Combatting Climate Change Through Conservation Easements

Claire Wright

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Claire Wright*

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I. INTRODUCTION

In 2007, Rafael Correa, then-President of Ecuador, offered not to extract the oil located underneath Ecuador's Yasuni National Park, in exchange for the international community paying Ecuador $3.6 billion, which was one-half of the estimated value of those oil fields.¹ He stated that he thought his offer was

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“an elegant way to help tackle climate change.”

He was referring to the fact that destroying part of the Yasuni National Park would release 800 million tons of carbon dioxide into the atmosphere while also abolishing a valuable “carbon sink” that otherwise would have absorbed millions of tons of carbon dioxide. A carbon sink is a plot of land or body of water that absorbs more carbon that it emits. In addition, extracting the oil from underneath the Yasuní and then burning those barrels of oil would release another 410 million tons of carbon dioxide into the atmosphere, according to Ecuador’s sources. Moreover, development of the Yasuní would threaten the viability of numerous plant and animal species, as Yasuní National Park is one of the most biologically diverse ecosystems on earth.


3. See Haddad, supra note 2, at 15 (referencing the effects of the carbon sink).

4. See, e.g., N.C. State Univ., Carbon Sink or Carbon Source? Aerosols Play Significant Role in Shifts, SCI. DAILY (Dec. 9, 2004), https://www.sciencedaily.com/releases/2004/12/041208225316.htm (“Researchers at North Carolina State University have shown that the amount of aerosols – dust particles, soot from automobile emissions and factories, and other airborne particles – in the atmosphere has a significant impact on whether the surface area below either absorbs or emits more carbon dioxide (CO2).”).


6. See, e.g., Friedman, supra note 1 (“There is little doubt that the Yasuní Reserve contains remarkable biodiversity . . . ”); Jeremy Hance, Photos: Park in Ecuador Likely Contains World’s Highest Biodiversity, but Threatened by Oil, MONGABAY (Jan. 19, 2010), https://news.mongabay.com/2010/01/photos-park-in-ecuador-likely-contains-worlds-highest-biodiversity-but-threatened-by-oil/ (“Yasuni is the most biologically diverse place on Earth.”); Kelly Hearn, Deep in Ecuador’s Rainforest, A Plan to Forgo an Oil Bonanza, YALE SCH. ENV’T.: YALEENVIRONMENT360 (Sept. 13, 2010), https://e360.yale.edu/features/deep_in_ecuadors_rainforest_a_plan_to_forgo_an_oil_bonanza (“In addition to its remarkable biodiversity, Yasuní sits atop a fortune of oil, making the park an
Essentially, President Correa was offering a conservation easement (an agreement not to develop) to the international community in exchange for payment by the international community of $3.6 billion. President Correa’s proposal was indeed an elegant and responsible approach to reducing carbon dioxide emissions, as then-Secretary General of the United Nations, Ban Ki-moon, acknowledged in a 2011 press conference. Secretary General Ki-moon stated that President Correa’s proposal was an “innovative concept to combat global warming [and] strikes at the root of the problem by preventing the release of CO₂ in the first place . . .” After Ecuador received funding commitments from the international community totaling only $13 million, however, President Correa withdrew this offer in August 2013, and various entities, including “Andes Petroleum Ecuador, a consortium of two Chinese state-owned firms” commenced extracting oil from the Yasuní National Park in 2016.

Correa’s “conservation easement” idea apparently had gained some traction by the September 29, 2020 U.S. Presidential debate. During the climate portion of that debate, then-U.S. Presidential candidate Joe Biden denounced the deforestation of the Brazilian Amazon in general and specifically the thousands of major fires that generally had been started by people clearing the Amazon for development and then had

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8. Id.


burned out of control in the summers of 2019 and 2020.\textsuperscript{11} For many years, the undeveloped Brazilian Amazon has served as a large “carbon sink” that absorbs much of the carbon dioxide emitted around the world.\textsuperscript{12} Accordingly, destruction of the Brazilian Amazon rainforest is concerning to people all over the world.\textsuperscript{13} In reference to those fires, Biden stated that, if elected, he would be “gathering up and making sure we had the countries of the world coming up with $20 billion to say ‘here’s $20 billion, stop tearing down the forest and if you don’t, you are going to have significant economic consequences.’”\textsuperscript{14}

In response to Biden’s comments, Brazilian President Bolsonaro, a right-wing proponent of economic development of

\begin{enumerate}
\item See Ryan Richards & Mikyla Reta, \textit{Charting a New Course for U.S.-Brazil Action on the Amazon}, CTR. FOR AM. PROGRESS (Apr. 13, 2021, 5:00 AM), https://www.americanprogress.org/issues/green/reports/2021/04/13/498006/charting-new-course-u-s-brazil-action-amazon/ (“During the 2020 presidential debate, then-candidate Biden affirmed the urgency of addressing the threat that President Bolsonaro’s policies posed to the Amazon and to the global climate, proposing to work with global partners to create a $20 billion fund that would incentivize Bolsonaro to change his approach to the Amazon.”).
\end{enumerate}
the Brazilian Amazon, angrily accused Biden of threatening Brazil’s sovereignty and stated that Brazil actually had done more than any other country to preserve its undeveloped lands. Bolsonaro’s claim that “Brazil is a model of conservation because of the size of forest land still standing” is belied by the fact that, since he took office in January 2019, destruction of the Brazilian Amazon accelerated at an eleven-year high, with forest clearances up 34.5% and an area the size of Lebanon destroyed. President Bolsonaro has been widely criticized for his pro-development stance on the Amazon in general and his handling of the 2019 and 2020 Amazon fires in particular.

Still, Bolsonaro’s response raised some legitimate questions regarding Biden’s comments. The first part of Biden’s statement was fine; he was merely touting Correa’s idea of a country offering a conservation easement in exchange for compensation, and numerous Brazilian leaders in recent years have argued that “the world should pay up if it wants more forest to be preserved.” However, Biden’s subsequent reference to imposition of economic sanctions on Brazil should Brazil decline to grant a conservation easement to the international community was mysterious. A conservation easement is a voluntary measure; how could Brazil’s declination of such an easement proposal justify imposition of economic sanctions on


16. See AL JAZEERA SEPT. 30, 2020, supra note 14; Charner & Kottasová, supra note 14 (“Bolsonaro told the UN General Assembly that no other country protected as much wild territory as Brazil.”).


18. Id.

19. See id. (“The Brazilian leader has insisted on economic development of the region, drawing condemnation from environmentalists, climate scientists and foreign leaders . . .”); Charner & Kottasová, supra note 14 (explaining that, in 2019, “the G7 group which includes Canada, France, Germany, Italy, Japan, the United Kingdom and the United States used its summit in France to call on Bolsonaro to step up efforts to protect the Amazon.”).

Brazil? Furthermore, is it fair for developed nations to focus on developing countries’ destruction of carbon sinks, when there would be no need for developing countries to preserve their carbon sinks if the developed nations did not emit so many tons of carbon dioxide in the first place? Following Biden’s comments, Brazil’s Environment Minister, Ricardo Salles, was more pragmatic. He tweeted: “Just one question: Biden’s $20bn in aid, is that yearly?”

The overwhelming majority of climate scientists around the world maintain that climate change (used interchangeably in this article with “global warming”) is caused by humans. Primarily, climate change is caused by the burning of fossil fuels, which releases CO$_2$ (a greenhouse gas), which is then trapped in the earth’s atmosphere and raises the average annual

21. See, e.g., Dawn Stover, You Pay or We Drill, ANTHROPOCENE MAG. (Dec. 2013), https://www.anthropocenemagazine.org/2013/12/how-do-we-not-drill (including former Ecuadorian President Rafael Correa’s argument that it is hypocritical for other nations to expect Ecuador to leave its resources untouched when “they are the polluters”). China is the largest emitter of carbon dioxide. See Ian Tiseo, Largest Global Emitters of Carbon Dioxide by Country 2019, STATISTA (Sept. 24, 2021), https://www.statista.com/statistics/271748/the-largest-emitters-of-co2-in-the-world (stating that China has “a share of almost 30 percent of the world’s total CO2 emissions that year”). Therefore, it is questionable whether China should be considered a developed nation today. See Philippe Benoit & Kevin Tu, Is China Still a Developing Country? And Why It Matters for Energy and Climate, COLUM. U.: CTR. ON GLOB. ENERGY POL’Y (July 23, 2020), https://www.energypolicy.columbia.edu/research/report/china-still-developing-country-and-why-it-matters-energy-and-climate (“While China’s economic might makes it a superpower alongside the United States, it still faces many of the major challenges of a typical developing country, such as widespread energy poverty, including 400 million people without access to clean cooking, significant air pollution, and dependence on increasing energy use to fuel future economic growth.”). However, the U.S. is the second largest emitter, and many of the other large emitters of carbon dioxide are developed countries as well. See Tiseo, supra. Moreover, “[a]lthough China currently emits the highest levels of CO2 annually, it has emitted far less than the United States over the past three centuries. Cumulative carbon dioxide emissions in the U.S. reached 367 billion metric tons by 2018. Since the birth of the Industrial Revolution more than 200 years ago, cumulative global CO2 emissions have increased dramatically. However, emissions started to increase more rapidly as of the 1960’s.” Id.


temperature of the globe. At a minimum, this warming of the globe is changing marine animals' feeding locations, shrinking polar ice caps, raising sea levels, and flooding low-lying lands. Moreover, many scientists have concluded that global warming is also responsible for much longer and more severe droughts, numerous and more dangerous wildfires, and many more catastrophic hurricanes and other storms.

Several climate scientists have warned that, if greenhouse gas emissions are not significantly reduced by 2030, that date may very well be a “tipping point,” meaning that self-perpetuating processes may then make reversal of a continually warming world impossible. In fact, according to a report issued by the United Nations-affiliated Intergovernmental Panel on Climate Change (IPCC) on August 9, 2021, “[r]ising seas, melting ice caps and other effects of a warming climate may [already] be irreversible for centuries . . . .” The catastrophe that we are facing may have been best summarized by Ko Barrett, vice chair of the IPCC and the senior adviser for climate at the Office of Oceanic and Atmospheric Research at the National Oceanic and Atmospheric Administration. He stated that “[w]e’ve known for decades that the world is warming, but this report tells us that recent changes in the climate are widespread, rapid and intensifying, unprecedented in thousands of years.” In short, climate change is the most grave environmental phenomenon threatening humanity today.

27. See Stephen Leahy, Climate Change Driving Entire Planet to Dangerous “Tipping Point”, NAT’L GEOGRAPHIC (Nov. 27, 2019), https://www.nationalgeographic.com/science/article/earth-tipping-point (“The idea of tipping points was introduced 20 years ago by the [IPCC]. The loss of the West Antarctic ice sheet and the Amazon rainforest, or extensive thawing of permafrost, as well as other key components of the climate system, are considered ‘tipping points’ because they can cross critical thresholds, and then abruptly and irreversibly change.”). Tipping points can be triggered between a warming of 1.0° and 2.0 °Celsius. Id. Without a drastic decline in greenhouse gas emissions by 2030, global warming will increase by 1.6° Celsius in the following decades. Id.
29. Id.
For this reason, 192 nations have joined the Paris Agreement\textsuperscript{30} to slow global warming to 2\degree Celsius and preferably 1.5\degree Celsius above the pre-industrial average global temperature and committed to specific, country-by-country greenhouse gas emission reductions called “Nationally Determined Contributions” or NDCs.\textsuperscript{31} Unfortunately, early in former U.S. President Trump’s Administration, he terminated the U.S.’s membership in the Paris Agreement, few countries are meeting their NDCs, and countries’ NDCs were not nearly aggressive enough to slow global warming significantly in any case.\textsuperscript{32} Accordingly, the world has become increasingly warmer since the Paris Agreement was signed in 2015.\textsuperscript{33}

The looming global warming crisis has generated numerous reactions and proposed solutions, including a suggestion that the U.S. military could invade Brazil someday if Brazil continues to permit the destruction of its Amazon carbon sink.\textsuperscript{34} Shortly after U.S. President Biden’s inauguration on January 20, 2021, his new Special Climate Envoy, John Kerry, announced that the U.S. was rejoining the Paris Agreement.\textsuperscript{35} In addition, President Biden suspended new fossil fuel mining leases on federal lands and waters, and instructed his Cabinet members to terminate any subsidies that their agencies provided to the fossil fuel industry.\textsuperscript{36} It should be noted, however, that many fossil fuel
subsidies are provided in the form of federal tax breaks, and the U.S. Congress, not the U.S. Executive Branch, would have to amend the Internal Revenue Code (IRC) to abolish such subsidies.

“Cap and trade” programs—in which an overall cap on emissions is implemented and then the companies and individuals affected can trade emissions among themselves—have been successful in lowering carbon emissions in certain locales, and several writers have proposed, as an alternative to a cap and trade program, the imposition of a carbon tax so that those developing and selling fossil fuels are forced to internalize the true cost of fossil fuels. Some have advocated that...
governments simply outlaw the extraction, refinement, and sale of fossil fuels (and not compensate people and entities engaging in such activities) on the ground that these activities cause global warming and consequently constitute a public nuisance. In addition, numerous civil liability lawsuits have been filed against major fossil fuel companies, such as Exxon Mobil Corp., for causing global warming and misleading investors and the public about the dangers of global warming caused by fossil fuels, and Senators and former U.S. Presidential candidates Elizabeth Warren and Bernie Sanders have even gone so far as to argue that oil company executives should be prosecuted criminally for hiding the fact that their products were destroying the planet.

At the same time, the U.S. provides pre-tax subsidies (meaning subsidies that don’t take into account negative externalities, or costs imposed on society by a party that does

(presenting a “spreadsheet tool for judging the likely impact on emissions, fiscal revenues, local air pollution mortality, and economic welfare impacts of a range of instruments including comprehensive carbon taxes.”); see Gilbert Metcalf, New (Republican) Support for a Carbon Tax, ECONOFACT (Feb. 10, 2017), https://econofact.org/new-republican-support-for-a-carbon-tax (discussing the details and potential consequences of a carbon tax proposal); Kyle Pomerleau & Elke Asen, Carbon Tax and Revenue Recycling: Revenue, Economic, and Distributional Implications, TAX FOUND. (Nov. 6, 2019), https://taxfoundation.org/carbon-tax/ (discussing some of the benefits for businesses of a carbon tax); Why Put a Price on Carbon, CITIZENS’ CLIMATE LOBBY, https://citizensclimatelobby.org/price-on-carbon/?gclid=Cj0KCQjw5auGBhDEARIIsAFYNm9FZ6NzGye kO6sYqWx_WM_gdYFZqR1WZkae0wFI_xL4zE-DiT80EIMaAIwEALw_wB (last visited Oct. 26, 2021) (discussing the benefits of a general carbon tax scheme).


42. See Umair Irfan, Bernie Sanders Wants to Take Fossil Fuel Companies to Criminal Court, Vox, (Nov. 20, 2019) https://www.vox.com/2019/11/12/20952933/bernie-sanders-climate-lawsuit-exxon-juliana-sinnok ("Several climate change lawsuits against fossil fuel companies and governments are now proceeding to trial and one suit may even yield a verdict soon.").

43. Id.

not pay for those costs), such as local air pollution and global warming, to fossil fuel companies in the amount of approximately $118.1 billion per year. Such subsidies make it difficult politically and legally to establish that extracting and selling fossil fuels constitutes a public nuisance. Of course, numerous individuals and companies around the world are also developing a wide range of greenhouse gas-reducing technologies and alternative energy sources. Most of the world agrees that global warming is a serious problem, but governments’ responses are uncoordinated and inconsistent, and ultimately little progress is being made to slow global warming.

The world’s atmosphere is a natural resource owned by all people and it is understandable that no country wants to do the lion’s share of the work to protect it for everyone. However, if human beings wish to survive, they must find a way to work...
together to slow climate change.\textsuperscript{54} Moreover, it is clear that the international community needs to take drastic action now to slow global warming,\textsuperscript{55} and all possible strategies for reaching that goal should be considered.\textsuperscript{56}

This article considers whether the international community, and whether the U.S. in particular, should promote the execution of conservation easements in which owners of fossil fuels agree not to extract, refine, sell or distribute those fossil fuels, in exchange for a public financial benefit. Again, this is the agreement that former President Rafael Correa was offering to make with the international community on behalf of Ecuador back in 2007.\textsuperscript{57} Furthermore, this article views this question from the perspective of U.S. land use law and the economic theory of property rights, which is discussed further below.\textsuperscript{58} Accordingly, the ultimate question addressed in this article is whether the execution of such conservation easements could be an economically efficient method of slowing global warming,\textsuperscript{59} and the analysis presented in this article suggests that the answer to this question is “yes.”\textsuperscript{60}

In considering this question, it should be kept in mind that an owner of fossil fuels could be a private person/entity or a government. Furthermore, a wealthier government typically can simply prohibit the exploitation of government-owned fossil fuels.\textsuperscript{61} In contrast, a poorer government typically would need to

\begin{itemize}
\item \textsuperscript{54} See, e.g., Our Planet, Our Future: Fighting Climate Change Together, EUR. COMM’N (Sept. 19 2018), https://ec.europa.eu/clima/sites/clima/files/youth/docs/youth_magazine_en.pdf (stating that slowing climate change is “going to need huge efforts from all of us individuals, governments, businesses, schools and other organizations, working together”).
\item \textsuperscript{56} See, e.g., Isabella Suarez, 5 Strategies That Achieve Climate Mitigation and Adaptation Simultaneously, WORLD RES. INST. (Feb. 10, 2010), https://www.wri.org/insights/5-strategies-achieve-climate-mitigation-and-adaptation-simultaneously (stating that governments should pursue any reasonable method of mitigating climate change and adjusting to it).
\item \textsuperscript{57} See supra text accompanying notes 1–10.
\item \textsuperscript{58} See infra text accompanying notes 88–115.
\item \textsuperscript{59} See infra text accompanying notes 250–406.
\item \textsuperscript{60} Id.
\item \textsuperscript{61} For example, as stated above, immediately upon being elected the U.S. President, President Biden suspended all new fossil fuel leases on federal lands and waters. See, e.g., Juliet Eilperin & Dino Grandoni, Biden Poised to Halt
be compensated for implementing such a prohibition, as it otherwise typically would need to exploit its fossil fuels to lift its population out of poverty.62

In Section II, I explain the basic mechanics of how a conservation easement works in the U.S. In Section III, I discuss the property law framework through which I am approaching the problem of global warming. In Section IV, I review the science of climate change, and in Section V, I review the major legal commitments that the international community has made regarding global warming. In Section VI, I set forth the specific amendments to the Internal Revenue Code (IRC) that I propose the U.S. Congress adopt to implement the conservation easements discussed here. In Section VII, I discuss whether prohibiting fossil fuel owners’ extraction, refinement, sale, and distribution of fossil fuels through conservation easements is an economically efficient method of slowing global warming, and, in Section VIII, I conclude.

II. CONSERVATION EASEMENTS

A conservation easement is a voluntary agreement, typically between a governmental entity or conservation land trust, in which the landowner agrees to use or refrain from using the land in a particular manner (e.g., maintain it as an open space or as a refuge for an endangered species), typically in exchange for a tax benefit.63 A conservation land trust is a non-profit corporation that acquires and manages donated lands and conservation easements for the purpose of limiting the

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62. See, e.g., Kestenbaum, supra note 1 (statement of former Ecuadorian President Rafael Correa) (discussing the need to exploit the Yasuni oil fields to help the poor of Ecuador since the international community would not pay Ecuador not to drill in the Yasuni).

development of the lands in question.\textsuperscript{64} In the U.S., for example, under Section 170(h) of the Internal Revenue Code (IRC), a landowner generally can take a charitable deduction on the taxpayer’s federal tax return for the diminution in the value of the land concerned attributable to an agreement to dedicate all or a portion of the land to one of the following uses:

1. preserving land for outdoor recreational use by, or education of, the general public;
2. protecting relatively natural habitats of fish, wildlife or plants;
3. preserving open space (including farmland or forest space) for scenic enjoyment of the general public or under a governmental conservation policy yielding significant public benefit; or
4. preserving a historically important land area or certified historic structure.\textsuperscript{65}

Generally speaking, a tax deduction under Section 170(h) of the IRC is available only if the land restriction is perpetual\textsuperscript{66} and “[t]he value of a conservation easement is the fair market value of the easement at the time of contribution.”\textsuperscript{67} Further, the date that the deed of easement is recorded pursuant to state law is the date of contribution for federal tax purposes.\textsuperscript{68} A “qualified appraiser” (as defined in IRC 170(f)(11)(E)) must be used to calculate the value of the easement,\textsuperscript{69} and an appraiser should investigate whether there have been sales of comparable easements as such sale prices typically would constitute the best evidence of the value of the easement.\textsuperscript{70} However, if the appraiser cannot find a record of comparable sales (which often is the case), the appraiser should calculate the value of the easement as the difference between the value of the land without the restriction and the value of the land with the restriction, taking into account all relevant information.\textsuperscript{71}

\begin{itemize}
\item \textsuperscript{65} 26 U.S.C. § 170(h)(4)(A).
\item \textsuperscript{66} 26 U.S.C. § 170(h)(5)(A).
\item \textsuperscript{68} Id. (citing Treas. Reg. § 1.170A-13(C)(3)(ii)(C)).
\item \textsuperscript{69} Id. at 41.
\item \textsuperscript{70} Id. at 43.
\item \textsuperscript{71} Id. at 43–44 (citing Treas. Reg. §1.170A-14(h)(3)(ii)).
\end{itemize}
landowner is denied and the landowner must pay the taxes owed without the deduction as well as penalties.\textsuperscript{72}

At the same time, for an individual taxpayer, partnership, S corporation, or other pass-through entity (in which the entity’s tax benefits and liabilities are passed down to the individual owners), the total amount of the deduction cannot exceed 50\% of the taxpayer’s contribution base\textsuperscript{73} (which, in most cases, means the taxpayer’s adjusted gross income (AGI) for the year in which the easement was granted),\textsuperscript{74} although any excess value of the easement not claimed in the first year may be carried over to the taxpayer’s federal returns for each of the fifteen succeeding years.\textsuperscript{75} If an individual taxpayer is a rancher or farmer, the total amount of the deduction cannot exceed 100\% of the taxpayer’s contribution base,\textsuperscript{76} and again any excess value of the easement not claimed in the first year may be carried over to the taxpayer’s fifteen subsequent tax returns.\textsuperscript{77} If the property in question appreciated during the period in which the taxpayer owned it, lower percentages of the taxpayer’s contribution basis would apply.\textsuperscript{78}

For a corporation (other than a farmer or rancher), the total amount of the deduction in general cannot exceed 10\% of the corporation’s taxable income for the year,\textsuperscript{79} and for a farmer or rancher, the total amount of the deduction cannot exceed 100\% of the farmer or rancher’s taxable income for the year.\textsuperscript{80} For any type of corporate taxpayer, any excess value of the easement not claimed in the first year may be carried over to the corporation’s fifteen subsequent tax returns.\textsuperscript{81}

While the fifteen-year carryover provision in the IRC suggests that many taxpayers ultimately can deduct 100\% of the value of a conservation easement on their federal income tax return, it should be kept in mind that the deduction still only

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\textsuperscript{72} 26 U.S.C. § 6662.
\textsuperscript{73} 26 U.S.C. § 170(b)(1)(E)(i).
\textsuperscript{74} 26 U.S.C. § 170(b)(1)(E)(i).
\textsuperscript{77} Id.
\textsuperscript{78} Conservation Easement Audit Techniques Guide, supra note 67, at 35–36.
\textsuperscript{79} 26 U.S.C. § 170(b)(2)(D).
reduces the taxpayer’s taxes by an amount equal to the value of the easement multiplied by the taxpayer’s tax rate. For example, assuming that the total value of a conservation easement was $100,000, that the taxpayer was able to deduct that total value over a number of years, and that the taxpayer’s tax rate was 20%, the taxpayer’s taxes would only have been reduced by $20,000. Several U.S. states today provide a tax credit, rather than a tax deduction, for a conservation easement, and as discussed further below in Section VII, the U.S. Congress may need to provide a tax credit for 100% of the value of the conservation easement (100% of the value of the taxpayer’s fossil fuel operation) to entice fossil fuel owners to grant conservation easements in which they agree not to extract, refine, sell or distribute those fuels. In addition, while a taxpayer in the U.S. can itemize the taxpayer’s deductions and take advantage of the IRC Section 170(h) conservation easement charitable deduction provision to maintain the land as a carbon sink today, the U.S. Congress would have to amend the IRC to allow a tax deduction or credit specifically for an agreement not to extract, refine, sell, or distribute fossil fuels owned by the taxpayer. At the same time, such legislation should not face significant opposition.

82. State Tax Credits for Donation of a Conservation Easement, LAND CONSERVATION ASSISTANCE NETWORK, https://www.landcan.org/article/state-tax-credits-for-donation-of-a-conservation-easement/1616 (last visited June 18, 2021). Most such states impose a significant cap on such a credit, but several states permit the taxpayer to transfer his or her credit to another taxpayer. Id. For example, Colorado provides a tax credit of 50% of the first $100,000 of the value of the conservation easement, and then 50% of the remainder of the value, up to a cap of $1.5 million. Russell Shay, State Land Conservation Tax Incentives as of April, 2019, LAND TR. ALL., http://s3.amazonaws.com/landtrustalliance.org/State-Land-Conservation-Tax-Incentives-April-2019.pdf (last visited June 18, 2021). Georgia provides a tax credit of 25% of the value of the donation up to a maximum of $250,000. Id. New Mexico provides a tax credit of 50% of the value of a conservation easement donation, up to a cap of $250,000 per year, for a total of 20 years. Id. All three of these tax credits are transferable, i.e., they can be sold to other taxpayers. Id.

83. See infra text accompanying notes 233–38.


85. See, e.g., Devon Ryan, New Analysis Suggests Ways for Landowners to Limit Fracking and Mineral Extraction Without Regulations, STAN. NEWS (Feb. 1, 2017), https://news.stanford.edu/2017/02/01/stanford-analysis-suggests-ways-landowners-limit-fracking-mineral-extraction-without-regulations/ (“For states where [mineral estate conservation easement (MECEs)] might not be legally supported, the analysis proposes amendments to state laws and the Internal Revenue Code that would allow MECEs to reach parity with the current use of conservation easements and be eligible for tax deductions.”).
because a conservation easement is voluntary, and the income tax laws in a few states already provide for a deduction or credit for conservation easements.

The specific amendments to the IRC that I propose the U.S. Congress adopt to implement the conservation easements advocated for in this article are discussed below, in Section VI.

III. PROPERTY LAW FRAMEWORK

Most nations around the world recognize private property ownership, and most economists and development experts agree that private property regimes experience greater economic growth than communal property regimes. Most property law scholars likewise agree that a private property regime is preferable to a common property regime in general. What distinguishes most property law scholars around the world is whether they maintain that the private property rights that are recognized today are “natural” and “morally-justified” or, in contrast, are utilitarian in nature, meaning that they are “a mere artifact – a human invention, a social institution.”

86. See id. (“A conservation easement is a contract (usually between a landowner and a land trust) whereby a landowner voluntarily agrees to sell or donate the right to use a piece of property in a certain way, commonly agreeing not to develop it.”).

87. Legislation in Alaska, Louisiana, Oklahoma, Texas, North Dakota, Pennsylvania, West Virginia, and Wyoming already provides for a deduction or a credit for such a conservation easement. Ryan, supra note 85.


property law scholars around the world today subscribe to the utilitarian theory of property rights.\(^93\)

Those utilitarian scholars who more specifically believe that the primary purpose of property rights is to “enhance social welfare by maximizing the value of scarce resources” or distributing scarce resources as efficiently as possible are adherents of the economic theory of property rights.\(^94\) Efficiency here means “Pareto efficiency,” named after the Italian economist and engineer Vilfredo Pareto, meaning that no change to the distribution scheme can be made to make anyone better off without making someone else worse off.\(^95\) In the economic theory of property rights, “[p]roperty rights are thought to perform this value-maximizing function by ‘internalizing externalities’... i.e., bringing the costs of the resource’s use to bear on the user.”\(^96\) As indicated above, this statement is referring to a negative externality, which is a cost of a use imposed on others for which the user does not have to pay.\(^97\) A positive externality is a benefit of a use bestowed on others for which the user is not paid.\(^98\) This paper addresses how the Paris Agreement parties could increase the chance that they achieve the goal of the Paris Agreement to limit the increase in the average global temperature to 2°C Celsius and preferably 1.5° Celsius and thereby slow global warming, through the lens of the economic theory of property rights.

Climate change, of course, is caused by damage to a very unusual type of property—the earth’s atmosphere—which, as stated above, is a natural resource that is owned by all of humanity.\(^99\) Some would go so far as to argue that the

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93. Id. at 36; see, e.g., Richard A. Epstein, The Utilitarian Foundations of Natural Law, 12 HARV. J.L. & PUB. POL’Y 711, 714 (1989).
94. DUKEMINIER ET AL., supra note 92, at 35.
96. DUKEMINIER ET AL., supra note 92, at 36.
97. See, e.g., Externalities, supra note 45.
98. Id.
99. Some writers argue that the earth’s atmosphere is not part of the “common heritage of mankind” (CHM) which all nations have explicitly agreed to protect. See, e.g., United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 3; Declaration on the Responsibilities of the Present Generations Towards Future Generations, (Nov. 12, 1997) United Nations Educational, Scientific and Cultural Organization. arts. 4, 8. The CHM as a principle in international law is most “commonly attributed to then-Maltese Ambassador Arvid Pardo who stated in a memorandum dated 17 August 1967...
atmosphere is not actually property at all, as no one has the right to exclude anyone else from utilizing it. As a commonly-owned natural resource, it is subject to the economic phenomenon known as “the tragedy of the commons,” which is most associated with Garrett Hardin, who popularized this phenomenon in his 1968 essay of the same name. By this phrase, Hardin (and others before him) meant that, with a communally-owned natural resource, each individual will use the resource as much as possible because the costs that he or she imposes will be spread across all users, and ultimately, as a result, the commonly-owned natural resource typically is ruined. Again, in the economics field, those costs which a user imposes on others but for which the user does not have to pay are referred to as “negative externalities.”

Hardin posited that the tragedy of the commons can be averted in only one of two different ways: adoption of “private property, or something formally like it,” or “mutual coercion, mutually agreed upon.” Hardin’s proposition that a commonly-owned natural resource could be protected through adoption of “private property, or something formally like it” is to the U.N. Secretary General that ‘the time has come to declare the seabed and the ocean-floor a common heritage of mankind.” Seokwoo Lee & Jeong Woo Kim, Applying the Principle of the Common Heritage of Mankind: An East-Asian Perspective, in GLOBAL COMMONS AND THE LAW OF THE SEA (Kenuuan Zou, ed., 2018). Given the linkage of the CHM with the seabed and ocean floor, it is not clear that all nations would consider the earth’s atmosphere to be part of the CHM. Id.; The Common Heritage of Mankind and Four Other Problem Areas, UNITED NATIONS UNIV. (Dec. 30, 2020), https://archive.unu.edu/unupress/unupbooks/uu15oe/uu15oe0q.htm. Some writers have argued that the earth’s atmosphere is a part of the CHM. See, e.g., Prue Taylor, An ECOLOGICAL APPROACH TO INTERNATIONAL LAW: RESPONDING TO CHALLENGES OF CLIMATE CHANGE 275 (1998). In any case, the earth’s atmosphere unquestionably is a commonly-owned natural resource, as it is not the private property of any single human being, group of human beings, or country, and, in the Paris Agreement, the nations of the world recognized that they must work together to protect this resource. Paris Agreement, supra note 30, arts. 3, 4. For this reason, protecting the world’s atmosphere is considered at least a “common concern of humankind.” See, e.g., Nico Schrijver, Managing the Global Commons: Common Good or Common Sink?, 37(7) THIRD WORLD Q. 1252, 1263 (2016), https://doi.org/10.1080/01436597.2016.1154441.

100. Krier, supra note 90, at 591 n.8.
102. Id. at 1244.
103. Id.
104. Id. at 1245, 1247.
105. Id.
supported by the Coase theorem in economics, named after Ronald Coase, who first posited it in 1960. The Coase theorem maintains that the parties involved in a dispute over use of a resource will be able to bargain to an efficient outcome, regardless of which party is awarded the property rights, if there is a competitive economy with complete information, zero transaction costs, and a clear definition of property rights. Coase’s theorem is especially widely applied to activities (such as the emission of greenhouse gases) that impose a negative externality on others.

Land use law, environmental law, and the major international agreements on climate change are all based to an extent on Hardin’s and Coase’s theories. For example, once the parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed that people around the globe are entitled to an atmosphere that does not cause severe effects due to global warming, the developed countries to date are largely responsible for greenhouse gas emissions and hence global warming, and the developing countries to date have suffered the most severe effects of global warming, the parties could then establish the Green Climate Fund (funded by the developed countries for the developing countries to use to reduce their greenhouse gas emissions and adjust to climate change) and negotiate the Paris Agreement, in accordance with Coase’s

107. Id. at 8.
theorem. Furthermore, given that the Paris Agreement parties were unwilling to adopt a system of “mutual coercion,” each party instead agreed to publish non-binding, evolving “nationally determined [greenhouse gas reduction] contributions” (NDCs) and utilize a wide range of public and “private property” or marketing measures to meet those NDCs, in accordance with Hardin’s theory. The Paris Agreement parties, through their NDCs, have agreed how the burden of decreasing greenhouse emissions and slowing global warming should be distributed.

Unfortunately, to date, the global climate change agreements have failed to slow global warming. An economic analysis of how the parties may increase the likelihood of achieving the goal of the Paris Agreement involves determining how the parties can decrease their greenhouse gas emissions at the lowest possible cost. As mentioned above, this article more specifically considers whether the execution of conservation easements in which fossil fuel owners agree not to extract, refine, sell, or distribute their fuels could be an economically efficient method of slowing global warming.

IV. THE SCIENCE OF CLIMATE CHANGE

“Climate change” refers to any long-term change in weather patterns, and global warming “is the long-term heating of Earth’s climate system . . . due to human activities, primarily fossil fuel burning . . . .” However, as the biggest change in our weather patterns for a number of years has been caused by global warming, climate scientists and the public often use the terms “climate change” and “global warming”

111. Pindyck, supra note 108.
113. Paris Agreement, supra note 30, at art. 4.
114. Infra text accompanying note 407.
115. Supra text accompanying note 95.
117. NASA JET PROPULSION LAB, supra note 116.
interchangeably. Accordingly, in this paper, the terms are used interchangeably as well.

Global warming is caused by a great increase in the concentration of greenhouse gases in the earth’s atmosphere. Greenhouse gases are “those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, the atmosphere, and clouds.” The greenhouse gases cause global warming by reflecting back to the earth energy from the sun which has bounced off of the earth, just as a giant greenhouse surrounding the globe would do (and hence these gases have come to be referred to as “greenhouse gases”).

The major greenhouse gases are water vapor, carbon dioxide (CO$_2$), methane (CH$_4$), nitrous oxide (N$_2$O), and various fluorinated gases (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF$_6$), and nitrogen trifluoride (NF$_3$)). Some of these gases are naturally present in the earth’s atmosphere. For example, human beings breathe in oxygen and expel CO$_2$, and cows and other large livestock expel significant amounts of methane. However, humans have significantly increased the emissions of these natural greenhouse gases. Furthermore, the fluorinated gases are

118. Id.; DAVIDSUZUKI.ORG, supra note 116.
123. Id.
126. Global Climate Change, supra note 121.
manmade. In sum, since the commencement of the Industrial Revolution in the 1750's, there has been a significant increase in the concentration of greenhouse gases in the atmosphere, and the rate of this increase has itself increased exponentially in recent decades.

For example, the rate of growth of CO₂, the gas responsible for 81% of the increased warming of the earth’s atmosphere, “averaged about 1.6 ppm per year in the 1980s and 1.5 ppm per year in the 1990s . . . ” Then, the mean growth rate increased to 2.3 ppm per year on average from 2009 to 2018, and in 2018, carbon dioxide increased by 2.5 ppm. The concentration of methane in the atmosphere has also been accelerating. For example, it increased 50% between 2007 and 2013. Climate scientists have warned for years that there likely will be a tipping point, “when the planet reaches a threshold of irreversible climate change and the worse effects—extreme drought, sea level rise, monster wildfires and hurricanes—become not the exception but the norm[.]” and they estimate today that this tipping point could be reached by 2030 in general and may have already been reached with respect to some aspects of global warming. When a tipping point has been reached, scientists maintain, the earth’s ability to absorb additional CO₂ will decline, “creating a destructive land-atmosphere feedback loop that could dramatically accelerate the worst effects of global warming.”

127. Denchak, supra note 122.
129. Id.
130. Id.
131. Id.
132. Id.
134. Id.
136. Hahn, supra note 133.
In sum, climate scientists have concluded that the buildup of greenhouse gases in the earth’s atmosphere is primarily caused by man, and, in particular, is primarily caused by (1) man’s burning of fossil fuels, including coal, gasoline, and oil, which releases CO\(_2\); and (2) man’s destruction or dissipation of many of the natural carbon sinks that exist around the world. Again, a “carbon sink” is an area, such as an ocean or a forest, that absorbs more CO\(_2\) than it emits.

V. SUCCESSES AND FAILURES OF INTERNATIONAL AGREEMENTS REGARDING CLIMATE CHANGE

The first major multilateral agreement regarding climate change was the U.N. General Assembly’s endorsement of the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organization (WMO) and the U.N. Environment Program (UNEP). The WMO and the UNEP established the IPCC in 1988, and the U.N. General Assembly endorsed this joint action in the same year. The IPCC is completely apolitical and exists solely to provide the U.N. members with accurate information regarding the causes and effects of climate change and suggest methods of adaptation and mitigation. It produces regular reports, referred to as “Assessments,” but it does not conduct its own research. Rather, it synthesizes data and reports produced by scientists all around the world regarding numerous aspects of climate

137. See, e.g., Causes of Climate Change, supra note 23 (“Humans are increasingly influencing the climate and the earth’s temperature by burning fossil fuels, cutting down forests and farming livestock.”).


141. The Intergovernmental Panel on Climate Change, IPCC, https://www.ipcc.ch/ (last visited Nov. 26, 2020); History of the IPCC, IPCC, https://www.ipcc.ch/about/history/#:~:text=The%20establishment%20of%20the%20IPCC,UN%20General%20Assembly%20in%201988.&text=Since%201988%2C%20the%20IPCC%20has%20produced%20worldwide (last visited Nov. 26, 2020).

142. Id.

143. Id.
change. Although the IPCC is sometimes criticized as not being alarmist enough, the IPCC is considered the most credible authority on the science of climate change. At present, the IPCC is working on its Sixth Assessment Report, which will be released in 2022.

Shortly after the establishment of the IPCC in 1988, the UNFCCC was adopted at U.N. headquarters in New York on May 9, 1992. President George H.W. Bush (Sr.) signed the UNFCCC on behalf of the U.S. at the Earth Summit held in Rio De Janeiro in June of 1992, and the U.S. Senate then ratified the UNFCCC on October 15, 1992. The UNFCCC entered into force on March 21, 1994. As its name suggests, this Convention essentially provides a framework through which the international community can continue to negotiate multilateral agreements designed to remediate climate change. Both the Kyoto Protocol on Climate Change and the Paris Agreement were negotiated under the auspices of the UNFCCC.
Convention remains operational today, and it currently has 197 parties.\(^\text{155}\)

The first agreement negotiated under the UCFCCC was the Kyoto Protocol to the United Nations Framework Convention on Climate Change (Kyoto Protocol), which was adopted on December 10, 1997, and entered into force in 2005.\(^\text{156}\) On behalf of the United States, U.S. Ambassador to the U.N. Peter Burleigh signed the Kyoto Protocol on December 11, 1998,\(^\text{157}\) but because it was never ratified by the U.S. Senate, the United States was not a party to the Kyoto Protocol.\(^\text{158}\) In addition, Canada withdrew from the Kyoto Protocol on December 12, 2011, stating that the Protocol’s “goals were unworkable because the United States and China never agreed to Kyoto . . .”;\(^\text{159}\) and the United States and China were the two largest emitters of greenhouse gases by 2018.\(^\text{160}\)

Under the Kyoto Protocol, the thirty-eight most developed nations, as well as the European Union (together known as the Annex 1 Parties) initially made commitments to reduce their greenhouse gas emissions by 5% below their 1990 levels during the 2009 to 2012 time period.\(^\text{161}\) Developing countries (at the time, including China and India) were encouraged to reduce their greenhouse gas emissions but were not obligated to do so.\(^\text{162}\) Theoretically, the developed nations’ commitments were legally binding, but if one of these nations failed to meet its stated greenhouse gas emission commitment, it was granted 100 days to fix or “true up” the situation,\(^\text{163}\) and it could do so by acquiring emission reduction credits through three different market mechanisms or investing in various land use, land use change, and forestry (LULUCF) projects (essentially designed to

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155. Sixth Assessment Report, supra note 147.
158. U.N. Status Report on the Kyoto Protocol, supra note 156.
159. Id.
162. Id.
The three market mechanisms are the Clean Development Mechanism (investing in a carbon emission reduction project in a developing country), Joint Implementation (entering into an agreement with a group of parties which, when combined, met their overall commitments), and Emissions Trading. Moreover, if a nation was still non-compliant at the end of that 100-day period, it was simply required to add its shortfall during the 2009 to 2012 compliance period to its new commitment for the second compliance Kyoto Protocol period of 2013 to 2020, plus commit to an additional 30% reduction in greenhouse gas emissions during that second period. Such a noncompliant party furthermore was required to submit a compliance action plan and its eligibility to make transfers under Emissions Trading was suspended until it was once again in compliance with its commitment.

As the environmental lawyer for ClientEarth, Josh Roberts, stated when Canada withdrew from the Kyoto Protocol, the Kyoto Protocol had “very few teeth beyond international diplomatic censure.”

If one assesses the success of the Kyoto Protocol based solely on whether the remaining thirty-six developed parties (following the United States’ failure to ratify the Protocol and Canada’s withdrawal from it) met their greenhouse gas emission reduction commitments, the Protocol was an unmitigated success. All thirty-six of these parties met their individual commitments under the Protocol during the 2009 to 2012 period. (Whether these nations met their additional

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164. Id.; see also Leggett, supra note 154, at 5.
165. The Clean Development Mechanism, UNITED NATIONS CLIMATE CHANGE, https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism (last visited Dec. 14, 2020) (“Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of [CO2], which can be counted towards meeting Kyoto targets.”).
166. Leggett, supra note 154, at 5.
170. See, e.g., Alan Martin, Climate Change: Figures Show Kyoto Protocol Was a Success – Or Do They?, ALPHR (June 15, 2016), https://www.alphr.com
greenhouse gas emission reduction commitments with respect to the 2013 to 2020 period has not yet been assessed.) To be sure, these nations are to be congratulated for having met their initial commitments under the Kyoto Protocol, and their 100% compliance rate suggests that international peer pressure can be an effective mode of enforcement. Still, if one measures the success of the Kyoto Protocol based on whether it actually slowed global warming, there is little to celebrate. To begin with, nine of the thirty-six remaining developed parties to the Kyoto Protocol actually met their commitments only by purchasing the right to emit more CO<sub>2</sub> from nations that were not emitting as much. In addition, the most severe economic recession since the 1930s occurred during 2008 to 2012, and experts estimate that carbon emissions during these years were one to two gigatons lower than they otherwise would have been as a result. Most important, most nations in the world (including the United States and Canada) did not reduce their greenhouse gas emissions during the 2009 to 2012 period, despite the recession in effect during those years, and global greenhouse gas emissions, in fact, rose significantly during those years.

As indicated above by Canada’s spokesperson at the time Canada withdrew from the Kyoto Protocol, the major flaw in the Kyoto Protocol was that it did not require most nations in the world, including the major greenhouse gas-emitting nations such as China and India, to make greenhouse gas emission reduction commitments. The continued warming of the earth simply cannot be halted or slowed until all or at least most nations on earth significantly reduce their greenhouse gas emissions.

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171. Leggett, supra note 154, at 5 (discussing these nations’ progress toward their contributions as of November 2018).
172. Martin, supra note 170.
173. Id.
174. Id.
emissions. In addition, those nations which had been required under the Protocol to reduce their greenhouse gas emissions understandably felt that the Protocol unfairly placed the burden of solving the climate change crisis solely on them. While negotiating a second round of Kyoto Protocol commitments for the 2013 to 2020 period, Australia, Japan, and a few other parties proposed the adoption of an agreement that included commitments on the same terms from all parties to the Protocol. This then led to a mandate, negotiated in 2011 in Durban, South Africa, to develop a protocol or legal instrument under the UNFCCC applicable to all participant nations no later than 2015. This mandate resulted in the adoption of the Paris Agreement.

The Paris Agreement was the second major agreement negotiated under the UNFCCC. It was adopted at the twenty-first session of the Conference of the Parties (COP) to the UNFCCC, opened for signature on April 22, 2016, and entered into force on November 4, 2016. At present, there are 192 parties to the Paris Agreement, constituting almost the entire 193 members of the United Nations. The U.S. signed the Paris Agreement on April 22, 2016, and it accepted the Agreement by Executive Order on September 3, 2016, but former U.S. President Trump officially withdrew the U.S. from the Paris Agreement and that withdrawal became effective as of

177. See, e.g., Global Climate Change Regime, COUNCIL ON FOREIGN RELS. (June 19, 2013), https://www.cfr.org/report/global-climate-change-regime (“Fifteen to twenty countries are responsible for roughly 75 percent of global emissions, but no one country accounts for more than about 26 percent. Efforts to cut emissions—mitigation—must therefore be global.” (emphasis in original)).

178. See, e.g., Martin, supra note 170 (“George W. Bush stated that ‘I’m not going to let the U.S. carry the burden for cleaning up the world’s air, like the Kyoto treaty would have done’ . . .”).

179. Leggett, supra note 154, at 5.

180. Id.

181. Id.

182. Id.


184. Id.


November 4, 2020. Then, U.S. President Joe Biden, shortly after his election, announced that the U.S. was rejoining the Paris Agreement.

The overall goal of the Paris Agreement is to “[h]old[] the increase in the global average temperature to well below 2°Celsius above pre-industrial levels and pursue[e] efforts to limit the temperature increase to 1.5°Celsius above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.” If the nations of the world do not make any effort to reduce their greenhouse gas emissions, the average global temperature is expected to rise between 3° and 5° Celsius above pre-industrial levels by the end of the century with catastrophic results. A subsidiary goal of the Paris Agreement is to achieve net zero emissions by mid-century (2050) by balancing anthropogenic greenhouse gas emissions against removals of greenhouse gases from the atmosphere.

In order to achieve these goals, each party, prior to convening in Paris in 2015, was encouraged to publish its intended individual greenhouse gas emission reduction contribution or “Intended Nationally Determined Contribution” (INDC). When each party formally joined the Paris Agreement through ratification or accession, its INDC was treated as its initial “Nationally Determined Contribution” or NDC, unless it had altered its INDC prior to its accession to, or ratification of, the Paris Agreement. Each party has furthermore agreed to communicate a second, more aggressive NDC by 2020 and at least every five years thereafter. Of course, a party may adjust...

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187. See id. at n.4.
189. Paris Agreement, supra note 30, art. 2.1(a), at 3.
191. See Paris Agreement, supra note 30, art. 4.1, at 4.
193. See Paris Climate Agreement Q&A, supra note 192.
194. Paris Agreement, supra note 30, arts. 4.3, 4.9, at 4–5.
its existing NDC at any time “with a view to enhancing its level of ambition.”\textsuperscript{195} No party is required to commit to any particular greenhouse gas emission reduction level,\textsuperscript{196} but every party agrees to communicate each of its NDCs to the other parties and allow a panel of experts to review and comment on them.\textsuperscript{197} Furthermore, the Conference of the Parties to the UNFCCC is committed to undertake a “Global Stocktake” in 2023 and every five years thereafter to assess overall progress toward the Paris Agreement’s goals.\textsuperscript{198} 

All of the NDCs which the parties have submitted to date are maintained by the Secretariat of the UNFCCC and can be accessed there.\textsuperscript{199} For example, in its initial NDC, the EU (including at that time the United Kingdom of Great Britain and Northern Ireland) committed to reduce greenhouse gas emissions by at least 40\% compared to 1990 by 2030.\textsuperscript{200} In an updated NDC submitted on December 17, 2020, the EU committed to reduce its greenhouse gas emissions by 55\% compared to 1990 by 2030.\textsuperscript{201} Furthermore, on December 11, 2020, the United Kingdom of Great Britain and Northern Ireland (the UK) submitted a NDC just for the UK, in which it stipulated that “the UK is committing to reduce economy-wide greenhouse gas emissions by at least 68\% by 2030, compared to

\textsuperscript{195} Paris Agreement, supra note 30, art. 4.11, at 5.
\textsuperscript{197} Paris Agreement, supra note 30, arts. 4.2, 4.8, 4.9, 13.7(b), 13.11, at 4–5, 17–18; see also PARIS AGREEMENT SUMMARY, supra note 196, at 3–4.
\textsuperscript{198} Paris Agreement, supra note 30, arts. 1, 14.1, 14.2, at 3, 18–19.
\textsuperscript{199} Id., art. 4.12, at 5. See generally INDCs as Communicated by Parties, UNFCCC, https://www4.unfccc.int/sites/submissions/INDC/Submission%20Pages/submissions.aspx (last visited Oct. 28, 2021) (UNFCCC Secretariat’s registry of parties’ INDC submissions).
\textsuperscript{201} GERMANY & EUROPEAN COMM’N, UPDATE OF THE NDC OF THE EUROPEAN UNION AND ITS MEMBER STATES 6 ¶ 27 (Dec. 17, 2020), https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Sweden%20First/EU_NDC_Submission_December%202020.pdf.
1990 levels." This is a significant increase in the commitment of the UK compared to when it was a member of the EU, and the UK is the seventeenth largest emitter of greenhouse gases. Angola, in its first NDC, stated that it “plans to reduce GHG emissions up to 35% unconditionally by 2030 as compared to the Business As Usual (BAU) scenario (base year 2005). In addition, it is expected that through a conditional mitigation scenario the country could reduce an additional 15% below BAU emission levels by 2030.” In an updated first NDC submitted on May 30, 2021, Angola then committed to achieve a 14% reduction in greenhouse gas emissions (unconditionally) by 2025.

When the U.S. initially joined the Paris Agreement, its first NDC provided that “the United States intends to achieve an economy-wide target of reducing its greenhouse emissions by 26-28 per cent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%.” Then, when the U.S. rejoined the Paris Agreement on February 19, 2021, it submitted an updated first NDC, which stated that it was “setting an economy-wide target of reducing its net greenhouse gas emissions by 50-52 percent below 2005 levels in 2030.”


203. See Climate Action: Paris Agreement, supra note 200.


205. REPUBLIC OF ANGOLA, INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) OF THE REPUBLIC OF ANGOLA 4 (Nov. 2015), https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Angola%20First/INDC%20Angola%20deposito.pdf (emphasis omitted).

206. REPUBLIC OF ANGOLA, NATIONALLY DETERMINED CONTRIBUTION OF ANGOLA 9 (May 2021), https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Angola%20First/NDC%20Angola.pdf.


209. UNITED STATES OF AMERICA, THE UNITED STATES OF AMERICA NATIONALLY DETERMINED CONTRIBUTION: REDUCING GREENHOUSE GASES IN THE UNITED STATES: A 2030 EMISSIONS TARGET 1 (2021), https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/United%20States%20of%20America%20First/United%20States%20NDC%20April%202021%202021%20Final.pdf (emphasis omitted).
The Paris Agreement was an extraordinary achievement in that almost every nation on earth joined the Agreement and each of those nations committed to reducing its greenhouse gas emissions.\textsuperscript{210} Further cause for celebration was the developed nations’ agreement to continue to fund a “Green Climate Fund” (GCF) in the amount of at least $100 billion annually by 2020, to assist the developing and least developed nations to reduce their own greenhouse gas emissions and adapt to climate change (which disproportionately affects these nations).\textsuperscript{211} In essence, the developed nations agreed that they owed these funds to the developing nations as it was the developed nations’ economic development activities, especially their reliance on fossil fuels, that was primarily responsible for global warming to date.\textsuperscript{212} The developing nations, for their part, agreed to use the GCF “reparation funds” to wean themselves from fossil fuels, follow a more sustainable economic development model, and adapt to climate change.\textsuperscript{213} This funding commitment was critical to consummation of the Paris Agreement.\textsuperscript{214} As indicated above, the establishment of the GCF is an example of the above-mentioned Coase theorem in action: once the global community agreed that the developing nations had a property right to a

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clean atmosphere and that furthermore the developed nations had violated that right, the parties could negotiate a payment from the developed nations to the developing nations to rectify this property right violation.215

The Paris Agreement is a groundbreaking agreement that has the potential to solve the global warming crisis,216 and arguably it is premature to assess the success of the Paris Agreement as the UNFCCC won’t complete its first “Global Stocktake” of greenhouse gas emissions until 2023.217 However, climate scientists have warned that aggregation of all of the parties’ initial NDC ambitions would need to be tripled to prevent the average global temperature from exceeding 2° Celsius above the pre-industrial average global temperature and would need to be increased fivefold to prevent the average global temperature from exceeding 1.5° Celsius.218 In other words, the average global temperature is predicted to rise between 2.9° Celsius and 3.4° Celsius above the pre-industrial average global temperature even if all of the Paris Agreement parties meet their stated NDCs.219 In addition, numerous authorities have reported that the great majority of Paris Agreement parties are

215. Pindyck, supra note 108, at 345.
failing to meet even their very modest NDCs. In short, the Paris Agreement is doomed to fail unless the parties, especially the biggest greenhouse gas emitters, establish and adhere to much more aggressive NDCs within just the next few years. Specifically, according to climate scientists, the parties must reduce their greenhouse gas emissions by at least 45% as compared to 2010 emission levels by 2030, less than eight short years from now, if they want to have a realistic chance of meeting the temperature goals stated in the Paris Agreement.

Unfortunately, as of late October 2021, only thirteen parties to the Paris Agreement had submitted their second NDC, which was due in 2020. These countries are Argentina, Bhutan, Gambia, Grenada, Marshall Islands, Nepal, Oman, Papua New Guinea, Samoa, South Sudan, Suriname, Tonga, and United

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220. See, e.g., Leahy, supra note 218; Nsikan Akpan, Only 2 Countries Are Meeting Their Climate Pledges. Here’s How the 10 Worst Could Improve, PBS (Sept. 26, 2019), https://www.pbs.org/newshour/science/only-2-countries-are-meeting-their-climate-pledges-heres-how-the-10-worst-could-improve. Furthermore, experts predict that the average global temperature will rise more than 4°C Celsius above the pre-industrial average global temperature if nations ignore their Paris Agreement commitments and continue to increase their greenhouse gas emissions. See National Climate Action, supra note 219; Carmen Singer et al., The 7 Countries Actually Living Up to the Paris Climate Agreement, GLOBAL CITIZEN (Oct. 12, 2018), https://www.globalcitizen.org/en/content/7-countries-paris-climate-agreement/.


223. NDC Registry, UNFCCC, https://www4.unfccc.int/sites/ndcstaging/Pages/Home.aspx (last visited Oct. 29, 2021) ("13 Parties have submitted their second NDCs.").
Arab Emirates, and none of the thirteen is in the group of the top ten emitters of carbon dioxide (based on 2018 data). Not surprisingly, greenhouse gas emissions have continued to increase, rather than decrease, since the 2015 adoption of the Paris Agreement.

To be sure, the U.S.’ rejoining of the Paris Agreement in 2021 as well as the distribution of vaccines throughout the world to protect against the COVID-19 pandemic are likely to reenergize the Paris Agreement parties and cause them to focus more on their commitments to reduce greenhouse gas emissions. In addition, the twenty-sixth Conference of Parties (COP) of the UNFCCC, which was rescheduled from November 2020 to November 2021 because of the COVID-19 crisis, 229  

224. NDC Registry (Interim), UNFCCC, https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx (last visited Oct. 29, 2021) (listing all parties’ first and, where applicable, second NDCs).


should encourage the parties to negotiate much more aggressive
second NDCs. Still, if global warming was a crisis in 2015, it
is an impending catastrophe today.

Bold, innovative approaches must be employed by the Paris
Agreement parties to assist them to reduce their greenhouse gas
emissions. The remainder of this paper proposes one such
approach.

VI. PROPOSED AMENDMENTS TO THE IRC

This short section describes the specific amendments to
Section 170 of the IRC that I propose the U.S. Congress adopt.
As indicated above, I recommend that Section 170 of the IRC be
amended to permit an owner of fossil fuels to take a credit on the
owner’s federal tax return for the entire value of his or her
current fossil fuel operation, in the event that the owner grants
a conservation easement prohibiting any further extraction,
refinement, sale or distribution of those fuels. At present, the
IRC does not even permit an owner of fossil fuels to take a
deduction on the owner’s federal tax return for the value of his
or her fossil fuel operation, should the owner grant such a
conservation easement. I am proposing that a fossil fuel owner

Glasgow Climate Change Conference – October-November 2021, UNFCCC,
https://unfccc.int/conference/glasgow-climate-change-conference-october-

231. See COP26 Postponed, supra note 230; John F. Kerry, U.S. Special
Presidential Envoy for Climate, Transcript of Remarks to UNA-USA’s Global
Engagement Summit, Marking the United States Rejoining the Paris Agreement
2021-02-19/transcript-of-remarks-una-usa%E2%80%99s-global-engagement-
summit-marking-the-united-states-rejoining-the-paris-agreement-qa (stating
that, at the COP26 in Glasgow in November 2021, “all nations must raise our
sights, must raise ambition together”).


233. See supra text accompanying notes 82–87.

and environmental law professors at the University of Buffalo and University
of California at Los Angeles have advocated for fossil fuel owners to grant
conservation easements prohibiting fracking (otherwise known as hydraulic
fracturing) and other subsurface activities on their land and they have dubbed
such conservation easements “mineral estate conservation easements”
(MECEs). Robert B. Jackson et al., Mineral Estate Conservation Easements: A
New Policy Instrument to Address Hydraulic Fracturing and Resource
Extraction, 47 ENV’T L. REP. 10112, 10113–15 (2017). They furthermore have
proposed that the IRC (and state income tax laws, if necessary) be amended to
recognize a MECE as a conservation easement. Id. at 10119–20; see also Devon
Ryan, New Analysis Suggests Ways for Landowners to Limit Fracking
and Mineral Extraction Without Regulations, STANFORD U. NEWS (Feb. 1, 201
who grants such a conservation easement be entitled to take a credit, rather than a deduction, because the economic analysis below demonstrates that paying fossil fuel owners for the full value of their operations is economically efficient, most fossil fuel owners probably would not grant such a conservation easement simply for a deduction of the value of their operation on their federal tax return, and society desperately needs these owners to close their operations.

As Subsection “a” of Section 170 of the IRC is entitled “Allowance of Deduction,” it most likely would be easiest for the U.S. Congress to amend Section 170 as advocated here by adding a new subsection “r” to Section 170 of the IRC entitled “Allowance of Credit.” As in the case of a conservation easement generally, the value of any fossil fuel owner’s operation should be valued at the time that the deed of easement is recorded and all relevant information should be considered in the determination of that value. Although such conservation easements would be voluntary, it would behoove any fossil fuel owner to grant such an easement sooner rather than later, as the value of any owner’s operation can be expected to decline in the future. As the value of some such operations could be very high, the U.S. Congress could provide that the credit is limited


235. Several states already permit a taxpayer to take a credit, rather than a deduction, on the taxpayer’s state income tax return for the value of an approved conservation easement, although many such states impose an upper limit on the credit that can be claimed. See Land Trust Alliance, State Tax Credits for Donation of a Conservation Easement, LAND CONSERVATION ASSISTANCE NETWORK, https://www.landcan.org/article/state-tax-credits-for-donation-of-a-conservation-easement/1616 (last visited Oct. 29, 2021) (discussing various state tax code provisions that permit a taxpayer to take a credit for donation of a conservation easement).

236. See infra text accompanying notes 350–406.

237. See supra text accompanying notes 66–71.

to a stated amount on the owner’s tax return for any particular year but could be carried over on future tax returns for a stated number of years until the full credit has been claimed. Section 170 of the IRC already establishes such yearly limits for conservation easement deductions and provides in general for the value of a conservation easement to be carried over on future tax returns for up to fifteen years.  

The U.S. Congress in this new subsection of Section 170 of the IRC should provide that any such credit is conditioned on the taxpayer’s agreement that any further federal or state subsidies promoting the use of the taxpayer’s fossil fuels will cease. To be sure, a fossil fuel owner’s use of state or federal subsidies to exploit the owner’s fuels would violate the terms of such a conservation easement in any case. However, to avoid confusion on this point, it would be best to explicitly state that a fossil fuel owner that grants such a conservation easement and claims the credit proposed here forfeits the right to receive any further state or federal subsidies intended to promote the exploitation of the taxpayer’s fossil fuels.  

Furthermore, the amendment to Section 170 of the IRC should include a rigorous program of monitoring and enforcement by the Internal Revenue Service (IRS) together with the owners of such conservation easements (the land trust or government agency receiving the easement in each case). The new conservation easements proposed in this article cannot assist in the critically important goal of slowing global warming if the easements are not enforced. To date, violations of a conservation easement by the landowner that granted the easement have been rare, but they do occur.  

In addition, a conservation easement owner (again, the land trust or government agency entrusted to enforce the easement) occasionally has knowingly permitted the conservation easement to be violated.  

Given the fossil fuel industry's

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239. See supra text accompanying notes 73–81.


241. E.g., Randy Schultz, Water District Gets Tough on All the Wrong People, S. Fla. SUN SENTINEL (Dec. 13, 2016), https://www.sun-sentinel.com/opinion/fl-rsscol-water-district-20161213-story.html (explaining that although sale of acreage in Palm Beach Agricultural Preserve to GL Homes initially would be subject to a conservation easement restricting it to agricultural use, a majority
tremendous political power today,\textsuperscript{242} it is not difficult to imagine a situation in which a fossil fuel owner grants a conservation easement agreeing not to extract, refine, sell, or distribute the owner’s fossil fuels, receives a full credit for the value of the owner’s fossil fuel operation on the owner’s federal tax return, and then somehow continues to exploit those fossil fuels.

If a violation of such a conservation easement is established, the IRS, of course, could obtain back taxes\textsuperscript{243} and possibly penalties\textsuperscript{244} from the fossil fuel owner/taxpayer. In addition, judges in at least some state courts possess the power to issue injunctive relief and award damages for breach of a conservation easement.\textsuperscript{245} The final recommended amendment to Section 170 of the IRC is that it include a requirement that a fossil fuel owner must agree, in the easement agreement, that a proper remedy for the owner’s violation of the easement would be to transfer ownership of the owner’s fossil fuels to the easement owner or another appropriate entity if that easement owner no longer exists, was complicit in the easement violation, or does not possess the capacity to ensure that the fossil fuels will not be extracted, refined, sold, or distributed in the future. As indicated, the fossil fuels should be subject to the same restrictions in the hands of the transferee.\textsuperscript{246} In light of society’s desperate need for such conservation easements and taxpayers’ very generous payment to fossil fuel owners of the full value of their operations pursuant to the amended IRC Section 170 discussed here, the remedies for violations of such easements need to be severe enough to ensure that the great majority of

\vspace{0.3cm}

\textsuperscript{242} See infra text accompanying note 287.

\textsuperscript{243} Conservation Easement Audit Techniques Guide, supra note 67.

\textsuperscript{244} Id.

\textsuperscript{245} Smith, supra note 240, at 605–07.

\textsuperscript{246} Related state legislation may need to be enacted to ensure that civil judges possess the power to transfer title of the fossil fuels in question to the easement owner or other appropriate entity as a remedy for a fossil fuel owner’s violation of the easement terms and provide for third-party enforcement of such a conservation easement when the easement owner is not enforcing the easement. Such legislation, however, is beyond the scope of this article.
fossil fuel owners granting such easements will comply with the terms of their easements.

The next section demonstrates that it would be economically efficient for the U.S. to pay fossil fuel owners the full value of their operations in exchange for their agreement to cease extracting, refining, selling, and distributing their fuels.

VII. ECONOMIC ANALYSIS

A. IT APPEARS THAT THE MOST ECONOMICALLY EFFICIENT METHOD OF SLOWING GLOBAL WARMING IS TO LEAVE FOSSIL FUELS IN THE GROUND.

As stated above, Garrett Hardin, the author of The Tragedy of the Commons, concluded that, in order to save a commonly-owned natural resource such as the world’s atmosphere, a government must either embrace “mutual coercion, mutually agreed upon” or employ “private property, or something formally like it.”247 If a government could impose “mutual coercion, mutually agreed upon,” it should order that fossil fuels stay in the ground, as that can be the most economically efficient method of slowing climate change.248 This conclusion is based, at least in part, on the common-sense notion that “prevention is better than the cure.” In other words, if a society pays to keep fossil fuels in the ground and therefore no carbon dioxide is emitted in the first place, it does not need to pay the much higher costs of remediating local air pollution and slowing global warming that are imposed by the burning of fossil fuels. The adage “prevention is better than the cure” is generally attributable to the Dutch philosopher Desiderius Erasmus in approximately 1500249 and is applicable in many contexts.250 For

247. Hardin, supra note 101, at 1245, 1247.
250. See, e.g., Leszek Borysiewicz, Prevention Is Better Than Cure, 9 CLINICAL MED. 572 (2009) (preventing acquisition of an illness through vaccination); Amer Ridzuan, Prevention is Better Than Cure (MUET ESSAY), AMERZING (Aug. 4, 2017), https://ameridzuan.blogspot.com/2017/08/prevention-is-better-than-cure-muet.html (healthy living to prevent illness, safe driving to
example, one of the main rationales for implementation of a national health care system is that generally it is much less expensive to ensure that an individual does not contract a particular illness in the first place than it is to treat that person in the emergency room of a hospital or cure the person of that illness.\footnote{251}

However, today neither the Paris Agreement coalition of parties nor the U.S. as an individual country is able to impose “mutual coercion, mutually agreed upon” to slow global warming.\footnote{252} In the U.S., states and local governments possess the primary authority to regulate land use,\footnote{253} and there are states (e.g., California) that have implemented various innovative and aggressive measures to reduce greenhouse gas emissions\footnote{254} and conceivably could ban the exploration and extraction of fossil fuels within their territories. Unfortunately, other states that possess large stores of fossil fuels appear to have very little interest in reducing their production of fossil fuels and would be very unlikely to prohibit the exploration and extraction of fossil fuels in their territories within the next several years.\footnote{255} The U.S. Congress, pursuant to the Commerce Clause of the U.S. Constitution,\footnote{256} and primarily through the Environmental Protection Agency which Congress endorsed,\footnote{257} can and does regulate carbon dioxide emissions throughout the


\footnote{252} See Melissa Denchak, \textit{Paris Climate Agreement: Everything You Need to Know}, NRDC (Feb. 19, 2021), https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know (pointing out that emissions reductions targets and financial contributions goals have no enforcement mechanisms to compel countries to comply with the targets).


\footnote{254} See, \textit{e.g.}, \textit{Climate Change}, \textsc{Cal. Air Res. Bd.}, https://ww2.arb.ca.gov/our-work/topics/climate-change (last visited Oct. 29, 2021) (detailing the work of the California Air Resources Board in response to climate change).

\footnote{255} See \textit{Major Fossil Fuel-Producing States Rely Heavily on Severance Taxes}, \textsc{U.S. Energy Info. Admin.} (Aug. 21, 2015), https://www.eia.gov/todayinenergy/detail.php?id=22612 (showing that states producing fossil fuels rely disproportionately on severance taxes on extracted resources, meaning the states financially benefit from increased extraction).

\footnote{256} U.S. \textsc{Const. art. I, \S\ 8, cl. 3.}

Still, given the fifty-fifty split between Democrats and Republicans in the U.S. Senate today, there is very little chance that the current U.S. Congress would be able to ban the extraction, refinement, sale, and distribution of fossil fuels throughout the U.S.\textsuperscript{259}

Furthermore, just like U.S. states that possess large reserves of fossil fuels tend to promote rather than restrict production of their fossil fuels, none of the Paris Agreement parties that possess large fossil fuel reserves (e.g., Saudi Arabia, India, Venezuela, the Russian Federation, Indonesia, Australia, and Nigeria) made a significant commitment to restrict its supply of fossil fuels in its initial NDC.\textsuperscript{260} For example, India is the only nation in the top ten fossil fuel producers that mentioned restraining the supply of fossil fuels at all\textsuperscript{261} (and that restraint consists solely of a coal tax).\textsuperscript{262} Also, there simply is no international legislature that could prohibit the extraction, refinement, sale, and distribution of fossil fuels around the world.\textsuperscript{263} In addition, China and the Russian Federation almost


\textsuperscript{259} See Coral Davenport, \textit{This Powerful Democrat Linked to Fossil Fuels Will Craft the U.S. Climate Plan}, N.Y. TIMES (Sept. 19, 2021), https://www.nytimes.com/2021/09/19/climate/manchin-climate-biden.html (discussing how Senator Joe Manchin, a West Virginia Democrat with deep ties to coal and natural gas interests, will be the key swing vote on climate legislation and thus sweeping reductions in extraction are extremely unlikely with the current composition of the Senate).


\textsuperscript{261} \textit{Id.} at 11–12, Tbl. 1.

\textsuperscript{262} \textit{Id.} at 11.

certainly would veto any U.N. Security Council action interfering in the affairs of individual nations to slow global warming, including a worldwide ban on the extraction, refinement, sale, and distribution of fossil fuels, unless numerous imminent deaths were threatened in both China and the Russian Federation.\(^{264}\)

Accordingly, per Hardin’s conclusion, both the Paris Agreement coalition and the U.S. must employ “private property” concepts, or, in other words, private market mechanisms, to slow global warming.\(^{265}\) In this context, “[m]arket-based environmental policies work by creating an incentive to reduce or eliminate emissions,”\(^{266}\) primarily by affecting the demand or supply (and therefore the price) of a particular fossil fuel or alternative energy source.\(^{267}\) Figure 1 below demonstrates how price and demand for gasoline are inversely related.\(^{268}\) In other words, it shows that, “as [the] price of [gasoline] rises, quantity demanded decreases, and vice versa. These points are then graphed, and the line connecting them is the demand curve (D).”\(^{269}\) The provision of subsidies for the production or use of alternative energy forms, the imposition of a carbon tax, the implementation of a cap-and-trade program (which serves the same function as a carbon tax), and conservation easements preserving carbon sinks and prohibiting

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\(^{264}\) See Ed King, China and Russia Block UN Security Council Climate Change Action, CLIMATE HOME NEWS (Feb. 18, 2013), https://www.climatechangenews.com/2013/02/18/china-and-russia-block-un-security-council-climate-change-action/ (showing that China and Russia have used their seats on the UN Security Council to block climate action in the past and will likely do so again).

\(^{265}\) See Hardin, supra note 101, at 1245, 1247.

\(^{266}\) Janet Peace & Jason Ye, Market Mechanisms: Options for Climate Policy, CTR. FOR CLIMATE ENERGY SOLs., at 1, 2 (Apr. 2020).


\(^{269}\) Id.
the extraction of fossil fuels are all examples of such private market measures.\textsuperscript{270}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Relationship between the Demand and Price of Oil.\textsuperscript{271}}
\end{figure}

However, in any coalition of governments where some have committed to reducing CO\textsubscript{2} emissions and some have not, if an individual government reduces its consumption of fossil fuels (i.e., pursues demand-side policies), the coalition price of fossil fuels will decline and those members of the coalition that have not committed to reduce CO\textsubscript{2} emissions will simply consume more fossil fuels.\textsuperscript{272} In economics terminology, this is known as

\begin{itemize}
\item \textsuperscript{270} See, e.g., RAMSEUR & PARKER, supra note 267, at 2 (comparing the market mechanisms of a carbon tax and a cap-and-trade program); NAT'L ACAD. OF ENG'G ET AL., THE POWER OF RENEWABLES: OPPORTUNITIES AND CHALLENGES FOR CHINA AND THE UNITED STATES 8 (2010) (“The most prominent national policy approach for renewable energy in both China and the United States has been price support, both direct and indirect. U.S. subsidies have been primarily in the form of tax breaks for producers and consumers, and have been effective in driving specific market and technology development.”).
\item \textsuperscript{272} Harstad 2012, supra note 248, at 78.
\end{itemize}
“carbon leakage,” and Figure 2 below demonstrates this phenomenon.

Alternatively, if an individual government in such a coalition reduces its supply of fossil fuels (i.e., pursues supply-side policies), the coalition price will increase and fossil fuel producers that have not committed to reduce CO\textsubscript{2} emissions will simply produce more fossil fuels. This is known as “supply-side leakage,” and Figure 3 below demonstrates this phenomenon.

![Figure 2: Demand-side leakage](image)

- Reduction in local consumption causes the price to decline.
- Price decline leads to increase in fossil fuel consumption in other coalition members (particularly if demand function is "flat").

**FIGURE 2: DEMAND-SIDE LEAKAGE**

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273. *Id.* (citing the IPCC’s definition of carbon leakage as “the increase in CO\textsubscript{2} emissions outside the countries taking domestic mitigation action divided by the reduction in the emissions of these countries”).


276. *See id.*


278. *Id.* at 7 (figure has a few adjustments approved by Harstad).
Therefore, both the Paris Agreement coalition and the U.S. should, at a minimum, pursue both demand-side policies and supply-side policies to balance demand-side leakage and supply-side leakage. Furthermore, they should do whatever they can to keep fossil fuels in the ground, as doing so can be the most economically efficient strategy for slowing global warming.

Unfortunately, most climate change agreements among nations, including the Paris Agreement, and most individual governments promote demand-side climate policies. In other words, they generally encourage imposing limits on greenhouse gas emissions (e.g., through a carbon tax or a cap-and-trade program) rather than imposing limits on greenhouse gas production. As saturation of the atmosphere with CO₂ is the ultimate cause of global warming, national policymakers logically may conclude that fossil fuel consumption is the

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279. Id. at 8.
283. See Harstad 2012, supra note 248, at 77–79 (discussing the prevalence of demand-side climate policies and the issues that arise from them).
“problem” that needs to be attacked. In addition, lawmakers may find it much more difficult to adopt supply-side policies and directly attack a few fossil fuel producers than to adopt demand-side policies and ask the much larger group of consumers to reduce their consumption of fossil fuels. This is especially the case, given that many governments rely on fossil fuel profits as an important component of their own coffers and fossil fuel producers tend to be very powerful politically. This does not bode well for the battle against global warming.

Again, the Paris Agreement is a tremendous success in that it includes almost the entire community of nations in one, all-encompassing climate change agreement. Also, as mentioned above, the Paris Agreement arguably is an example of Coase's

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284. See Lazarus et al., supra note 282, at 3 (stating that the “combustion of fossil fuels is by far the largest human source of global greenhouse gas emissions” and laying out some of the ways that policymakers are attempting to lessen the amount of fossil fuel consumption).

285. Id. at 4, 7 (stating that supply-side climate policies are less common for three general reasons: 1) the greater political attractiveness of demand as compared with supply measures; 2) standard GHG accounting rules that undervalue supply-side relative to demand-side measures; and 3) common perceptions of the nature of fuel markets,” and discussing how supply-side policies “target a narrower set of actors”).


287. Lazarus et al., supra note 282, at 4 ("[D]irectly addressing fossil fuel production, by taxing or reducing such activities, could be expected to engender strong opposition from powerful coal, oil and gas interests."); Samantha Gross, Why Are Fossil Fuels so Hard to Quit, BROOKINGS INST. (June 2020), https://www.brookings.edu/essay/why-are-fossil-fuels-so-hard-to-quit/ (stating that “fossil fuel companies are politically powerful” and discussing the challenges of moving away from reliance on fossil fuels).


That is, once the international community agreed that: (1) everyone deserves to live in a world where the average global temperature is limited to a 2°C Celsius increase, and preferably a 1.5°C Celsius increase, (2) the developed countries owe the developing countries damages for past greenhouse gas emissions, and (3) the developing countries would utilize their “damage awards” to reduce their own greenhouse emissions and adjust to the effects of climate change, the Paris Agreement parties could proceed to commit to attempting to achieve that temperature goal and each party could commit to an initial NDC. Still, it is very clear in 2022 that the Paris Agreement is not working to slow global warming. As stated above, to reach the more modest goal of preventing the increase in the average global temperature from rising above 2°C, the Paris Agreement parties’ initial NDCs would need to be tripled, and most of the parties are not even reaching their very modest initial NDCs.

In 2012, prior to the international community’s negotiation of the Paris Agreement in 2015, Bård Harstad, a Norwegian economist who teaches at the University of Oslo, published a research article which analyzed the possibility that a climate coalition could adopt supply-side policies and specifically “buy . . . [fossil fuel] deposits and conserve them.” Naturally, Harstad pointed out, the coalition should purchase deposits based on their price, starting with the least expensive deposits, or those that are marginally profitable to exploit. Importantly, it is exactly these marginally profitable deposits that will be exploited if and only if the fossil fuel price is high, that will generate the supply-side leakage discussed above. When these deposits are locked, the hazard of “supply-side leakage” is reduced, and the coalition can then safely restrict its own
production of fossil fuels without engendering supply-side leakage.\textsuperscript{298}

In addition to eliminating supply-side leakage, he noted that such purchases of fossil fuel deposits have two additional advantages.\textsuperscript{299} First, he explained, in such a situation, coalition members could \textit{exclusively} implement supply-side measures and avoid implementing demand-side policies that would (in contrast to the supply-side policies) lead to leakage.\textsuperscript{300} Second, he noted, eliminating supply-side leakage would cause the price of fossil fuels to rise to a high level, which in turn would make needed investments in green technologies (including both alternative energy technologies and carbon capture technologies) much more attractive.\textsuperscript{301} In sum, Harstad concluded, the coalition’s purchase and preservation of fossil fuel deposits can be the most economically efficient method of slowing global warming.\textsuperscript{302}

Below, Figure 4 demonstrates the market for the purchase of fossil fuel deposits around the world,\textsuperscript{303} and Figure 5 demonstrates secondary effects of the coalition purchasing fossil fuel deposits.\textsuperscript{304}

\begin{itemize}
  \item \textsuperscript{298} Id.
  \item \textsuperscript{299} Id. at 79, 93, 106; Harstad, Financial Times, \textit{supra} note 248.
  \item \textsuperscript{300} Harstad 2012, \textit{supra} note 248, at 79, 93, 106.
  \item \textsuperscript{301} Harstad, Financial Times, \textit{supra} note 248; see also Harstad 2012, \textit{supra} note 248, at 79 (explaining that when the implementation of supply-side policies equalizes consumption prices across countries, investments in technology will become more efficient).
  \item \textsuperscript{302} Harstad 2012, \textit{supra} note 248, at 77; Harstad, Financial Times, \textit{supra} note 248.
  \item \textsuperscript{303} Harstad Presentation, \textit{supra} note 274, at 11.
  \item \textsuperscript{304} Id. at 12.
\end{itemize}
In this same paper, Harstad explained that a similar “leakage” problem occurred regarding the deforestation of tropical forests around the world. That is, to preserve carbon sinks, one could boycott timber logged in tropical forests, but that would just cause the timber price to fall and those not
participating in the boycott would be able to purchase more timber from those forests. Therefore, the international community has learned that, to forestall destruction of those forests, “it is more effective to acquire the land or pay certain countries directly for reducing deforestation.” The Reducing Emissions from Deforestation and Forest Degradation (REDD) program is dedicated to obtaining and distributing funds for this specific purpose today.

Harstad received the very prestigious biannual “Erik Kempe prize” for the best paper in the field of environmental and resource economics for his 2012 paper. Naturally, his 2012 paper built on the work of other economists, including Peter Bohm. In recent years, more and more economists have demonstrated the economic advantages of supply-side climate policies that keep fossil fuels in the ground. In addition, some

308. Id.
312. See Peter Bohm, Incomplete International Cooperation to Reduce CO₂ Emissions: Alternative Policies, 24 J. ENV’T ECON. & MGMT. 258 (1993) (discussing “a policy where the price reductions from reduced fuel demand are neutralized by fuel-deposit purchases or leases by signatory countries or an international organization acting on their behalf”).
have demonstrated the political advantages of supply-side climate policies.\textsuperscript{314} Many environmentalists have long advocated that governments adopt supply-side climate change policies and restrict or ban further extraction of fossil fuels.\textsuperscript{315} Now, they can rely on very reputable economists to support their argument.\textsuperscript{316}

Harstad’s purchase proposal is essentially equivalent to advocating that the Paris Agreement coalition enter into conservation easements with nations that possess large fossil fuel deposits.\textsuperscript{317} Not surprisingly then, Harstad endorsed former Ecuadorian President Correa’s proposed conservation easement for Ecuador’s Yasuní National Park.\textsuperscript{318} Specifically, Harstad stated, “[t]he Yasuní-ITT Initiative seems to be a good example of what may constitute an efficient climate policy . . . . There exists no better climate policy than not drilling.”\textsuperscript{319}

\textsuperscript{314} See, e.g., Green & Denniss, \textit{supra} note 313, at 79–84.
\textsuperscript{315} See, e.g., David Roberts, \textit{It’s Time to Think Seriously About Cutting Off the Supply of Fossil Fuels}, \textsc{Vox} (May 31, 2018), https://www.vox.com/energy-and-environment/2018/4/317187606/fossil-fuel-supply (“Policies that choke off fossil fuels at their origin . . . have been embraced by climate activists, picking up steam with the Keystone pipeline protests and the recent direct action of the Valve Turners.”) (emphasis omitted)); \textit{Keep It in the Ground}, \\textsc{Ctr. for Biological Diversity}, https://www.biologicaldiversity.org/campaigns/keep_it_in_the_ground/ (last visited Oct. 29, 2021) (“[O]ur climate can’t afford any new fossil fuel development. That’s why, since 2015, the Center has campaigned to \textit{keep it in the ground} — to stop the expansion of oil, gas and coal development on public lands and oceans by halting new leasing and permitting.”); Julian Spector, \textit{To Fight Climate Change, We Need To Go Beyond Burying Fossil Fuels}, \textsc{Bloomberg} (Feb. 9, 2016), https://www.bloomberg.com/news/articles/2016-02-09/environmentalists-must-go-beyond-keep-it-in-the-ground-to-fight-climate-change (“The explicit language of ‘keep it in the ground’ appears in a letter written by 400 green advocates . . . . A bill with that name sits in the U.S. Senate . . . . The websites of leading environmental groups like the Sierra Club and Greenpeace proclaim \textit{Keep It in the Ground as a top priority for fighting climate change}.”).

\textsuperscript{316} See \textit{supra} text accompanying notes 248–315.
\textsuperscript{317} See Harstad 2012, \textit{supra} note 248, at 83.
\textsuperscript{318} Stover, \textit{supra} note 21.
\textsuperscript{319} Id.
Of course, even with the adoption of aggressive conservation easement programs aimed at shutting down the fossil fuel industry around the world or within the U.S., some fossil fuel production would continue, as a conservation easement program is voluntary. Hence, it would be logical for the Paris Agreement coalition or the U.S. to also pursue conservation easement programs aimed at preserving carbon sinks. As prohibiting the extraction or refinement of fossil fuels can be the most efficient method of slowing global warming, however, this article focuses on conservation easements prohibiting the extraction, refinement, sale, and distribution of fossil fuels. It also focuses primarily on the situation in the U.S., which, as a federal system, constitutes a coalition of governments, like the Paris Agreement coalition, in which some of the governments are attempting to reduce CO₂ emissions and slow global warming and some are not.

B. IT IS ECONOMICALLY EFFICIENT FOR THE U.S. GOVERNMENT TO PAY U.S. FOSSIL FUEL OWNERS NOT TO EXTRACT THEIR FOSSIL FUELS.

As stated above, the U.S. is a coalition of governments, some of which are attempting to reduce CO₂ emissions and slow global warming and some are not. Hence, when considering the U.S. as an independent entity, the most economically efficient

320. See, e.g., Phil Willon, Must Reads: Will Newsom End Drilling in California? Many Environmentalists Are Betting Yes, L.A. TIMES (Apr. 23, 2019), https://www.latimes.com/politics/la-pol-ca-gavin-newsom-fracking-oil-drilling-ban-20190423-story.html (noting that California Democratic Governor Gavin Newsom recognized that, “despite his strong support for putting California on a path to a 100% renewable energy supply, it would be unrealistic to think that California can just stop its dependence on oil and gas”); see also supra note 63 and accompanying text.


323. See supra note 322 and accompanying text.
method for the U.S. to pursue to slow global warming likewise can be to keep fossil fuels in the ground.\footnote{324}{See Harstad 2012, supra note 248, at 77; Harstad, Financial Times, supra note 248.}

Due to the large political support for the fossil fuel industry in several U.S. states which possess significant quantities of fossil fuels, the strong support for the fossil fuel industry in the U.S. Congress, and the heavy subsidization of the fossil fuel industry in the U.S., it is very unlikely that the federal or any state government would simply ban or materially restrict the extraction, refinement, sale, or distribution of fossil fuels within the next few years.\footnote{325}{This is true regardless of whether a government would be willing to compensate the fossil fuel owners for that action. At the same time, as discussed above, the U.S. Congress could implement a voluntary conservation easement program as a method for keeping much of U.S. fossil fuel reserves in the ground,\footnote{327}{See supra text accompanying notes 233–46. Of course, as Harstad explained so well, if the U.S. is the only fossil fuel-producing country that restricts fossil fuel extraction through a conservation easement program, then the other fossil-fuel-producing nations around the world will simply increase their own extractions of fossil fuels. Harstad 2012, supra note 248, at 78–80. In other words, such a supply-side policy will lead to supply-side carbon leakage. \textit{Id.} at 80. Still, it makes sense for the U.S. to be the early adopter of such a conservation easement program, as such a program appears to be an economically efficient method for combatting climate change in general and the major international climate change agreements emphasize that the “developed country Parties should take the lead in combating climate change.” Torben K. Mideksa, \textit{Leadership and Climate Policy} 1 (Munich Soc’y for the Promotion of Econ. Research, CESifo Working Paper No. 9054, 2021), https://www.cesifo.org/en/publikationen/2021/working-paper/leadership-and-climate-policy (quoting Article 3.1 of the UNFCCC and stating that “[b]oth the Kyoto Protocol and the Paris Agreement encourage the developed countries to take a lead in reducing emissions”).} and the U.S. Government probably would have to pay fossil fuel owners 100\% of the value of their operations for such easements.\footnote{328}{See supra text accompanying note 235.} Accordingly, as discussed above in Section VI of this paper, it is recommended...
that the IRC be amended to provide that fossil fuel owners can be compensated for agreeing not to extract, refine, sell, or distribute their fossil fuels and receive a credit (rather than a deduction) for the full value of their fossil fuel operations.\footnote{329}{See supra text accompanying notes 232–46.}

This section considers whether it would be economically efficient for the U.S. Government to implement such a program of conservation easements within the U.S. territory. In other words, it considers whether the value of U.S. producers’ and refiners’ businesses is lower than the costs imposed on society by the burning of those fossil fuels (assuming, for purposes of this section, that the U.S. can afford to pay that value).

As stated above, in valuing any particular conservation easement being granted to the U.S. Government, the U.S. Government should consider valuations of comparable easements.\footnote{330}{See supra text accompanying notes 69–70.} If there are no sale prices for comparable easements, the easement should be valued as the difference between the value of the taxpayer’s property with the easement and the value of the taxpayer’s property without the easement, taking into account all relevant factors regarding a fossil fuel owner/taxpayer’s operation, including, for example, the type of fossil fuel concerned, the quantity of that fuel, the cost of extracting or refining the fuel, the anticipated sales revenue for that fuel, and the fundamental financials of the operation, including cash flow and debt level.\footnote{331}{See supra text accompanying note 71. The U.S. Government could pay fossil fuel owners something like $5/ton of carbon dioxide emissions avoided, which is what the GCF pays landowners in developing countries who agree to preserve their lands as carbon sinks. See, e.g., Bruno Vander Velde, New Climate Funding Pays to Protect Forests, \textit{Conservation Intl.} (Oct. 4, 2017), https://www.conservation.org/blog/new-climate-funding-pays-to-protect-forests (“Countries can apply to sell verified emissions reductions — each one of them representing 1 ton of avoided carbon dioxide emissions — to the GCF, at a price of US$ 5 per ton.”). However, the value paid for conservation easements granted by fossil fuel owners would need to be high enough to entice the owners to grant such easements, as society needs the owners to stop extracting, refining, selling, and distributing their fossil fuels.} Those individuals or entities whose operations are or would be borderline profitable, especially those who have not yet incurred “sunk capital costs,”\footnote{332}{See \textit{Richard Baron} \& \textit{David Fischer}, OECD, \textit{Divestment and Stranded Assets in the Low-Carbon Transition} 7 n.1, https://www.oecd.org/sd-roundtable/papersandpublications/Divestment%20and%20Stranded%20Assets%20in%20the%20Low-carbon%20Economy%2032nd%20OECD%20RTSD.pdf; Daniel Rosenbloom, Breaking Carbon Lock-In Through...
Conservation easement program, just as Harstad’s above-discussed economic analysis predicts.\textsuperscript{333} It should be emphasized, though, that there is an incentive for all fossil fuel owners to enter into such conservation easements sooner rather than later, as the value of each owner’s fossil fuels is likely to decrease over the next several years, given the local air pollution and CO\textsubscript{2} emissions caused by the burning of those fossil fuels and the consequent unpopularity of those fuels.\textsuperscript{334}

Financial experts reported that, in 2020, the value of that segment of the U.S. fossil fuel industry that explores for, extracts, and refines oil, gas, and coal was approximately $686.83 billion.\textsuperscript{335} The $686.83 billion figure is higher than the...

\textsuperscript{333} See supra text accompanying notes 296–97.

\textsuperscript{334} See, e.g., supra note 238 and accompanying text.

\textsuperscript{335} This figure was calculated by starting with the $4,677.45 billion value figure for the global oil and gas market in 2020. \textit{Global $7425.02 Billion Oil and Gas Markets, 2015-2020, 2020-2025F, 2030F, GLOBEWEWSIRE} (Mar. 4, 2021), https://www.globenewswire.com/news-release/2021/03/04/2187025/0/en/Global-7425-02-Billion-Oil-and-Gas-Markets-2015-2020-2020-2025F-2030F.html#:~:text=filingsmedia%20partners,-Global%20%247425.02%20Billion%20Oil%20and%20Gas%20Markets%2C%202015%20to%202030%2D%20CAGR%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20...
value of only the operations of the producers and the refiners,\textsuperscript{336} but if it is economically efficient for the U.S. Government to pay the $686.83 billion, it is economically efficient to pay the smaller figure for just the producers’ and refiners’ businesses. Alternatively, financial experts project that, in 2021, the value of that segment of the U.S. fossil fuel industry that explores for, extracts, and refines oil, gas, and coal will be approximately $858.4 billion,\textsuperscript{337} and this may be a fairer figure to utilize for the value of the U.S. fossil fuel industry, as the value of the industry was unnaturally suppressed by the COVID-19 virus in 2020.\textsuperscript{338}


\textsuperscript{336} See GLOBENEWSWIRE, \textit{supra} note 335 (“The oil and gas market consists of sales of oil and gas by entities . . . that undertake the exploration for, extraction, drilling, and refining, of oil and gas and some of its derivatives.”).

\textsuperscript{337} This figure was calculated by multiplying the 2021 global oil and gas industry value of $5,870.13 billion by 19% to determine the 2021 value for the North American oil and gas industry value of $1,115.33 billion. GLOBENEWSWIRE, \textit{supra} note 335. Then, the $1,115.33 billion figure was multiplied by 75%, to determine the U.S. oil and gas industry value of $836.5 billion, as the U.S. constitutes 75% of the North American oil and gas industry. \textit{Supra} note 335. Then, the 2020 value for the U.S. coal industry was multiplied by 7.8%, as financial experts project that the U.S. coal industry will produce 7.8% more coal in 2021 than it did in 2020. Tyler Godwin, \textit{US 2021 Coal Production Estimated to Rise 7.8\% on Year: EIA}, S&P GLOB. (Mar. 9, 2021), https://www.spglobal.com/platts/es/market-insights/latest-news/coal/030921-us-2021-coal-production-estimated-to-rise-78-on-year-eia. Finally, the U.S. oil and gas value figure for 2021 was added to the U.S. coal value figure for 2021, for a total of $858.4 billion.

Again, the 2021 figure of $858.4 billion is higher than the value of only the operations of the producers and the refiners, but if it is economically efficient for the U.S. Government to pay the $858.4 billion figure, it is economically efficient to pay the smaller amount for just the producers’ and refiners’ businesses.

One accepted method of valuing a business is to multiply a recent annual profit figure (or, sometimes, a recent figure for “Earnings Before Interest, Taxes, Depreciation, and Amortization” or “EBITDA”) by the appropriate number of years. The appropriate multiplier varies widely depending on the industry or company, from one times the profit level for “a small, personal service business where the new owner will be the only, or one of the only, professional service providers,” to eight to ten times the profit level for “[a]n extremely well-established and steady business with a rock-solid market position, whose continued earnings will not be dependent upon a strong management team.” For “middle-market companies with sales of several million dollars up to several hundred million dollars, . . . assuming modest growth of low to high single digits, a common fair valuation range is five to seven times EBITDA.” Most U.S. fossil fuel owners probably fit into this last category.

As illustrated below in Figure 7, the annual profits of the entire U.S. fossil fuel industry in 2017 were approximately $120.7 billion, and five times that figure is $603.5 billion and seven times that figure is $844.9 billion. Once again, this profit figure is larger than just the profit figure for the producers and refiners, but if it is economically efficient for the U.S.

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339. See supra text accompanying notes 335–37.


342. Id.


344. See infra text accompanying note 352.
Government to pay the larger amount for the entire industry, it is economically efficient for the U.S. Government to pay the smaller amount for just the producers’ and refiners’ businesses.

The highest valuation of the U.S. fossil fuel industry, based on the above-discussed valuation figures, is $858.4 billion. As demonstrated in Figure 6, the local air pollution and global warming costs imposed on society by the burning of U.S. fossil fuels has steadily increased since 2010 and totaled $454.1 billion in 2017 alone. The 2017 figures for post-tax subsidies (externalities, or, in other words, costs imposed on society by a party that does not pay for those costs) reported in Figure 6 are the most recent figures available for the costs imposed on society by the burning of U.S. fossil fuels. However, such costs have continued to rise after 2017, as the burning of U.S. fossil fuels has continued to increase since 2017, with a possible dip in such costs for 2020 due to the disruption of many fossil fuel business operations by the COVID-19 pandemic.

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<td>164.7</td>
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<td>186.2</td>
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<td>42.1</td>
<td>33.9</td>
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<td>34.7</td>
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<tr>
<td>TOTAL</td>
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<td>558.8</td>
<td>578.5</td>
<td>610</td>
<td>650.1</td>
<td>647.2</td>
<td>672.1</td>
<td>676.6</td>
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FIGURE 6: POST-TAX SUBSIDIES PROVIDED TO THE U.S. FOSSIL FUEL INDUSTRY (U.S. $ BILLIONS)

345. See Externalities, supra note 45.
347. Le et al., supra note 46.
Rounding the industry valuation up to $1 trillion and using the 2017 figure of $454.1 billion for the local air pollution and global warming costs imposed on society in 2017, it clearly would be economically efficient for the U.S. Government to pay the $1 trillion in value for the U.S. fossil fuel industry to avoid such costs, as such costs would total $1 trillion in only 2.2 years.

The fact that it would be economically efficient for the U.S. Government to pay the producers and refiners not to extract, refine, sell or distribute their fossil fuels may be easier to comprehend by considering the relevant figures for just one year, given that a multiple of annual profits or EBITDA is an acceptable method of valuing a business or industry. 348 That is, if the costs imposed by the burning of U.S. fossil fuels in a particular year exceed the entire industry’s profits for that year, that also would suggest that it would be economically efficient for the U.S. Government to pay the producers and refiners not to extract, refine, sell, or distribute their fossil fuels. The year 2017 is utilized in this analysis, as 2017 figures are available for both U.S. fossil fuel industry profits and the post-tax subsidies provided to the industry. As explained further below, pre-tax subsidies for 2015 to 2016 are used as a proxy for pre-tax subsidies for 2017, as 2017 pre-tax subsidy figures are unavailable and the 2017 figures would be even higher than the 2016 figures. 349 Pre-tax subsidies are all subsidies except for externalities, 350 or, in other words, costs imposed by a party that are not paid by that party. 351

As Figure 7 reveals, profits for the entire U.S. fossil fuel industry in 2017 were approximately $120.7 billion. 352

348. Laidre, supra note 340; Patel, supra note 340.
349. See infra text accompanying note 357.
350. See Coady et al., supra note 44, at 7–8.
351. See Externalities, supra note 45.
352. The profit figures reported in Figure 7 were calculated based on a reported $257 billion in profits for the fossil fuel industry in North America in 2014 (the height of the industry). $257 Billion, OIL CHANGE INT’L (May 2015), http://priceofoil.org/profits-oil-gas-coal-companies-operating-u-s-canada/ [hereinafter Profits for Oil, Gas & Coal]; Lorne Stockman, Newsletter: Despite Falling Prices North America’s Fossil Fuel Sector Makes Healthy Profits, OIL CHANGE INT’L (May 5, 2015), http://priceofoil.org/2015/05/05/despite-falling-prices-north-americas-fossil-fuel-sector-makes-healthy-profits/ (clarifying that the above-referenced Oil Change International article was reporting on profits for all of North America, not just the U.S. and Canada). As the U.S. constitutes 75% of the North American fossil fuel industry, supra note 335, this $257 billion figure for 2014 was multiplied by 75% to obtain the profit figure of $192.8 billion.
The profit level for just the producers and refiners would be lower than this figure. However, if the costs imposed by the burning of fossil fuels in 2017 exceed the entire industry’s profits for 2017, those costs certainly would exceed the profits of just the producers and refiners in 2017. In addition, all the costs imposed by local air pollution and global warming resulting from the burning of U.S. fossil fuels in 2017 should be attributed to the producers and refiners.

In contrast, as Figure 6 reveals, global warming and health care costs attributable to local air pollution created by the burning of U.S. fossil fuels in 2017 were $212 billion and $242.1 billion, respectively, for a total of $454.1 billion. Just comparing the $454.1 billion annual cost to the $120.7 billion annual profit for the entire industry demonstrates that it would be economically efficient for the U.S. Government to pay producers and refiners the value of their businesses, in exchange

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353. Profits for Oil, Gas & Coal, supra note 352.
354. Le et al., supra note 46; Coady et al., supra note 44.
for their promises not to extract, refine, sell, or distribute any further fossil fuels.\textsuperscript{355}

To add insult to injury, much of the industry’s profits of approximately $120.7 billion for 2017 would disappear in the absence of the substantial pre-tax subsidies that the U.S. federal and state governments provided to producers and consumers in 2017.\textsuperscript{356} The pre-tax subsidy figures for 2015 to 2016 that are reported in Figure 8 are the most recent pre-tax subsidy figures available. Because the 2017 pre-tax subsidy figures would be even higher due to the Trump Administration significantly increasing pre-tax subsidies to the fossil fuel industry,\textsuperscript{357} the 2015 to 2016 figures are used as a proxy for 2017 figures. The definition of the term “subsidy” used in this paper is the definition used by the Organization for Economic Cooperation and Development (OECD) and the World Trade Organization (WTO), which is “any government action that lowers the cost of production, lowers the cost of consumption, or raises the price received by producers.”\textsuperscript{358}

\textsuperscript{355} See Joseph E. Aldy, Professor of the Practice of Pub. Policy, Harvard Kennedy Sch., Statement of Joseph E. Aldy, United States House Committee on Oversight and Reform, Subcommittee on Environment, Hearing on “The Role of Fossil Fuel Subsidies in Preventing Action on the Climate Crisis’’ (Apr. 22, 2021), https://media.rff.org/documents/Joseph_Aldy__Testimony__April_2021.pdf (“To the extent U.S. production subsidies increase hydrocarbon consumption, the adverse public health, climate change, and labor productivity losses from pollution resulting from fossil fuel combustion could exceed the market value of these fuels.”).

\textsuperscript{356} See infra text accompanying notes 358–65.


Conservative estimates of the subsidies that the federal and state governments provided to U.S. fossil fuel producers (on average in 2015 and 2016) are $14.7 billion and $5.8 billion, respectively, for a total of $20.5 billion.359 Consumer subsidies

359. Id. at 5, 10, 21–22, 27, 34, app. I (Appendix I contains complete list of state and federal production subsidies, which relies heavily on the OECD’s database of fossil fuel subsidies around the world); Tom DiChristopher, U.S. Spends $81 Billion a Year to Protect Global Oil Supplies, Report Estimates, CNBC (Sept. 21, 2018), https://www.cnbc.com/2018/09/21/us-spends-81-billion-a-year-to-protect-oil-supplies-report-estimates.html (discussing comprehensive study of U.S. military costs related to fossil fuels conducted by Securing America’s Future Energy (SAFE)).

360. OIL CHANGE INTERNATIONAL 2017, supra note 358, at 5, 10, 16—19, 27, 34. A list of the major tax break programs through which most of the federal producer subsidies are provided can be found on page eleven of the report. A complete list of the specific federal and state production subsidie

s is provided in Appendix I. Several commentators have reported that U.S. governments provide approximately $20 billion per year in subsidies to fossil fuel producers, but most appear to be relying on the Oil Change International 2017 report or the OECD database, upon which the Oil Change International 2017 report heavily relies, for this figure. See Nuccitelli, supra note 357; Fact Sheet, supra note 37. At the same time, this $20 billion annual figure for producer subsidies is not an unusually high figure. In a 2014 study, Oil Change International reported that the federal and state governments provided $21.6 billion in exploration and production subsidies in 2013. SHARUNTA MAHKJANI, OIL CHANGE INT’L, CASHING IN ON ALL OF THE ABOVE: U.S. FOSSIL FUEL PRODUCTION SUBSIDIES UNDER OBAMA 4, 7 (July 2014), http://priceofoil.org/content/uploads/2014/07/OCI_US_FF_Subsidies_Final_Screen.pdf; see also Simon Denyer, Richest Nations Fail To Agree on Deadline To Phase out Fossil Fuel Subsidies, WASH. POST (July 1, 2016), https://www.washingtonpost.com /world/richest-nations-fail-to-agree-on-deadline-to-phase-out-fossil-fuel-subsidies/2016/07/01/7db563f8-42f0-46c8-bea4-2fcf0f48c69_story.html (discussing Oil Change International’s 2014 study). In 2018, the National Resources Defense Council (NRDC) published a study concluding that the federal and state governments provided tax breaks totaling $26 billion and favorable financing totaling $1.4 billion to fossil fuel producers. Han Chen &
Danielle Droitsch, Time for the US to End Fossil Fuel Subsidies, NRDC (June 3, 2018), https://www.nrdc.org/experts/danielle-droitsch/time-us-end-fossil-fuel-
-subsidies; Phil Dziky, Fossil Fuel Subsidies Top $5 Trillion Worldwide, Fair

Another report states that “[o]ther credible estimates of annual United States fossil fuel
subsidies range from $10 billion to $52 billion annually – yet none of these
include[s] costs borne by taxpayers related to the climate, local environmental,
and health impacts of the fossil fuel industry.” Fossil Fuel Subsidies Overview,
30, 2021). The OECD database of fossil fuel subsidies indicates that the U.S.
federal and state governments provided only $6,169,088,982 in subsidies to fossil fuel producers in 2017. OECD Inventory of Support Measures for Fossil
visited Oct. 30, 2021) (select “Budgetary Transfer” or Tax Expenditure” from
the “Mechanism” tab and “Federal” or “Sub” or “Both” from the “Level” tab).
However, the OECD database was not complete, so Oil Change International
supplemented the OECD database in its own 2017 report discussed above. See
OIL CHANGE INTERNATIONAL 2017, supra note 358, at 19 n.64 (“Our state
subsidy estimates benefited from OECD’s 2015 Inventory of Support Measures
for Fossil Fuels. Three state subsidies were directly over from their U.S. fossil
fuel support inventory, which can be found at http://stats.oecd.org/index.aspx?
?DataSetCode=FFS_USA.”); see also Explainer: The Challenge of Defining
Fossil Fuel Subsidies, CARBONBRIEF (June 12, 2017), https://www.carbonbrief
.org/explainer-the-challenge-of-defining-fossil-fuel-subsidies (explaining that
the OECD originally did not track public finance subsidies provided to the fossil
fuel industry); OECD: Fossil Fuel Subsidies Added up to At Least $373bn in
2015, CARBONBRIEF (Feb. 28, 2018), https://www.carbonbrief.org/oecd-
fossil-fuel-subsidies-373-billion-2015. The International Monetary Fund (IMF)
reported that the U.S. provided only $1.09 billion in pre-tax subsidies to its U.S.
fossil fuel industry. Le et al., supra note 46. The IMF states that it based this
figure on the OECD’s Inventory of Support Measures for Fossil Fuels. See
Coady et al., supra note 44, at 16. However, the OECD’s Inventory of Support
Measures for Fossil Fuels reports a much higher figure, as previously noted. An
IMF researcher who worked on the IMF’s report replied to an inquiry regarding
this $1.09 billion figure, confirming that the IMF did not include any U.S.
military costs and stating that perhaps the IMF only reported the subsidies that
the U.S. federal government had to producers (see email from IMF
Researcher Piotr Le to the author, (on file with the Law Review)), but even the
$1.3 billion figure reported by the OECD for producer subsidies provided by the
U.S. federal government is higher than the $1.09 billion figure reported by the
IMF for all pre-tax subsidies. It is possible that the IMF did not include in its
pre-tax subsidy figure any subsidies provided by the U.S. federal or state
governments to the oil industry. See Le et al., supra note 46 (noting that its
$1.09 billion figure comprises $410 million for the coal industry and $670
million for the natural gas industry, implying that no subsidies to the oil
industry were included).

361. OIL CHANGE INTERNATIONAL 2017, supra note 358, at 7, 22 & nn.95–
96 (“U.S. federal and state governments provide an estimated $14.5 billion
annually in consumption subsidies that reduce the cost of fossil fuel energy use
by end-users. This annual estimate combines a federal annual average for 2015
(subsidies provided to consumers to lower their price of fossil fuels) totaled approximately $14.5 billion annually.)
U.S. federal government also provided approximately $2.1 billion per year to assist fossil fuel producers to develop fossil fuel deposits outside of the U.S. in 2015 and 2016.\textsuperscript{362} In addition, the U.S. military incurs costs of approximately $81 billion per year just to secure oil distribution channels around the world.\textsuperscript{363} This is a very conservative figure for U.S. military costs, as it concerns only oil, not gas or coal,\textsuperscript{364} and no alternative fuel industry, like the solar or wind power industries, is provided with a free global security service.\textsuperscript{365} The sum of all of these pre-tax subsidies in 2017 is $118.1 billion, as shown in Figure 8, and the overwhelming majority of these subsidies were provided by the U.S. federal government. Specifically, only the $5.8 billion that states provided to producers and the $2.8 billion that states provided to consumers were not provided by the federal government.\textsuperscript{366} If all of these pre-tax subsidies in 2017, totaling $118.1 billion, are deducted from the industry’s profits of approximately $120.7 billion in 2017, the industry’s 2017 profits decline to only $2.6 billion.

Furthermore, in 2017, U.S. states lost $34.7 billion in sales tax revenue (referred to as “foregone tax revenue” in Figure 6 above) on account of the unnaturally low, subsidized price of fossil fuel.\textsuperscript{367} They also incurred costs of approximately $187.1 billion for traffic jams and vehicle accidents (referred to as “vehicle externalities” in Figure 6 above) that would not have occurred but for that unnaturally low, subsidized fossil fuel price to 2016, including LIHEAP ($3.4 billion) and Highway Trust Fund ($8.3 billion) spending, and state-level totals for 2014 ($2.8 billion), which come from OECD’s state inventory of direct consumer support subsidies.” (footnotes omitted)).

\textsuperscript{362} See id. at 21.


\textsuperscript{364} DiChristopher, supra note 363; see also SecureEnergy, supra note 363.


\textsuperscript{366} OIL CHANGE INTERNATIONAL 2017, supra note 358, at 5, 22.

\textsuperscript{367} See Le et al., supra note 46 (enter “U.S.” and “2017”); Coady et al., supra note 44, at 7, 19–21.
(as drivers would have patronized public transportation more). These last two figures, along with the figures for the CO₂ emissions added to the atmosphere and the healthcare costs incurred due to local air pollution, typically are considered to be “post-tax subsidies,” and they totaled $676.6 billion, as shown in Figure 6 above.

If the post-tax subsidies totaling $676.6 billion for 2017 are added to the pre-tax subsidies of $118.1 billion for 2017, the total of all subsidies is $794.7 billion, and the U.S. fossil fuel industry actually lost $674 billion in 2017. Clearly, the U.S. fossil fuel industry is not pursuing a sustainable business model. No private company would spend $794.7 billion annually to obtain annual profits of only $120.7 billion. And, of course, the U.S. population should not continue to spend $794.7 billion annually so that the U.S. fossil fuel industry by itself can enjoy annual profits of $120.7 billion. To be sure, government entities in the U.S. to date have not spent all of the costs indicated above for the remediation of local air pollution and global warming. Nonetheless, those costs are, in fact, accruing and will have to be paid.

Within the discipline of liberal economics upon which capitalism is based, subsidies are very disfavored. According to the tenets of liberal economics, demand and supply should determine the range of goods and services available in the marketplace, and subsidies cause goods and services to be provided that otherwise would not be provided and take resources away from goods and services that otherwise would be provided. Only when there is a market failure—e.g., an infant

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368. Le et al., supra note 46 (enter “U.S.” and “2017”); Coady et al., supra note 44, at 13–14.
industry that society wants but would fail on its own, or a near-monopolist that is driving out all competitors in an industry—would subsidies be justified.\textsuperscript{373} There is no market failure that would justify the enormous subsidies that governments in the U.S. provide to the fossil fuel industry.\textsuperscript{374} This industry is not an infant industry but rather a very mature one, and it has been receiving enormous subsidies for many years.\textsuperscript{375} At one point, the Organization of Arab Petroleum Exporting Countries (OAPEC) might have been considered at least an oligopolist that the U.S. needed to counter for national security reasons, but the threat of the U.S.' dependence on a foreign source of energy has long since dissipated.\textsuperscript{376} Despite the economic disadvantages of government subsidies, subsidies provided to the fossil fuel industry in the U.S. and throughout the world are enormous.\textsuperscript{377} In fact, the International Monetary Fund estimates that subsidies provided to the fossil fuel industry constitute 85% of all subsidies provided globally.\textsuperscript{378}

For many years now, the enormous subsidies that various U.S. government entities have provided to the U.S. fossil fuel industry have caused all kinds of distortions in the energy marketplace and other harmful results.\textsuperscript{379} In particular,

\begin{itemize}
\item \textsuperscript{373} See id. See generally GENE M. GROSSMAN, PROMOTING NEW INDUSTRIAL ACTIVITIES: A SURVEY OF RECENT ARGUMENTS AND EVIDENCE (1988) (discussing a wide range of market failures that could justify provision of a government subsidy to a particular company or industry).
\item \textsuperscript{374} See Aldy, supra note 355, at 1, 7 (stating that “fossil fuel production subsidies do not correct market failures” and explaining that, to the contrary, such subsidies constitute “a government failure”).
\item \textsuperscript{375} E.g., Fact Sheet, supra note 37, at 1.
\item \textsuperscript{376} See Johannes Urpelainen & Elisha George, Reforming Global Fossil Fuel Subsidies: How the United States Can Restart International Cooperation, BROOKINGS INST. (July 14, 2021), https://www.brookings.edu/research/reforming-global-fossil-fuel-subsidies-how-the-united-states-can-restart-international-cooperation/ (“[S]caling up domestic fossil fuel production was part of the United States’ aggressive push for energy security following the OPEC oil embargo in 1973.”); OECD, FOSSIL FUEL SUPPORT COUNTRY NOTE: UNITED STATES OF AMERICA (June 2020), http://stats.oecd.org/wbos/fileview2.aspx?IDFile=2c7b60cf-dae4-49dd-ac6d-b173bd0a403e (“Exports of crude oil . . . were previously banned until the 40-year-old policy was repealed at the end of 2015.”).
\item \textsuperscript{377} See Fact Sheet, supra note 37, at 2.
\item \textsuperscript{378} Id.
\item \textsuperscript{379} See id. at 1–2; Urpelainen & George, supra note 376; Hans Biebl, Comment, Energy Subsidies, Market Distortion, and a Free Market Alternative, 46 U. MICH. J.L. REFORM CAVEAT 43, 43–44 (2012) (“[M]arket distortions created by fossil fuel subsidies’ have led to inefficient market share ‘allocation within the energy sector.’” (quoting OFFICE OF MGMT. & BUDGET, FISCAL YEAR 2013, CUTS, CONSOLIDATIONS, AND SAVINGS, BUDGET OF THE U.S.)
\end{itemize}
hundreds, if not thousands, of new companies have entered the oil and gas markets in recent years, when neither the U.S. nor the world in general needs any more oil or gas. These companies have helped to further pollute the air in local communities and contribute to global warming through the burning of their oil and gas. In addition, some studies have concluded that approximately one-half of the companies in the U.S. fossil fuel industry would be unprofitable in the absence of the pre-tax subsidies that the federal and state governments are providing to them. Furthermore, the subsidies provided to these companies have made it much more difficult for those same government entities to subsidize the development of alternative energy sources.

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380. See, e.g., Carrington, supra note 313 (“[I]t makes literally no sense for the industry to go hunting for more fossil fuel . . . We’ve binged to the edge of our own destruction.”).

381. See, e.g., id.; David Roberts, Friendly Policies Keep US Oil and Coal Afloat Far More Than We Thought, Vox (July 26, 2018), https://www.vox.com/energy-and-environment/2017/10/6/16428458/us-energy-coal-oil-subsidies (“[T]ax preferences and other subsidies push nearly half of new, yet-to-be-developed oil into profitability. This potentially increases US oil production by almost 17 billion barrels over the next few decades, equivalent to 6 billion tonnes (Gt) of CO2. ’Almost half of the new oil fields getting drilled would have been left alone if not for subsidies.’” (quoting Peter Erickson et al., Effect of Subsidies to Fossil Fuel Companies on United States Crude Oil Production, 2 NATURE ENERGY 891 (2017))).

382. See Bart Hawkins Kreps, Pulling the Plug on Fossil Fuel Production Subsidies, RESILIENCE (Mar. 25, 2019), https://www.resilience.org/stories/2019-03-25/pulling-the-plug-on-fossil-fuel-production-subsidies/ (quoting Erickson et al., supra note 381). Another study identified which specific oil, gas, and coal reserves around the world are already borderline unprofitable even with the enormous subsidies that their owners receive. McGlade & Ekins, supra note 313, at 188–90; see also Carrington, supra note 313 (discussing the McGlade and Ekins study).

383. George Ferns & Marcus Gomes, G7: Why Major Economies Are Delaying a Break with the Fossil Fuel Industry, CONVERSATION (June 10, 2021), https://theconversation.com/g7-why-major-economies-are-delaying-a-break-with-the-fossil-fuel-industry-162281 (“Governmental support for the industry in the form of subsidies or tax breaks artificially inflates the profitability of fossil fuels, in turn making renewables a less attractive investment.”); OCEANA, FACT SHEET: MYTH VS. FACT – OIL & GAS SUBSIDIES 1 (Apr. 5, 2012), https://usa.oceana.org/sites/default/files/MythsFactsheet_JustSubsidies_FINAL_4-5-12.pdf (“[T]he U.S. Government – by eliminating unnecessary subsidies for oil and gas – would be saving on the order of $10 billion per year that could be invested in other national priorities like defense, transportation, or alternative energy. A Congressional Research Service report corroborates these findings.” (footnotes omitted)).
Perhaps best illustrating the perverse nature of the subsidies that the federal and state governments provide to the fossil fuel industry is the fact that these subsidies make the industry as a whole so wealthy that it then can continue to pressure lawmakers into continuing to grant the industry subsidies year after year.\textsuperscript{384} Lobbying and campaign contribution costs are a matter of public record.\textsuperscript{385} For decades, fossil fuel companies have paid hundreds of millions of dollars in lobbying and campaign contribution costs annually to block the U.S. Congress' enactment of any legislation adverse to their interests.\textsuperscript{386} For example, as Figure 9 reveals, in 2018 and 2020 (campaign years), lobbying costs and campaign contributions by the energy/natural resources sector as a whole totaled $250,837,518 in 2018 and $297,803,541 in 2020, with a large majority of those totals coming from oil and gas, natural gas, and coal mining, combined.\textsuperscript{387}

\textsuperscript{384} See infra text accompanying notes 385–80; infra Figure 9.
\textsuperscript{386} See infra text accompanying note 388.
\textsuperscript{387} See id.
As Joseph Aldy stated in his article “Eliminating Fossil Fuel Subsidies,” fossil fuel subsidies “convey billions of dollars of benefits to the firms claiming them without an identifiable benefit for consumers or for the nation’s energy security.” The enormity of the pre-tax and post-tax subsidies provided to the U.S. fossil fuel industry is demonstrated by the fact that it “is more than the country’s defense budget and 10 times the federal

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388. Energy/Natural Resources: Long-Term Contribution Trends, OPENSECRETS, https://www.opensecrets.org/industries/totals.php?cycle=2022&ind=E (last visited Oct. 31, 2021). Considering only campaign contributions, a large majority of campaign contributions by the energy/natural resources sector comes from fossil fuel industries (e.g., oil and gas, natural gas, and coal mining). For example, for 2020 contributions: oil and gas, natural gas, and coal mining combined for a total contribution of approximately $168.2 million of the sector total of $221.1 million. See id. Similarly, for 2018 contributions: oil and gas, natural gas, and coal mining combined for a total contribution of approximately $101.2 million of the sector total of $145.2 million. See id. To see the contribution amount for individual industries within the energy/natural resources sector, choose the specific industry (e.g., “Oil & Gas”) from the “Industries in this Sector:” drop-down list.

spending for education.” And the utter absurdity of the U.S.’ and other countries’ phenomenal subsidization of the fossil fuel industry was succinctly summarized in May 2019 by the U.N. Secretary-General, António Guterres: “What we are doing is using taxpayers’ money – which means our money – to boost hurricanes, to spread droughts, to melt glaciers, to bleach corals. In one [phrase]: to destroy the world.”

For all the above reasons, many economists and environmentalists are steadfastly opposed to the provision of subsidies to the fossil fuel industry. Accordingly, in 2009, former U.S. President Obama, at a meeting of the G20 nations, proposed that the G20 nations end inefficient fossil fuel subsidies. Then, in 2012, President Obama particularly urged the end of subsidies to the oil and gas industries, stating that “[y]ou can keep subsidizing a fossil fuel that’s been getting taxpayer dollars for a century, or you can place your bets on a clean-energy future.” To date, though, very little progress has been made toward fulfilling the goal of ending fossil fuel subsidies. However, at the 2016 G7 meeting, the leaders of the G7 nations urged “all countries to eliminate inefficient subsidies by no later than 2025 and left the door open to an earlier phase-out for some countries.”


394. See OIL CHANGE INT’L, supra note 392 (noting that although the Obama Administration and G20 proposal generated repeated acknowledgement, “it resulted in very limited progress for many years . . . . You can’t really say you’re committed to the fight against climate change if you’re still funding oil, gas, and coal”).

395. Id.
To repeat, the subsidies that various U.S. government entities are providing to the fossil fuel industry are causing terrific economic and environmental harm, and the U.S. has indicated that it will eliminate these subsidies by 2025. Consequently, as stated above, if the current U.S. Congress and other government entities enact any legislation opposed by the fossil fuel industry in the next few years, it most likely will be to abolish or phase out the approximately $118.1 billion in pre-tax subsidies that they are currently providing to the fossil fuel industry.

Again, the important point of this section of the paper is that even if the U.S. federal and state governments cannot force the U.S. fossil fuel industry to internalize the negative externalities that the industry imposes on society (as appears to be the case), the analysis presented above demonstrates that it would, in fact, be economically efficient for the U.S. Government to pay producers and refiners not to extract, refine, sell, or distribute their fossil fuels, through the provision of income tax benefits. This is the case even if the U.S. Government had to pay these owners the full value of their businesses, as the costs of local air pollution and global warming imposed on society each year by the burning of fossil fuels is much higher than their annual profits.

C. THE U.S. GOVERNMENT CAN AFFORD TO PAY PRODUCERS AND REFINERS NOT TO EXTRACT AND REFIN THEIR FOSSIL FUELS.

As stated above, the highest estimate of the value of the entire U.S. fossil fuel industry today is $858.4 billion, or $1 trillion when rounded up. Furthermore, as discussed above, pre-tax subsidies provided to the U.S. fossil fuel industry in 2017 totaled approximately $118.1 billion, and most of these pre-tax subsidies were provided by the federal government. If the U.S. Government were to redirect the $118.1 billion per year in pre-tax subsidies it pays to the U.S. fossil fuel industry to the new conservation easement program, it would take the U.S.}

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396. See, e.g., Le et al., supra note 46 (enter “U.S.” and year desired); Coady et al., supra note 44, passim.
397. OIL CHANGE INT’L, supra note 392.
398. See supra text accompanying notes 366–69.
399. Supra note 337 and accompanying text.
400. See supra text accompanying notes 357–66; supra Fig. 8.
401. Supra note 366 and accompanying text.
Government approximately 8.5 years to pay the $1 trillion figure.\textsuperscript{402}

As discussed above, I recommend that the IRC be amended to provide that an owner of fossil fuels can take a credit (rather than a deduction) for the value of a conservation easement prohibiting extraction or refinement of those fuels.\textsuperscript{403} If the U.S. Government wishes to spread such payments over several years, it could limit the amount a taxpayer can claim for the credit each year and then permit the taxpayer to carry-over any unclaimed value for a specified number of years in the future. There should not be any resistance to adoption of such an annual claim limit and carry-over provision, especially as a carry-over period of fifteen years is already in place for other types of conservation easements.\textsuperscript{404} It is axiomatic that a fossil fuel owner could not receive payment for foregoing extraction or refinement of the owner’s fossil fuels pursuant to a conservation easement and at the same time receive subsidies based on the extraction or refinement of those fossil fuels. Still, as stated above, the IRC could also be explicitly amended to condition the U.S. Government’s payment for a conservation easement granted by a producer or refiner on the cessation of any further government subsidies to that producer or refiner.

For some period of time after the U.S. Government has commenced a conservation easement program, the U.S. federal and state governments could continue to pay consumer subsidies to consumers and producer subsidies to fossil fuel producers and refiners that are not participating in the conservation easement program. However, as the value of fossil fuel deposits decrease in the future\textsuperscript{405} and conservation easement program becomes more popular, it should become easier and easier for the federal and state governments to abolish all producer and consumer subsidies. In short, the U.S. Government can afford to pay producers and refiners not to extract, refine, sell, or distribute

\textsuperscript{402} One trillion U.S. dollars divided by $118.1 billion is 8.467.

\textsuperscript{403} See supra text accompanying notes 232–46.

\textsuperscript{404} See supra text accompanying notes 73–87; see 26 U.S.C. § 170(b)(1)(E)(ii).

\textsuperscript{405} See Carrington, supra note 313 (“Major fossil fuel companies face the risk that significant parts of their reserves will become worthless.”); Adam Barth et al., The Future of Natural Gas in North America, MCKINSEY & CO. (Jan. 6, 2020), https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-future-of-natural-gas-in-north-america# (stating that decarbonization policies and shifting demand for renewable energy are likely to reduce the revenues and profits of natural gas producers).
their fossil fuels. As most pre-tax fossil fuel subsidies are provided by the U.S. Government, the U.S. Government ultimately should be able to pay for the conservation easements proposed in this paper by redirecting the pre-tax subsidies that it currently provides to the fossil fuel industry to the new conservation easement program.

VIII. CONCLUSION

Despite all the international efforts to slow global warming in the last few decades, the last seven years have been the seven hottest years on record, with “2020 tied with 2016 as the warmest year on record, according to an analysis by NASA.” Clearly, we need to take very bold actions now to reverse the perverse death spiral that humankind currently is engaged in with the fossil fuel industry. Furthermore, as Garrett Hardin has advised, we must rely on private market measures to reduce CO₂ emissions and slow global warming, as there does not seem to be any way to force independent nations or individual companies within the U.S. to stop extracting, refining, selling, or distributing fossil fuels.

The specific action considered here—private conservation easements prohibiting the extraction, refinement, sale, and distribution of fossil fuels—certainly is novel and may be distasteful to many. To begin with, the idea that it would ever make sense to pay someone to do nothing is difficult to grasp. However, there is precedent for such payments. For example, in the U.S. and around the world, workers have received incentives not to commute to work during certain hours of the workday, and the U.S. Government pays farmers not to grow certain crops in certain years.

Moreover, the terrific public largesse that the fossil fuel industry has already enjoyed over the years makes it especially

406. Supra note 366 and accompanying text.
407. 2020 Tied for Warmest Year on Record, supra note 52.
408. See Hardin, supra note 101, at 1245–47.
409. See Stover, supra note 21 (quoting German Minister of Economic Cooperation and Development Dirk Niebel noting, in response to former Ecuadorian President Correa’s Yasuní proposal, that “countries such as Germany did not like the idea of ‘payment for non-action’”).
difficult to accept that the most economically efficient method of slowing global warming may be to pay fossil fuel owners again, this time not to exploit their fossil fuels. Arguably, the U.S. fossil fuel industry has acted like a bully for decades, but any realistic effort to slow global warming must acknowledge, rather than simply bemoan, the fact that the fossil fuel industry today possesses tremendous political power and may continue to do so for the near future. Furthermore, this article considers the global warming crisis from the perspective of the economic theory of property rights, which treats an economically efficient outcome as a just outcome, and the analysis presented here strongly suggests that paying fossil fuel owners to close their operations and leave their fossil fuels in the ground is an economically efficient method of slowing global warming.

Fossil fuel companies have already located approximately five times more fossil fuel reserves than can be burned and still limit warming to 1.5°C Celsius, so that continuing to explore for more fossil fuels literally is a waste of energy, in addition to a waste of time and money. Scientists have concluded that wind and solar energy alone could provide approximately 80% of the U.S.’ energy needs, and the U.S. possesses a very large reserve of oil, referred to as the “strategic petroleum reserve,” as well as large reserves of gasoline, from which it can make withdrawals whenever needed. Finally, in order to pay for a new

412. E.g., Emma Searson, No More Candy for Fossil Fuels, ENVNT AM. (Aug. 4, 2020), https://environmentamerica.org/blogs/environment-america-blog/sme/no-more-candy-fossil-fuels (discussing how the U.S. fossil fuel industry has received billions of dollars of COVID-19 recovery funds, despite receiving billions of dollars in subsidies from the federal and state governments each year, describing the fossil fuel industry as “the big bad bully”).


414. See Carrington, supra note 313.

415. See Matthew R. Shaner et al., Geophysical Constraints on the Reliability of Solar and Wind Power in the United States, 11 ENERGY & ENV’T SCI. 914 (2018); see also Ellsmoor, supra note 390 (discussing the study published in Energy & Environmental Science).

416. See Grant Nülle, New Legislation Affects U.S. Strategic Petroleum Reserve, EIA (Dec. 9, 2015), https://www.eia.gov/todayinenergy/detail.php?id=24072 ("As the largest stockpile of government-owned emergency crude oil in the world, the SPR is designed to help alleviate significant disruptions in oil supplies from events such as severe weather; major geopolitical events; and unplanned production, transport, and delivery outages. Located in four storage sites along the Gulf of Mexico, the SPR currently holds more than 695 million barrels of crude oil, or about 96% of its 727 million barrel design capacity . . . .")
conservation easement program through which fossil fuel owners agree not to further extract, refine, sell, or distribute fossil fuels, the U.S. Government can simply redirect the very large subsidies that it already pays to the U.S. fossil fuel industry to the new conservation easement program.

Essentially, the conservation easement program proposed here accepts the great political power that the fossil fuel industry currently possesses and suggests a method of accomplishing what society otherwise cannot seem to accomplish: outlawing further extraction or trafficking in fossil fuels and at the same time providing a way for the fossil fuel companies to go out of business. Owners of fossil fuels would expect to be compensated for leaving their fossil fuels in the ground, just as developing countries like Ecuador expect to be paid for leaving their fossil fuels in the ground. At the very least, it is hoped that this paper has sparked further interest in novel private market measures that could help combat climate change.

417. See Kestenbaum, supra note 1 (quoting Former Ecuadorian President Rafael Correa’s discussion regarding the need to exploit the Yasuni oil fields to help the poor of Ecuador since the international community would not pay Ecuador not to drill in the Yasuni); Harstad, Financial Times, supra note 248 (“Fossil fuel owners will certainly request compensation for conserving their resources on the world’s behalf.”); Carrington, supra note 313 (stating that providing compensation would be key to getting countries (whether rich or poor) to agree to keep their fossil fuels in the ground).
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