for drinking, hygiene and sanitation while consumptive industrial water usage soars [18].

Fracking is a large consumer of water and contributes to the rapid aridification in the west [3, 5, 6, 7]. The landscape is rapidly changing as the climate becomes more severe every year [1]. Without immediate change of water usage in industrial uses like fracking, the west could be permanently altered in a few short decades. The arid desert of Texas and New Mexico cannot sustain the loss of its water table caused by fracking depletions. The BLM leases in the Permian Basin ensure the production of large quantities of methane that will accelerate climate change and simultaneously deplete the freshwater supply for the region [7]. This threatens the existence of communities in the Basin and elsewhere.

Mining water has been a human occupation for as long as it was needed [5, 13, 14]. Historical evidence is abundant in archeological and anthropological studies that humans have built villages and homes next to freshwater sources and used it for all their livelihood purposes [13]. To mine fossil fuels with precious water resources is incongruous to maintaining the well-being of communities and citizens; it is an unsustainable practice.

Water is a non-renewable resource in the western United States where less than 20" of rain falls annually [5, 14]. The dwindling freshwater, both surface water and groundwater, is non-renewable and yet the oil and gas operations pump millions of gallons a day while creating millions of gallons of saline wastewater that is largely untreatable [5, 14, 3].

Legal and Regulatory Environmental Protections of Water

According to the Environmental Protection Agency (EPA), access to high-quality drinking water in the United States will be affected by changes in climate and water usage [9]. Thirty percent of the total area of the United States has experienced moderate to extreme drought conditions in the last two decades [9]. Declines in freshwater resources have led to increased withdrawals and depletions of groundwater in some areas [8, 9]. As

a result, unconventional non-freshwater resources (a.k.a. wastewater from sewage, brackish groundwater and surface water, and seawater) are increasingly treated and used to meet drinking water demand [8]. A contributing factor to this depletion is that the oil and gas industry mines water so quickly from groundwater aquifers for use in fracking that recycling wastewater is becoming the only option for drinking water in some areas. However, water treated from fracking is not useful for anything because it can never be pure enough to be used in fracking again and no biological creature can use it either [6, 7, 8, 9].

Although oil and gas companies tell farmers they can use the fracking water for their cattle and crops, the animals won't drink it, and little will grow with the wasted water [8]. This is certain to cause small business owners to lose money when their crops fail, or animals to die as was the case with the Gold King Mine spill in Colorado [11]. Small business owners like farmers and ranchers are the most affected by direct point source pollution from mining gas and the instant climate change it causes. In the case of the Gold King Mine spill, area residents looked to government agencies like the EPA to alleviate the damages to their assets caused by destructive mining practices, not to the corporations that caused the pollution originally.

Mining water for fracking and industrial purposes threatens human safety because it permanently depletes a critical resource of existence. It is a threat against small businesses, the communities and families living nearby [1, 6, 15]. Gas feeds machines, but water is life.

Future generations in places like the Permian Basin will be drinking recycled wastewater if fracking continues unchecked. The safety of the air, soil and water are at a risk of being permanently polluted by this toxic fuel source [6]. People in these communities and around the world will suffer if they live along any water ways that will now flood annually and create devastating losses for those communities. Towns will wash away while losses of crops and earnings accumulate. More than a billion citizens that live near water ways globally will be impacted [1]. Melting ice and snow will contribute to a possible 100 feet rise in sea levels over the next few hundred years [1]. This will considerably disrupt weather patterns and permanently alter local climates with drastic fluctuations in precipitation [1].

Federal laws have been previously implemented to protect our water, soil and air like the Clean Water Act of 1972 and the Endangered Species Act of 1973 [5]. These two

critical pieces of federal legislation have been powerful allies in the race to save Earth from corporate greed. They are key to success in the future for changing legislation to better reflect the safety and well-being of citizens over corporate profits. Using them to create a net of protection across all water resources is critical.

Although oil and gas interests are working overtime to pump as much methane as possible, enough gas is already stored to last us for the next hundred years [10]. If people burned all the methane currently in storage, the planet would be on a fast track to certain destruction [1]. The last time Earth had this much CO₂ in the atmosphere, the average temperature was 18 degrees higher than it is now [1]. Very little life on Earth could sustain that sort of an increase in temperature. According to the EPA, one pound of methane traps 25 times more heat in the atmosphere than CO₂, suggesting that it is far more dangerous than anyone is reporting [17,2]. The combination of an atmosphere richer in CO₂, water vapor and methane means the future for humanity is heating up.

Benefits of Fracking

Energy security is the main reason for all fossil fuel exploration on a nation's own land [13]. When a nation pumps oil in their own vicinity their costs of shipping, production and labor are reduced considerably [20]. The ability to pump, refine and pipeline all one's own fossil fuels is very appealing to every world leader. The reason is that energy is the source of all human productivity: all industry, government, agriculture, municipalities and quotidian life activities [13]. Without water, nothing exists.

Cheap and local energy is a dream come true for sovereign leaders because it decreases government reliance on war-torn, oil-rich countries in the Middle East and South America [20]. It also significantly reduces the likelihood of a conflict over those oil reserves and reduces the volume of CO₂ produced in shipping fossil fuels.

Local energy production adds jobs to the economy often in rural places that are economically depressed and need the financial assistance an industry like oil and gas may bring [20]. Increasing taxes and investing in local community infrastructure benefits all the citizens that live there [20].

The citizens of the communities are benefitted in multiple layers, beginning with increased tax revenues. The states of New Mexico and Texas are currently the largest

producers of natural gas; in 2018, they enjoyed over a \$4 billion surplus from mining activities [12]. Local schools and infrastructure improvements in rural and economically depressed areas largely benefitted from that surplus [12, 20].

Costs of Fracking

Water is the most precious resource that drives the economy; industry, mining and agriculture depend on it. To use this limited resource to extract fossil fuel when proven reliable alternatives for energy exist is illogical. The main benefit of pumping endless supplies of fossil fuels accrues to the shareholders of the oil companies who receive record returns. One of the largest battles that oil and gas companies face concerns their reputation in public opinion. Polls indicate that most people do not fully understand the environmental impacts of fracking. Public concerns about fracking have caused, ironically, an increase in well production and development [20].

Citizens have expressed concern about the potential for groundwater pollution, surface-water destruction, air quality degradation, accidental greenhouse gas emissions, induced seismic activity and ecosystem fragmentation [20]. None of these issues have been directly addressed by the oil and gas industry; in fact, oil and gas companies frequently release propaganda to confuse citizens about the actual costs and benefits of fracking [3, 19, 20]. The purpose of this propaganda is to enable the oil and gas industry to drill as many wells as possible before legislation is passed that is aimed to protect the environment from oil and gas production. Any existing wells will be grandfathered under the laws such that oil and gas companies can continue to frack with little or no regulation or environmental protections; these wells, drilled before new regulations take effect, will be exempt from new laws [20,22]. Vocalized concerns made by the public have been addressed in the *Annual Review of Environmental Resources* in an article titled the “Environmental Costs and Benefits of Fracking,” this centrist review was authored by researchers affiliated with leading universities and research organizations who reviewed more than 160 studies.

“Public concerns about the environmental impacts of hydraulic fracturing have accompanied the rapid growth in energy production. Moreover, extensive industrial development and high-density drilling are occurring in

areas with little or no previous oil and gas production, often literally in people's backyards.” [20]

Federal Responsibilities

Dependence upon foreign oil has caused the federal government to overlook some of the costs of fracking regarding laws to protect the air, water and land:

“No comprehensive statutory scheme for regulation of public lands exists, and management of these lands is fragmented among a number of agencies housed under different departments, which have different directives and land management philosophies...The BLM is responsible for 261 million acres of public land.” [24]

This suggests that the federal government is simply too large to properly govern the entire country and must rely on local authorities to decide what's best. The BLM, for example, opted to lease land in the Permian Basin for fracking, abdicating its responsibility to protect the public trust.

Following is a summary of some of the key federal environmental laws, the purpose of which is to protect water, or, in contrast, to encourage exploitation:

1. Federal Water Pollution Control Act of 1948

This act formalizes the government's obligation for the control of water pollution. Later amendments to the act strengthened the role of the federal government but left most of the responsibilities to the local state governments [24]. This act should be enforced in order to protect the water used in fracking operations on federal land. Fracking creates billions of gallons of wastewater, while mining oceans of freshwater. These infractions should be in the crosshairs of the enforcers of this law.

2. Safe Drinking Water Act

This law is meant to protect the public from toxic substances; fracking byproducts certainly fall under that category [24]. The water used in fracking is pumped full of potassium and toxic chemicals in order to properly fracture the shale rock. These chemicals and salts are left in the crust of the Earth to mix with groundwater. The mixture is also pumped up and

collected in tailings pools to evaporate, leaving a toxic residue. This law should theoretically protect water on federal land that is being polluted with toxic substances. The EPA has concluded that a third of Americans will have scarce drinking water supplies within the next 20 years; meanwhile, current mining methods that destroy drinking water supplies are threatening the existence of life in arid regions.

3. Energy Policy Act of 2005

The law that dilutes or destroys many of the environmental protections codified in our federal laws is the Energy Policy Act, revised in 2005 by oil executives Dick Cheney and George Bush [26]. This act gave tax subsidies for energy efficiency and investments in energy efficient programs. It was meant to have several areas of focus such as energy security, energy and economic efficiencies, future energy supplies, environmental quality and research and development [27]. The law was to have included environmental protections but instead gave oil and gas companies generous incentives to drill [4,26]. This policy deliberately excluded fracking so that the method would be unregulated by Federal agencies. A fracking boom has occurred since this act was passed in 2005.

4. The Resource Conservation and Recovery Act

RCRA imposes criminal liability for any violator knowingly committing environmental crimes of dumping hazardous waste [24]. However, the penalties are weak and easily avoidable for nearly all corporations and individuals who avoid liability by selling assets, declaring bankruptcy, and changing business names or principals to confuse ownership [25]. RCRA also allows citizens to hold the EPA liable in its lack of action or effort if needed. Since fracking is known to create oceans of wastewater, under RCRA the federal government should not allow fracking to continue; it should not allow the dumping of hazardous waste into the environment and onto federal land.

5. The Fracturing Responsibility and Awareness of Chemicals/ FRAC Act

This bill was introduced in 2017 and was read twice by the Senate and referred to an environmental panel for review. The Act would define fracking as a federally regulated activity under the *Safe Drinking Water Act*. It has yet to be voted upon [29].

Implications of Fracking

The oil and gas industry is the only industry in America that is allowed by the EPA to inject known hazardous materials directly into or adjacent to underground drinking water supplies [24]. All point sources of pollution are subject to permits for discharge into surface water. Discharge pools of fracking wastewater are not permitted per the State of Colorado [14]. Thousands of gas wells have been abandoned and are uncapped, directly polluting water sources without consequence to anyone but the environment and public health [21, 23]. This detriment is summarized in a report from the EPA from 2004:

Natural gas and shale gas extraction operations can result in a number of potential impacts to the environment, including:

- Stress on surface water and ground water supplies from the withdrawal of large volumes of water used in drilling and hydraulic fracturing;
- Contamination of underground sources of drinking water and surface waters resulting from spills, faulty well construction, or by other means;
- Adverse impacts from discharges into surface waters or from disposal into underground injection wells; and
- Air pollution resulting from the release of volatile organic compounds, hazardous air pollutants, and greenhouse gases [21].

In addition, the EPA website summarizes the effects of fracking on drinking water as follows:

“We studied the relationship between hydraulic fracturing and drinking water resources. The study includes a review of published literature, analysis of existing data, scenario evaluation and modeling, laboratory studies, and case studies...Our report concludes that hydraulic fracturing activities can impact drinking water resources under some circumstances and identifies factors that influence these impacts.” [21]

The keywords here *can* and *some* were perceived by the presidential administration of 2004 to mean that there is no threat to drinking water and oil and gas production should ensue. This implies that the federal government is aware that fracking indeed damages drinking water, but they have given the green light to drill for oil and gas, regardless of the various laws in place to protect this very thing from occurring.

In 1997, the U.S. Court of Appeals ordered the EPA to regulate hydraulic fracturing under the Safe Drinking Water Act. This decision followed a 1989 CBM fracking operation in Alabama that landowners say contaminated a residential water well [26]. In response to the 1997 court decision, the EPA began a study of the threats to water quality safety associated with the fracking for methane production in the year 2000 [26]. The main goal of the study was to assess the potential for fracking to contaminate underground drinking water supplies. Meanwhile, in 2001, a special task force on energy policy convened by Vice President Dick Cheney recommended that Congress exempt hydraulic fracking from the Safe Drinking Water Act [26].

The EPA completed its study in 2004, finding that fracking “poses little or no threat” to drinking water. The EPA also concluded that no further study of hydraulic fracking was necessary [26]. Looking at it from a different perspective, the 2004 study acknowledges that fracking *can* and *does* harm water sources, thus proving the government’s knowledge that fracking is indeed polluting water resources, both surface and groundwater.

When the CEO of fracking chemical producer Halliburton, Dick Cheney, was appointed to a high office in the executive branch, the administration actively became involved in assisting the EPA with what activities must be excluded from the Safe Drinking Water Act [26]. Fracking swiftly was added to the list of activities excluded from the Safe Drinking Water Act [26]. Despite a mountain of evidence that fracking uses massive amounts of freshwater and turns it into a toxic wastewater full of dangerous chemicals, the Halliburton loophole has kept oil and gas companies fracking without regulation for years. The Permian Basin on the New Mexico/Texas border has so much methane that, if mined, would ensure rapid extinctions of species across the globe. Earth’s temperature would rise to an unsustainable high level and our atmosphere would be like a rapidly heating oven.

Stakeholders

Energy security is a necessary concern for government leaders given their obligations to their constituencies: the citizens of all the communities around the world: the public. The largest stakeholders in energy production, storage, conservation and usage is the public--the stakeholder with the highest risk of safety from air, water and land pollution. Governments must represent their public.

Another important stakeholder is the collection of global governments who will ultimately be responsible for management of the natural disasters that are already occurring at record levels for millions of people around the world. Every dollar earned from fossil fuels today will need to be tripled to mitigate the harm caused by those fuels tomorrow. Tax incentives and subsidies to drill will be the largest issues to address in the agenda. The other stakeholder in this scenario is the oil and gas investors themselves. They have opted for rapid returns on investments with known adverse effects.

Climate Action: Common Sense Initiatives (CSI)

Common Sense Initiatives (CSI) are used in environmental laws to create a balance of environmental and economic protections. CSIs can be enacted that review business-impacting rules, help businesses navigate regulatory obstacles to reduce fossil fuel reliance and lead initiatives to improve protections concerning climate action. A renewable energy CSI may be funded by corporate and community tax dollars, stamps and mill levies. The CSI would be governed by an NGO and have a rotating board of community leaders, citizens and scientists. Initiatives can be placed in communities to prevent pollution of resources like air and water. The goal of the initiatives is to maintain the safety of the community, wildlife and natural resources. Monitoring wells around oil and gas production sites, for example, is a CSI that can provide a check and balance for allowing for responsible energy production while simultaneously protecting the air and water from pollution caused by mining activities.

Conclusion

The focus of the fossil fuel and fracking conversation needs to be on the fact that Earth cannot sustain the heated atmosphere that comes from using fossil fuels. Studies have shown that with more heat in the air, the ice caps are melting at record rates. With more water in the atmosphere, more severe storms develop that are slower moving and cause more damage to the areas affected. Climate change is a cyclical issue with more than just one cause or solution. Enforcing federal regulations designed to protect the land,

air and water is a critical step to help ensure a better and safer future. Eliminating fossil fuels would be the best step forward to a sustainable future.

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