

**Resolve: US states should allow fracking operations and associated industries.**

**Pro**

By:

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Term Paper

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## Public Policy

This paper is necessitated due to a variety of current policies that ban fracking and/or its associated industries. One such current policy that bans fracking is in New York State. This policy was initiated on June 29, 2015 and is still in effect till today.<sup>1</sup> In fact, New York State has gone even further by considering waste water from hydrofracking as hazardous.<sup>23</sup> On the other hand, New York State does receive most of its natural gas from Pennsylvania which gets most of its natural gas from fracking operations, so New York State benefits from fracking even though it banned the technology.<sup>45</sup> Three more states that banned fracking include Vermont, Maryland, and Washington which banned it on May 17, 2012, October 1, 2017, and July 28, 2019, respectively.<sup>6789</sup> The interesting thing about Maryland is that even though it banned fracking, it

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1. New York State Department of Environmental Conservation, "High-Volume Hydraulic Fracturing in NYS," New York State Department of Environmental Conservation, accessed December 10, 2022, <https://www.dec.ny.gov/energy/75370.html>.

2. Rachel May, "Senator Rachel May Proud to Announce Passage of Bill Closing Hazardous Waste Loophole," The New York State Senate, last modified June 4, 2019, <https://www.nysenate.gov/newsroom/press-releases/rachel-may/senator-rachel-may-proud-announce-passage-bill-closing-hazardous>.

3. N.Y. Env'tl. Conserv. Law §§ 27-0903 (Apr. 22, 2022). <https://legislation.nysenate.gov/pdf/bills/2019/S3392>.

4. U.S. Energy Information Administration, "New York State Profile and Energy Estimates," U.S. Energy Information Administration, last modified November 17, 2022, <https://www.eia.gov/state/analysis.php?sid=NY>.

5. U.S. Energy Information Administration, "Pennsylvania State Energy Profile," U.S. Energy Information Administration, last modified November 17, 2022, <https://www.eia.gov/state/print.php?sid=PA>.

6. Department of Environmental Conservation Vermont Agency of Natural Resources, A Report on the Regulation and Safety of Hydraulic Fracturing for Oil or Natural Gas Recovery, by Underground Injection Control Program, 4-6, <https://legislature.vermont.gov/assets/Legislative-Reports/ANR-REPORT-REGULATION-OF-HF-FOR-OIL-OR-NATURAL-GAS-RECOVERY-2015.02.12.FINAL.pdf>.

7. Oil and Natural Gas – Hydraulic Fracturing – Prohibition, Md. Code Ann. Envir. § 14–107.1 (Nov. 15, 2022). <https://mgaleg.maryland.gov/mgaweb/legislation/details/hb1325?ys=2017rs>.

8. CNN Wire Staff, "Vermont first state to ban fracking," CNN, May 17, 2012, <https://www.cnn.com/2012/05/17/us/vermont-fracking/index.html>.

9. Wash. Rev. Code § 78.52.560 (June 29, 2022). <https://app.leg.wa.gov/RCW/default.aspx?cite=78.52.560&pdf=true>.

still allowed for the construction of associated infrastructure to export natural gas resulting from fracking.<sup>10</sup> This demonstrates that many of the previous mentioned states that ban fracking still benefit from this technology even though they desire to ban the technology. To understand the benefits and flaws of this technology one will have to understand the history of this technology which can be found below.

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10. Kevin Rector, "Maryland, which bans fracking, is a global gateway for fracked gas. Here's how.," The Baltimore Sun, March 20, 2019, <https://www.baltimoresun.com/politics/bs-md-lng-takeaways-20190318-story.html>.

## History

Modern hydraulic fracking started with a study by Floyd Farris of Stanolind Oil and Gas in 1947 regarding how pressurization of oil and gas wells affected output. This study led to an experiment where 1000 gallons of gelled gasoline and sand was pumped into a gas well before a gel breaker was pumped into the well. This would mark the first time hydraulic fracking was ever used even though it wasn't particularly successful. To this point, non-hydraulic fracking, which used either explosives or acid, had already been tested and used with some level of success. In this case, hydraulic fracturing represents a technique in which a liquid is pumped into a well under pressure to form fractures in the rock surrounding the well. In 1949, Halliburton, a major oil and gas services company, tested this technique at 2 wells with significantly more success compared to the 1947 experiment.<sup>11</sup> By the 1960s and 70s, fracking had been more widely adopted in commercial usage.<sup>12</sup> In 1974, the Safe Drinking Water Act was passed which regulates the injection of hazardous materials into the ground but didn't affect the fracking industry. This loophole in the law was known as the Halliburton loophole.<sup>131415</sup> In 1975, the Energy Research and Development Administration (ERDA), later called the Department of Energy (DOE), first experimented with directional drilling with multi stage fracking in the Appalachian Basin. This was critical as multi stage allowed the fracking of highly impermeable

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11. Halliburton, accessed November 25, 2022, <https://www.halliburton.com/en/about-us>.

12. John Manfreda, "The origin of fracking actually dates back to the Civil War," *Business Insider*, accessed November 25, 2022, <https://www.businessinsider.com/the-history-of-fracking-2015-4>.

13. John Richardson to Quora web forum, "The History of Fracking (A Timeline)," 2012, <https://energywithjr.quora.com/The-History-of-Fracking-A-Timeline>.

14. "The Halliburton Loophole," editorial, New York Times, November 2, 2009, <https://www.nytimes.com/2009/11/03/opinion/03tue3.html>.

15. Earthworks, "The Halliburton Loophole," EarthWorks, accessed November 25, 2022, [https://earthworks.org/issues/inadequate\\_regulation\\_of\\_hydraulic\\_fracturing/](https://earthworks.org/issues/inadequate_regulation_of_hydraulic_fracturing/).

rock which allowed the hydraulic fracturing industry to grow.<sup>16</sup> This experiment by the DOE led to further exploration of the field in the form of the Eastern Gas Shales Program (EGSP) whose goal was to figure out how much gas was in the Appalachian Basin and how to get to it as cheaply as possible. As part of the EGSP, the DOE found a large amount of shale and compiled some 110 technical reports with critical information in relation to fracking. The DOE was also involved some 35 demonstration wells starting with DOE massive hydraulic fracturing demonstration leading up to the first successful multi-fracture horizontal well in 1986. In the 1990s, the Department of Energy and Gas Research Institute, a joint public - private partnership which researched natural gas, worked with several companies to develop experimental wells. These experiments allowed industry to learn and develop strategies to work with horizontal multi-stage fracking operations which made the process more affordable over time allowing for its growth.<sup>17</sup> These experiments when combined with technologies such as improved drill bits and three-dimensional microseismic imaging allowed the industry to grow to what it is now.<sup>18</sup> The growth of this technology has led to both many positive and negative issues which are detailed below.

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16. Shanshan Yao, "Modelling of Multi-Stage Fractured Horizontal Wells" (master's thesis, University of Regina, 2013), 20-23, [https://central.bac-lac.gc.ca/.item?id=TC-SRU-5483&op=pdf&app=Library&oclc\\_number=1032938600](https://central.bac-lac.gc.ca/.item?id=TC-SRU-5483&op=pdf&app=Library&oclc_number=1032938600).

17. John Kemp, "COLUMN-The real shale revolution: Kemp," editorial, Reuters, July 2014, <https://www.reuters.com/article/shale-usa-kemp-idCNL6N0PP3A620140714>.

18. Justin Ong and Ron Munson, "Hydraulic Fracturing: A Public-Private R&D Success Story," Clearpath, last modified January 4, 2018, <https://clearpath.org/tech-101/hydraulic-fracturing-a-public-private-rd-success-story/>.

## Current Issues

There are many factors that affect fracking, two of the most influential being pollution and the possible health effects originating from said pollution. Fracking often leads to the accidental and sometimes purposeful release of BTEX chemicals (benzene, toluene, ethylbenzene, and xylene), hydrogen sulfide, fine particulate, ozone, and other chemical reagents into the air, water, and ground which causes pollution and can cause human illness.<sup>19</sup> The process of fracking also brings naturally occurring radioactive materials which when not disposed of properly can lead to widespread contamination. It can also increase light and noise pollution which decrease the quality of life in a region. The fracking industry also uses certain dangerous chemicals in its process such as PFAS (polyfluoroalkyl substances) which leach into groundwater and be released into the air leading to contamination and pollution which is harmful to human health.<sup>20,21</sup> Frac sand used to stabilize the drill shafts can cause respiratory issues such as lung cancer when it gets in the air.<sup>22</sup>

All of these pollution and decreased quality of life concerns have led to numerous lawsuits. One of such lawsuits includes Ely v. Cabot Oil and Gas Corp which dealt with water contamination in Dimock, Pennsylvania. During this case the court determined that fracking and its associated operation weren't abnormally hazardous in regard to groundwater and that the case should be considered under traditional and longstanding negligence principles demonstrating that

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19. Lee Marotta, The Determination of Low Level Benzene, Toluene, Ethyl Benzene, and Xylenes (BTEX) in Drinking Water by Headspace Trap GC/MS, accessed November 25, 2022, [https://resources.perkinelmer.com/lab-solutions/resources/docs/APP\\_The\\_Determination\\_of\\_Low\\_LevelBTEX\\_DrinkingWater.pdf](https://resources.perkinelmer.com/lab-solutions/resources/docs/APP_The_Determination_of_Low_LevelBTEX_DrinkingWater.pdf).

20. United States Environmental Protection Agency, "PFAS Explained," United States. Environmental Protection Agency, last modified April 28, 2022, <https://www.epa.gov/pfas/pfas-explained>.

21. Dusty Horwitt, Fracking with "Forever Chemicals" (2021), <https://psr.org/wp-content/uploads/2021/07/fracking-with-forever-chemicals.pdf>.

22. FracTracker Alliance, "Frac Sand," FracTracker Alliance, accessed December 12, 2022, <https://www.fracktracker.org/frac-sand/>.

fracking is normally safe when done properly.<sup>23</sup> But eventually, the court did end up awarding a \$4.24 million verdict to 8 plaintiffs for nuance and discomfort which was then overturned and a new trial granted at the request of Cabot Oil and Gas Corp on April 26, 2017.<sup>24</sup> Even though I wasn't able to locate any further results to this lawsuit, I was able to locate a criminal case against Cabot Oil and Gas Corp in Dimock, Pennsylvania in which Cabot Oil and Gas Corp plead guilty for violating the Clean Streams Law on November 29, 2022.<sup>25</sup> Another case involving fracking was Phillips v. Chesapeake Appalachia, LLC, which ended in Chesapeake Appalachia, LLC buying the plaintiff's property for \$1.6 million.<sup>26</sup> Both of these cases and many others show that players in the fracking industry are already punished for inappropriate actions and that fracking is not inherently abnormally hazardous. In addition, there have been many lawsuits involving the use of zoning to ban fracking in certain areas with pollution being brought up as a reason for said ban. These issues can be seen in Pennsylvania as well as in New York State, before it banned fracking. In Pennsylvania, in 2013, Act 13 of the zoning ordinance was struck down as constitutional by the Pennsylvania Supreme Court. Act 13 prevented local areas

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23. Casetext, "Ely v. Cabot Oil & Gas Corp.," Casetext, last modified April 23, 2014, <https://casetext.com/case/ely-v-cabot-oil-amp-gas-corp/case-details>.

24. NOLEN SCOTT ELY v. CABOT OIL & GAS : CORPORATION, No. 3:09-CV-2284, slip op. at 5-6 (United States District Court Middle District of Pennsylvania Apr. 27, 2017). [https://www.govinfo.gov/content/pkg/USCOURTS-pamd-3\\_09-cv-02284/pdf/USCOURTS-pamd-3\\_09-cv-02284-22.pdf](https://www.govinfo.gov/content/pkg/USCOURTS-pamd-3_09-cv-02284/pdf/USCOURTS-pamd-3_09-cv-02284-22.pdf).

25. Office of Attorney General Josh Shapiro, "AG Shapiro Announces Plea, Public Water Line Construction for Victims of Cabot Oil & Gas," Office of Attorney General Josh Shapiro, last modified November 29, 2022, <https://www.attorneygeneral.gov/taking-action/ag-shapiro-announces-plea-public-water-line-construction-for-victims-of-cabot-oil-gas/>.

26. Blake Watson, "Hydraulic Fracturing and Tort Litigation: A Survey of Landowner Lawsuits," American Bar Association, accessed December 11, 2022, [https://www.americanbar.org/groups/real\\_property\\_trust\\_estate/publications/probate-property-magazine/2017/september\\_october\\_2017/ppv31-5-article-hydraulic-fracturing-and-tort-litigation-landowner-lawsuits/](https://www.americanbar.org/groups/real_property_trust_estate/publications/probate-property-magazine/2017/september_october_2017/ppv31-5-article-hydraulic-fracturing-and-tort-litigation-landowner-lawsuits/).

from controlling zoning regulations that prevent fracking operations in certain areas.<sup>27</sup> A similar situation occurred in the town of Dryden, New York when Anschutz Exploration Corporation, a gas drilling company, sued the town for banning the company from fracking within the premises of the town. The ruling resulting from *Energy Corp. USA v. Town of Dryden*, was that the Town of Dryden was in its right to ban fracking using the zoning ordinance.<sup>28</sup> In addition, there have also been court cases regarding fracking and zoning that are in favor of fracking operations. One of such examples is *Frederick v. Allegheny Twp. Zoning Hearing Bd* which took place in 2018 within Pennsylvania. In this court case, the gas company followed all protocols and took into effect local conditions which is what we advocate for. These protocols included the use of public water supplies instead of a stream and choice to transport waste away from the site to prevent the onsite burial of waste.<sup>29</sup>

In addition, the only U.S. Supreme Court case regarding fracking and its associated operations in recent years is *Penneast Pipeline Co., LLC v. New Jersey Et Al*. This case is regarding whether Penneast Pipeline Co., LLC can use eminent domain powers provided to it by the federal government to seize state lands which the Supreme Court determined it could.<sup>30</sup>

In addition to the lawsuits and court cases mentioned above, there have been a variety of other issues related to fracking and its associated industries, another one of which is the issue of

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27. StateImpact Pennsylvania, "Pennsylvania Supreme Court strikes down controversial portions of Act 13," StateImpact Pennsylvania, December 19, 2013, <https://stateimpact.npr.org/pennsylvania/2013/12/19/state-supreme-court-strikes-down-act-13-local-zoning-restrictions/>.

28. Jesse McKinley, "Fracking Fight Focuses on a New York Town's Ban," New York City, October 23, 2013, <https://www.nytimes.com/2013/10/24/nyregion/court-case-on-fracking-ban-in-dryden-ny-may-have-wide-implications.html>.

29. Casetext, "Frederick v. Allegheny Twp. Zoning Hearing Bd.," Casetext, last modified April 23, 2014, <https://casetext.com/case/frederick-v-allegheny-twp-zoning-hearing-bd>.

30. *PENNEAST PIPELINE CO., LLC v. NEW JERSEY ET AL.*, No. No. 19–1039, slip op. at 1-5 (June 29, 2021). [https://www.supremecourt.gov/opinions/20pdf/19-1039\\_8n5a.pdf](https://www.supremecourt.gov/opinions/20pdf/19-1039_8n5a.pdf).



fracking requiring millions of gallons of water which some see as a waste of water.<sup>3132</sup> Fracking and its associated operations have also been known to cause earthquakes which can cause damage to local structures and cause the loss of human life.<sup>33</sup> That being said, these earthquakes are incredibly rare. In fact, even in the state with the largest number of induced earthquakes, Oklahoma, only 2% of their earthquakes can be tied to fracking activities.<sup>34</sup> On the other hand, fracking has a decreased carbon dioxide output compared to coal when the amount of methane lost is controlled.<sup>35</sup> Although, the control of methane loss is often lacking leading to higher emissions of greenhouse gasses that put in doubt fracking advantage in relation to climate change.<sup>36</sup> But still some say that it is still too slow and that we should invest in energy technologies that don't involve fossil fuels.<sup>37</sup> On the other hand, fracking has also helped maintain the United States's dominance in the energy sector by protecting the US as an energy

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31. FracTracker Alliance, "The Health and Environmental Effects of Fracking," FracTracker Alliance, accessed November 25, 2022, <https://www.fracktracker.org/resources/oil-and-gas-101/health-environmental-effects-of-fracking/>.

32. Melissa Denchak, "Fracking 101," Natural Resources Defense Council, last modified April 19, 2019, <https://www.nrdc.org/stories/fracking-101#history>.

33. Gillian R. Foulger et al., "Global review of human-induced earthquakes," *Earth-Science Reviews* 178 (March 30, 2018): 1-2,17-22, <https://doi.org/10.1016/j.earscirev.2017.07.008>.

34. U.S. Geological Survey, "Does fracking cause earthquakes?," U.S. Geological Survey, accessed December 12, 2022, <https://www.usgs.gov/faqs/does-fracking-cause-earthquakes>.

35. Samantha Gross, "The United States can take climate change seriously while leading the world in oil and gas production," Brookings Institution, last modified January 2020, <https://www.brookings.edu/policy2020/bigideas/the-united-states-can-take-climate-change-seriously-while-leading-the-world-in-oil-and-gas-production/>.

36. Stephen Leahy, "Fracking boom tied to methane spike in Earth's atmosphere," National Geographic, last modified August 15, 2019, <https://www.nationalgeographic.com/environment/article/fracking-boom-tied-to-methane-spike-in-earths-atmosphere>.

37. James O'Brien, letter to the editor, *New York Times*, October 7, 2019, <https://www.nytimes.com/2019/10/07/business/energy-environment/climate-energy-experts-debate.html>.

exporter. This export of energy gives the US more control on the global stage.<sup>38</sup> Fracking also is a massive provider of jobs in that it provided 10.3 million part time and full time jobs in 2015.<sup>39</sup> It also is a massive provider of economic productivity for the United State as a ban on fracking could potentially lead to a 7.1 Trillion Dollar loss of GDP and a loss of 1.9 Billion Dollars of tax revenue.<sup>40</sup> That being said, in some regions such as Pennsylvania the economic benefits are marginal. It also leads to money leaving these regions as foreign workers and companies from locations such as Texas are employed in these projects.<sup>41</sup> Fracking also has the effect of decreasing the average level of education attainment in a region by decreasing the relative value of college to people in those regions.<sup>42</sup> Fracking also provides the US with a source of natural gas and oil for use in the petrochemical sector as feedstocks for products ranging from plastics to fertilizers, in the residential space for heating and cooking, as well as transportation. This can be seen below in the chart from Energy Information Administration.

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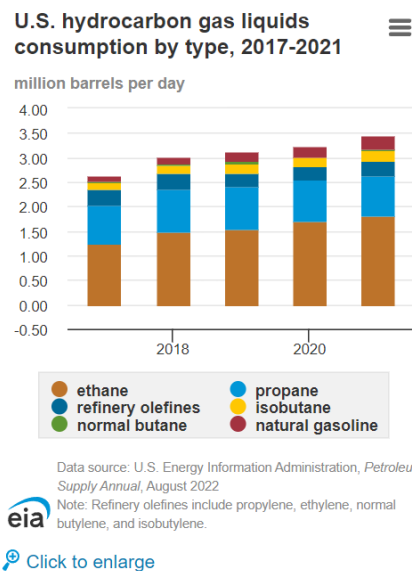
38. David Usborne, "Fracking Is Turning the US into a Bigger Oil Producer than Saudi Arabia," in *Foreign Oil Dependence*, ed. Noah Berlatsky, At Issue (Farmington Hills, MI: Greenhaven Press, 2016), previously published in *Independent* (n.p., 2014), [https://link.gale.com/apps/doc/EJ3010319250/OVIC?u=nysl\\_me\\_71\\_svhs&sid=bookmark-OVIC&xid=9d844285](https://link.gale.com/apps/doc/EJ3010319250/OVIC?u=nysl_me_71_svhs&sid=bookmark-OVIC&xid=9d844285).

39. American Petroleum Institute, *Impacts of the Natural Gas and Oil Industry on the US Economy in 2015*, 14-15, July 17, 2017, <https://www.api.org/~media/files/policy/jobs/oil-and-gas-2015-economic-impacts-final-cover-07-17-2017.pdf>

40. U.S. Chamber Of Commerce, *What If... Hydraulic Fracturing Was Banned?* (2019), 6, accessed December 2019, [https://www.globalenergyinstitute.org/sites/default/files/2019-12/hf\\_ban\\_report\\_final.pdf](https://www.globalenergyinstitute.org/sites/default/files/2019-12/hf_ban_report_final.pdf).

41. Susan Christopherson, "The false promise of fracking and local jobs," *The Conversation*, January 27, 2015, <https://theconversation.com/the-false-promise-of-fracking-and-local-jobs-36459>.

42. Elijah Neilson, *The Fracking Boom, Local Labor Market Opportunities, and College Attainment*, 1-10, <https://www.aeaweb.org/conference/2020/preliminary/paper/n97k6Tzz>.



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As you can see, fracking has led to many positive issues as well as negative issues. A further discussion about the interrelations between the issues described in this section as well as other issues can be found below as part of our position.

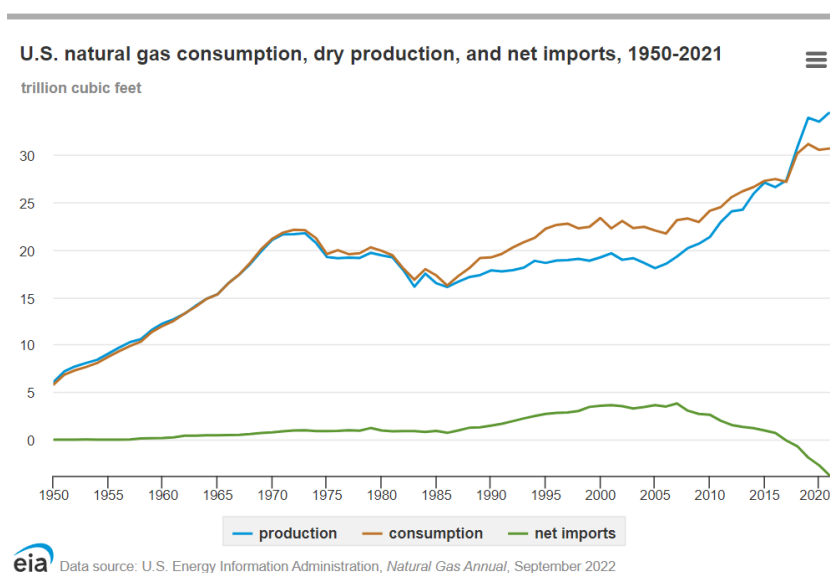
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43. U.S. Energy Information Administration, "Hydrocarbon gas liquids explained," U.S. Energy Information Administration, last modified September 13, 2022, <https://www.eia.gov/energyexplained/hydrocarbon-gas-liquids/uses-of-hydrocarbon-gas-liquids.php>.

## Our Position

US states should allow for fracking operations and associated operations as it allows the US to stay a major player in global energy markets, allows the US to control its own energy supply, allows for the creation of jobs, and allows the US to decrease its carbon footprint.

On the issue of the US controlling its own energy supply, the recent Russian Invasion of Ukraine has wildly destabilized and stressed global energy markets.<sup>44</sup> We are in a time in which energy markets abroad are highly unstable, where the US should try to protect our energy sector by allowing fracking. Fracking already contributes over 85% of the US's natural gas as of 2021 and ½ of the US's oil as of 2015 making it an extremely valuable technology in protecting our energy sector. This fact can be seen below in the Energy Information Administration Chart.<sup>45</sup>



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44. International Energy Agency, "Russia's War on Ukraine," International Energy Agency, accessed November 26, 2022, <https://www.iea.org/topics/russia-s-war-on-ukraine>.

45. U.S. Environmental Protection Agency, "PFAS Explained," U.S. Environmental Protection Agency, last modified April 28, 2022, <https://www.epa.gov/pfas/pfas-explained>.

46. U.S. Energy Information Administration, "Natural gas explained," U.S. Energy Information Administration, last modified October 3, 2022, <https://www.eia.gov/energyexplained/natural-gas/where-our-natural-gas-comes-from.php>.

By protecting the US supply of energy, the US will also be able to support our allies in Europe through LNG exports which decreases their dependence on Russian natural gas. The US needs to support our allies with more natural gas due to Russia exporting an expected 50 billion less cubic meters of gas to Europe in 2022 compared to 2021.<sup>47</sup> This support of our allies supports the United State's foreign policy objectives.<sup>48</sup> Fracking would also allow the US to rethink its relationship with despotic countries like Saudi Arabia.<sup>49</sup>

Some others who want fracking to be banned try to argue that the US should use renewables for its energy independence exclusively. This is a faulty position since most of the USA's supply of solar panels are made by China and/or contain components which are almost exclusively made by China such as silicon wafers.<sup>50</sup> There will be no point in energy independence if you are still dependent on your adversaries since the main point of energy independence is to not support adversaries and not be dependent on them.<sup>51</sup> In addition, for the US to switch to all renewables the US would need a large scale long-term storage of electrical supply with a robust long distance transmission network for power. This is currently only partly feasible as long term grid level storage just doesn't exist and the amount of shorter term grid

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47. Reuters, "Russian gas exports to EU will fall by 50 bcm this year -Ifx cites Deputy PM," Reuters, September 15, 2022, <https://www.reuters.com/business/energy/russian-gas-exports-eu-will-fall-by-50-bcm-this-year-ifx-cites-deputy-pm-2022-09-15/>.

48. The White House, "FACT SHEET: United States and European Commission Announce Task Force to Reduce Europe's Dependence on Russian Fossil Fuels," news release, March 25, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/25/fact-sheet-united-states-and-european-commission-announce-task-force-to-reduce-europes-dependence-on-russian-fossil-fuels/>.

49. Usborne, "Fracking Is Turning," in *Foreign Oil Dependence*

50. International Energy Agency, *Special Report on Solar PV Global Supply Chains*, 1-122, 2022, <https://iea.blob.core.windows.net/assets/d2ee601d-6b1a-4cd2-a0e8-db02dc64332c/SpecialReportonSolarPVGlobalSupplyChains.pdf>.

51. Federal Bureau of Investigation, "The China Threat," Federal Bureau of Investigation, <https://www.fbi.gov/investigate/counterintelligence/the-china-threat>.

level electrical storage is limited.<sup>52</sup> In fact, in 2020, the US only had storage for 24 GW compared to the 1,148 GW that the US generates.<sup>53</sup> There is also currently a lack of high throughput connections between the Western Interconnection, the Eastern Interconnection, and the Electric Reliability Council of Texas which make the type robust long distance transmission network that a renewable based power grid would need impossible.<sup>54</sup>

In addition to securing the US energy industry, fracking would also bring large quantities of tax revenue for the government while providing jobs. This I have already illustrated in my current issues section. In that section, I mention one of the arguments naysayers of fracking present in that fracking causes people to be less educated relative to their peers.<sup>55</sup> I don't think this isn't much of an issue since the goal of higher education is to prepare people for the workforce and fracking increases the value of jobs that don't require higher education.<sup>56</sup> This would mean people won't need to get a college degree to get a well paying job which makes college less valuable. In addition, the cost of higher education relative to inflation is at an all

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52. Devonie McCamey, "What We Know—and Do Not Know—About Achieving a National-Scale 100% Renewable Electric Grid," National Renewable Energy Laboratory, last modified May 19, 2021, <https://www.nrel.gov/news/features/2021/what-we-know-and-dont-know-about-achieving-a-national-scale-100-renewable-electric-grid.html>.

53. Center for Sustainable Systems, University of Michigan, "U.S. Grid Energy Storage Factsheet," Center for Sustainable Systems, University of Michigan, last modified 2021, <https://css.umich.edu/publications/factsheets/energy/us-grid-energy-storage-factsheet>.

54. IEA Photovoltaic Power Systems Programme, Trends in Photovoltaic Applications 2022, 47-51, 2022, [https://iea-pvps.org/wp-content/uploads/2022/09/PVPS\\_Trend\\_Report\\_2022.pdf](https://iea-pvps.org/wp-content/uploads/2022/09/PVPS_Trend_Report_2022.pdf).

55. Madeline Geocariss, "A Decade of Transformation: What We Have Learned Since RE Futures Showed What Was Possible," National Renewable Energy Laboratory, last modified June 6, 2022, <https://www.nrel.gov/news/features/2022/re-futures.html>.

56. Matt Simon, "The Grid Isn't Ready for the Renewable Revolution," Wired, last modified October 6, 2021, <https://www.wired.com/story/the-grid-isnt-ready-for-the-renewable-revolution/>.  
57 Neilson, The Fracking, 1-10.

58. Association of Public & Land-Grant Universities, "How do college graduates benefit society at large?," Association of Public and Land-Grant Universities, accessed November 26, 2022, <https://www.aplu.org/our-work/4-policy-and-advocacy/publicvalues/societal-benefits.html#33>.

time high which means college graduates will have higher levels of debt that are getting ever harder to pay back.<sup>59</sup>

In addition, fracking provides a source of hydrocarbons for the petrochemical industry to make products which there currently isn't a replacement that could match it in cost and scale. For example, the average minimum price for biomethane, a type of methane generated from biological sources, a source is \$3 per MMBTU (Million British Thermal Units) while the average minimum price of fracking Marcellus and Delaware shale, which is mostly methane, has a continued price of less than \$2 per MMBTU.<sup>60</sup><sup>61</sup><sup>62</sup> This is significant as methane is critical as it can be used to hydrogen gas which is needed to create fertilizers. This hydrogen currently can't be made more cheaply without the use of hydrocarbons, a ban on fracking would almost certainly mean an increase in fertilizer and food costs given how closely related the costs of natural gas and ammonia, a key ingredient in fertilizers, are to each other.<sup>63</sup><sup>64</sup> Another critical petroleum product is ethane which is used to make polyethylene, one of the most popular plastics

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59. The White House, "FACT SHEET: President Biden Announces Student Loan Relief for Borrowers Who Need It Most," news release, August 24, 2022, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/24/fact-sheet-president-biden-announces-student-loan-relief-for-borrowers-who-need-it-most/>.

60. Mélodie Mistré et al., Shale gas production costs: historical developments and outlook, 5, January 2017, <https://doi.org/10.1016/j.esr.2018.01.001>.

61. International Energy Agency, Sustainable supply potential and costs, 14 - 29, 2020, [https://iea.blob.core.windows.net/assets/03aeb10c-c38c-4d10-bcec-de92e9ab815f/Outlook\\_for\\_biogas\\_and\\_biomethane.pdf](https://iea.blob.core.windows.net/assets/03aeb10c-c38c-4d10-bcec-de92e9ab815f/Outlook_for_biogas_and_biomethane.pdf).

62. Christopher D. Laughrey, Produced Gas and Condensate Geochemistry of the Marcellus Formation in the Appalachian Basin: Insights into Petroleum Maturity, Migration, and Alteration in an Unconventional Shale Reservoir, 7-12, July 2021, <https://doi.org/10.15530/urtec-2021-5195>.

63. Christos M. Kalamaras and Angelos M. Efstathiou, Hydrogen Production Technologies: Current State and Future Developments, 1, 2013, <https://doi.org/10.1155/2013/690627>.

64. Jorge Liboreiro and Zacharia Vigneron, "Explained: Why higher gas costs lead to higher food prices," Euronews, May 24, 2022, <https://www.euronews.com/my-europe/2022/05/23/explained-why-higher-gas-costs-lead-to-higher-food-prices>.

on the planet.<sup>65</sup><sup>66</sup> In fact, ethane consumption has increased 0.95 million barrels per day starting from the first quarter of 2013 to 1.85 million barrels per day in the first quarter of 2021. This consumption is likely to further rise as can be seen in the following chart from the Energy Information Administration.<sup>67</sup>

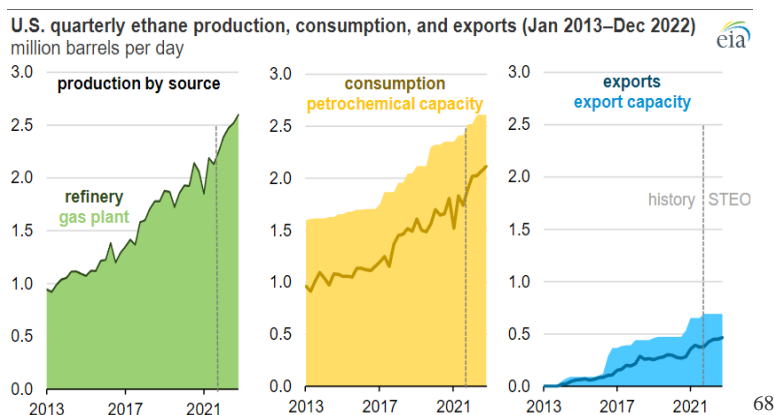
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65. Catherine Hausman and Ryan Kellogg, Welfare and Distributional Implications of Shale Gas, 38-40, 2015, [https://www.brookings.edu/wp-content/uploads/2015/03/2015a\\_hausman.pdf](https://www.brookings.edu/wp-content/uploads/2015/03/2015a_hausman.pdf).

66. FracTracker Alliance, "Key Facts about Petrochemical," FracTracker Alliance, accessed November 26, 2022, <https://www.fracktracker.org/petrochemicals/guide/>.

67. Warren Wilczewski, "U.S. ethane production to grow, along with expanding domestic consumption and exports," U.S. Energy Information Administration, last modified May 21, 2021, <https://www.eia.gov/todayinenergy/detail.php?id=48056>.





As you can see based on the data, the banning of fracking would destroy the petrochemical industry as you would not be able to keep up with the US consumption of certain hydrocarbons. This would cause catastrophic levels of damage to US living conditions as most of the products around us contain plastics of some sort due to plastic's unique properties that make it useful for applications other materials are less suitable for.<sup>69</sup> In fact many of the technologies renewable energy depends on require plastics or petrochemical products of some sort to be created which fracking provides.<sup>70</sup> In addition when plastics are used responsibly can lead to a net decrease in carbon production.<sup>71</sup>

Another one of the main arguments people who want to ban fracking use is that because fracking uses a lot of water and uses certain harmful chemicals that the industry as a whole should be banned. This viewpoint is highly problematic since everything around us has risk of

68. Wilczewski, "U.S. ethane," U.S. Energy Information Administration.

69. Anthony L. Andrady and Mike A. Neal, Applications and societal benefits of plastics, 1-7, July 27, 2009, <https://doi.org/10.1098%2Frstb.2008.0304>.

70. AFPM Communications, "Renewable energies rely on Petrochemicals from Oil and Natural Gas," American Fuel & Petrochemical Manufacturers, last modified March 4, 2019, <https://www.afpm.org/newsroom/blog/renewable-energies-rely-petrochemicals-oil-and-natural-gas>.

71. AFPM communications, "Plastics reduce emissions — here's how," American Fuel & Petrochemical Manufacturers, last modified August 30, 2022, <https://www.afpm.org/newsroom/blog/plastics-reduce-emissions-heres-how>.

some sort and everything we do has a cost benefit analysis. In this case, we do agree with some of the measures proposed by the Physicians for Social Responsibility in that we do believe that increased regulation and banning of certain hazardous chemicals can be beneficial to this industry in assisting the mitigation of pollution related issues.<sup>72</sup> That being said, there are already regulations on the fracking industry that are already being enforced which includes the Clean Water Act. In fact, the EPA as of this year has already issued fracking related violations of the clean water act demonstrating that the EPA can and does take action to mitigate threats to the environment.<sup>73</sup> In addition, a recent EPA study demonstrated that fracking can have a minimal effect on a watershed if preventative measures are taken and the industry becomes more transparent about its operations and fracturing fluid composition. Preventative measures could also include the switch from groundwater supplies to surface water or brackish water, enhancing containment methods, elongated surface casings to protect groundwater supplies, and other measures.<sup>74</sup> A similar logic can also be applied for air pollution as well as soil pollution to mitigate their effects.<sup>75</sup> In addition, there have been many industrial research efforts to make the fracking operations more environmental friendly ranging from changing the composition of fracturing fluids to increase the efficiency of the process to developing methods to determine

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72. Horwitt, Fracking with.

73. United States Environmental Protection Agency, "Enforcement Annual Results for Fiscal Year 2021," United States Environmental Protection Agency, accessed November 26, 2022, <https://www.epa.gov/enforcement/enforcement-annual-results-fiscal-year-2021#:~:text=In%20FY%202021%2C%20EPA's%20enforcement,communities%20with%20environmental%20justice%20concerns>.

74. United States Environmental Protection Agency, Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States (Final Report), by United States Environmental Protection Agency, 565-590, December 2016, <https://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990>.

75. United States Environmental Protection Agency, "Unconventional Oil and Natural Gas Development," United States Environmental Protection Agency, last modified August 1, 2022, <https://www.epa.gov/uog>.

where might fracking fluid move underground to determining how fracking chemicals break down in the environment to improved water reuse procedures to decrease water usage to many other techniques and methods. Some of the industrial research efforts include but are not limited to research into foam based fracturing fluids to decrease water usage and research into the removal of hydroxypropyl guar gum from fracturing fluids to allow the recycling of water to decrease water usage.<sup>7677</sup> These innovations make this industry ever more environmentally friendly and less accident prone. In addition, the fracking industry already has many incentives in the form of economics for limiting the amount of chemicals used, which can be taken advantage of by the government to phase out certain chemicals and develop certain processes to decrease the effect of fracking on the environment.<sup>78</sup> Also, further developments in technologies such as carbon capture technology can allow fracking to still be possible while meeting the goal of keeping global surface temperatures from rising over 2°C.<sup>7980</sup> In addition, the methane from fracking can also be converted into syngas, a mixture of hydrogen and carbon monoxide, which can be used to generate hydrogen which can be used to meet the US climate goals since this

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76. Shiliang Xu et al., "Design of Facile Technology for the Efficient Removal of Hydroxypropyl Guar Gum from Fracturing Fluid," PLoS ONE 16, no. 3 (March 4, 2021): 1-3, [https://link.gale.com/apps/doc/A653840731/OVIC?u=nysl\\_me\\_71\\_svhs&sid=bookmark-OVIC&xid=0abb6f70](https://link.gale.com/apps/doc/A653840731/OVIC?u=nysl_me_71_svhs&sid=bookmark-OVIC&xid=0abb6f70).

77. Maria E. Gonzalez Perdomo and Sharifah Wan Madihi, Foam Based Fracturing Fluid Characterization for an Optimized Application in HPHT Reservoir Conditions, 2-4, February 27, 2022, <https://doi.org/10.3390/fluids7050156>.

78. Lashun Thomas et al., Toward better hydraulic fracturing fluids and their application in energy production: A review of sustainable technologies and reduction of potential environmental impacts, 1-23, February 2019, <https://doi.org/10.1016/j.petrol.2018.09.056>.

79. Department of Energy, "DOE Invests \$45 Million to Decarbonize the Natural Gas Power and Industrial Sectors Using Carbon Capture and Storage OCTOBER 6, 2021," Department of Energy, last modified October 6, 2021, <https://www.energy.gov/articles/doe-invests-45-million-decarbonize-natural-gas-power-and-industrial-sectors-using-carbon>.

80. James H. Williams et al., pathways to deep decarbonization in the United States, 32-33, November 2014, <https://biotech.law.lsu.edu/blog/US-Deep-Decarbonization-Report.pdf>.

process yields half the greenhouse gas emissions of using gasoline.<sup>81</sup> In addition this syngas from methane can also be used in the steel making process to replace current methods to reduce the greenhouse gas emissions in steel manufacturing. Also, the conversion of methane to syngas can be made to produce significantly less greenhouse gasses through more advanced techniques such as methane pyrolysis in molten metal.<sup>82</sup>

Finally, banning fracking would go against the free market economic system on which the US is based on. The free market economic system improves the lives of the average American by improving worker productivity, increasing wage, and decreasing cost of living.<sup>83</sup> In addition, this cheap energy has allowed the US to prosper and succeed while increasing quality of life and national security while lowering greenhouse gas emissions as mentioned previously.<sup>8485</sup>

We desire increased regulation and innovation in the industry of fracking and its associated industry to ensure the US's continued economic prosperity, national security, and

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81. Office of Energy Efficiency and Renewable Energy - Environmental Protection Agency, "Hydrogen Production: Natural Gas Reforming," Office of Energy Efficiency and Renewable Energy - Environmental Protection Agency, accessed November 27, 2022, <https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming>.

82. Abhinav Bhaskar, Mohsen Assadi, and Homam Nikpey Somehsaraei, Can methane pyrolysis based hydrogen production lead to the decarbonisation of iron and steel industry?, 1-4, June 2021, <https://doi.org/10.1016/j.ecmx.2021.100079>.

83. The White House, "The Importance of Competition for the American Economy," The White House, last modified July 9, 2021, <https://www.whitehouse.gov/cea/written-materials/2021/07/09/the-importance-of-competition-for-the-american-economy/#:~:text=Healthy%20market%20competition%20is%20fundamental,greater%20variety%2C%20and%20more%20innovation>.

84. Dennis Anderson, World Energy Assessment: Energy and the Challenge of Sustainability, 394-398, November 28, 2015, <https://www.undp.org/sites/g/files/zskgke326/files/publications/chapter11.pdf>.

85. Office of Fossil Energy and Carbon Management, "Department of Energy Releases Report on Economic and National Security Impacts of a Hydraulic Fracturing Ban," Office of Fossil Energy and Carbon Management, last modified January 14, 2021, <https://www.energy.gov/fecm/articles/department-energy-releases-report-economic-and-national-security-impacts-hydraulic>.

ability to meet its climate goals. The banning of fracking would go against and prevent these goals from being met.

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