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**WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT**

**Volume 5 2013 Number 1**

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Environmental Overreach: The EU’s Carbon Tax on International Aviation

Surya Gablin Gunasekara*

Abstract

On November 27, 2012—without the fanfare of a Rose Garden ceremony—President Obama signed into law a bill that forbids United States airlines from participating in the European Union Emissions Trading Scheme (“EU ETS”). Environmental organizations bemoaned the President’s decision after having urged him to veto the bill. Supporters of the law hailed the passage as a win for American sovereignty, preventing an illegitimate and disingenuous environmental tax on U.S. carriers and passengers. This article addresses the aviation industry’s role in global climate change, and offers an in-depth analysis of the EU ETS and the European Commission’s decision to include international aviation in the ETS. It also discusses the legal implications of the EU’s Aviation Directive and the legal challenge before the European Court of Justice. Finally, this article discusses the aforementioned legislation and exposes the pitfalls of the EU’s unilateral action.

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I. Introduction

[T]he EU’s Emissions Trading Scheme, when applied to U.S. airlines, is the wrong way to achieve the right objective. It goes against international law and agreements, and it brings the hand of European regulators into our own airspace. The EU’s go-it-alone approach is not the way to find a global solution to a global problem.1

~ Congressman Nick Rahall (D-W.Va.)

Through the efficiency and reliability of global air travel, distant nations have been brought closer together in a way that was not contemplated even a hundred years ago. 2 A trans-Atlantic trip that once took weeks has been reduced to mere hours. 3 As this means of transportation evolved through the twentieth and twenty-first centuries, air travel has continued to be more accessible and affordable. 4 Every year,

4. See GEORGE WILLIAMS, THE AIRLINE INDUSTRY AND THE IMPACT OF Deregulation 20 (2d ed. 1994) (discussing the proliferation of major traffic hubs during the last quarter of the twentieth century and the drastic increase in passenger numbers during that time); MORRISON & WINSTON, supra note 2, at 11 (showing that the average domestic air fare per passenger mile has fallen consistently since 1970).
about 2.2 billion passengers travel on the world’s air carriers, “with predictions of 9 billion passengers by 2025.”5 There is no doubt that modern society has become dependent on aviation for day-to-day life.6

As global air transportation increases,7 concerns over the amount of carbon dioxide, nitrous oxide, ozone, and methane (collectively greenhouse gases, or GHGs) emitted from the aviation industry also escalate.8 Like any motor vehicle that runs on fossil fuels, aircrafts release gaseous and particulate emissions into the atmosphere.9 Aircrafts are unique, however, in that their emissions are injected directly into the atmosphere at high altitudes.10 There is scientific consensus that cumulative anthropogenic GHG emissions are driving climate change,11 the precise effects of which are still being debated.12 The fact remains that international aviation emissions represent only about two percent of total global carbon dioxide emissions, which is a tiny fraction of the overall anthropogenic emissions.13

Over the last two decades, international bodies and national governments have attempted to curb emissions through various command-

6. See Air Transport Action Group, Aviation: Benefits Beyond Borders 24 (2012), available at http://aviationbenefitsbeyondborders.org/sites/aviationbenefitsbeyondborders.org/files/pdfs/ABBB_Medium%20Res.pdf (explaining that 3.5% of global GDP is supported by aviation and that air transport carriers haul close to 35% of world trade by value).
7. See ICAO Environmental Report, supra note 5, at 19 (stating that from 1989 to 2009, total scheduled airline traffic grew at a yearly rate of 4.4%).
8. See id. at 69 (discussing the concern over climate change during the past decade and the increasing pressure on the aviation industry to reduce its impact on climate change).
9. See id. at 38 (stating that aircraft produce emissions much like those produced during fossil fuel combustion).
11. See ICAO Environmental Report, supra note 5, at 38 (“Global climate change is caused by the accumulation of greenhouse gases (GHG) in the lower atmosphere.”).
12. See Janelle Veno, Comment, Flying the Unfriendly Skies: The European Union’s New Proposal to Include Aviation in Their Emissions Trading Scheme, 72 J. Air L. & Com. 659, 659 (2007) (stating that scientists around the world debate global warming as well as the effect it may have on the earth).
13. See ICAO Environmental Report, supra note 5, at 38 (stating that aviation accounts for two percent of global carbon dioxide emissions and showing that carbon dioxide emissions from aviation make up a miniscule portion of the world’s anthropogenic carbon dioxide emissions).
and-control and market-based emissions schemes.\textsuperscript{14} Perhaps the most famous agreement dedicated to climate change and the reduction of greenhouse gases is the Kyoto Protocol (Protocol).\textsuperscript{15} In 1997, the United Nations Framework Convention on Climate Control (UNFCCC) created the Kyoto Protocol, a treaty in which Member States agreed to the task of reducing their carbon dioxide emissions.\textsuperscript{16} The Protocol established an initial five-year commitment period, from 2008 to 2012, for Member States to achieve their reduction goals.\textsuperscript{17} The Protocol also created mandatory reduction targets during the commitment period that are at least five percent below the countries’ 1990 emissions levels.\textsuperscript{18} In 2012, the Member States agreed to extend the Kyoto Protocol for a few years and to commit to more ambitious actions to reduce greenhouse gases.\textsuperscript{19}

One of the principal means of reducing greenhouse gases suggested by the Kyoto Protocol was an emissions trading system.\textsuperscript{20} Emissions trading systems involve exchanging credits, which permit the holder to emit a predetermined amount of carbon dioxide.\textsuperscript{21} Actors that emit more than their credit limit can purchase additional credits while those who emit less than their credit limit can sell their unused credits.\textsuperscript{22} Under this theory, actors

\begin{itemize}
\item 14. See Reagan, supra note 10, at 350 (discussing how regulatory bodies over the past two decades have “moved beyond command-and-control regulation” and have begun using market-based systems like emissions trading).
\item 16. See id. at art. 2 (defining the goals of the Kyoto Protocol).
\item 17. See id. at art. 3, para. 1 (stating that Member States must “ensure that their aggregate anthropogenic carbon dioxide equivalent emissions . . . do not exceed their assigned amounts, . . . with a view to reducing their overall emissions of such gases by at least 5 percent below 1990 levels in the commitment period 2008 to 2012”). Additionally, in 2012, delegates from Kyoto Protocol Member States decided to extend the Protocol for “a few years.” John M. Broder, Climate Talks Yield Commitment to Ambitious, but Unclear, Actions, N.Y. TIMES, Dec. 9, 2012, at A13 (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item 18. See Veno, supra note 12, at 660 (discussing mandatory emission reduction targets under the Kyoto Protocol).
\item 19. See Broder, supra note 17 (stating that the delegates from over 190 nations agreed to extend the Protocol and to use more ambitious, albeit unspecified, methods to combat emissions).
\item 20. See Kyoto Protocol, supra note 15, at art. 17 (“The Parties . . . may participate in emissions trading for the purposes of fulfilling their commitments under Article 3.”).
\item 21. See Veno, supra note 12, at 660 (explaining that an emissions trading system issues credits to polluters, each credit allowing a set amount of emissions, and lets the polluters buy and sell each other’s credits in order to cover their respective amounts of pollution).
\item 22. See id. (noting that an emissions trading system permits low emissions-producing entities to sell off their unused credits for profit, while high emissions-producing entities must buy credits to account for their pollution).
\end{itemize}
that can reduce emissions at a low cost will do so, while actors that are not financially equipped to reduce emissions will be able to purchase credits.\textsuperscript{23} Essentially, the emissions trading system is a market-based scheme designed to reduce greenhouse gases in the most cost-effective method.\textsuperscript{24}

The European Union (EU)\textsuperscript{25} has implemented an Emissions Trading Scheme (ETS) to meet its target Kyoto Protocol reductions, which represents the most ambitious emissions trading plan to date.\textsuperscript{26} Phase I of the ETS began in 2005 and only covered carbon dioxide emissions from “energy, metal production, mineral, and paper industries in EU member-states.”\textsuperscript{27} Phase I represents the first wave of a planned EU implementation strategy, which will slowly tighten emissions targets and expand to include new industries.\textsuperscript{28} Under Directive 2008/101/EC (Aviation Directive) civil aviation was included in the EU ETS.\textsuperscript{29} The Aviation Directive extended emissions trading to the aviation industry by covering flights within the EU beginning in 2011 and all flights arriving and departing from the EU beginning on January 1, 2012.\textsuperscript{30}

\begin{itemize}
\item \textsuperscript{23} See \textit{id.} (explaining that, in theory, entities that cannot cut emissions cost effectively will buy credits from those entities that can do so cost effectively).
\item \textsuperscript{24} See \textit{Why Emissions Trading is More Effective than Command and Control}, INT’L EMISSIONS TRADING ASS’NS, http://www.ieta.org/index.php?option=com_content&view=article&id=418:why-emissions-trading-is-more-effective-than-command-and-control&catid=54:3-minute-briefing&Itemid=135 (last visited Sept. 10, 2013) (describing emissions trading and arguing that a cap and trade system “is the most effective way of minimizing the cost” of emissions reduction) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).
\item \textsuperscript{25} The European Union is an economic and political union consisting of twenty-seven Member States, which are primarily located throughout Europe. It was created to serve as “a political and economic community with supranational and intergovernmental features,” evidenced by the fact that Member States “delegated to the Union the exercise of certain national competencies.” Ruwantissa Abeyratne, \textit{The Authority of the European Union to Unilaterally Impose and Emissions Trading Scheme}, 21 AIR & SPACE L. & POL. 4, 2008, at 5–6.
\item \textsuperscript{26} See Reagan, \textit{supra} note 10, at 350 (“The European Union (EU) has implemented its Emissions Trading Scheme (ETS)—the most ambitious CO\textsubscript{2} emissions trading scheme to date.”).
\item \textsuperscript{27} See \textit{id.} (describing phase I of the ETS, including its starting date in 2005 and the industries that the regulation covered during that phase).
\item \textsuperscript{28} See \textit{id.} at 363 (describing how phase I was just the first part of the scheme, with later phases expanding to cover more GHGs and industries while simultaneously tightening emissions caps).
\item \textsuperscript{30} See \textit{id.} at 17 (requiring that “[f]rom 1 January 2012 all flights which arrive at or depart from an aerodrome situated in the territory of a Member State” shall be subject to the
The aviation industry only produces a small portion of the total greenhouse gases, yet that percentage could grow. Civil aviation, like all transportation sectors, is working towards emissions reduction through efficiency; however, the EU’s extension of their ETS to the international community presents broader international legal ramifications with extra-jurisdictional consequences. Section I of this article will address the aviation industry and the role that it plays in global climate change. Section II will offer an in-depth analysis of the EU’s ETS, and the European Commission’s (“EC”) decision to include international aviation in the ETS. Section III discusses the legal implications of the EU’s Aviation Directive, the legal challenge before the European Court of Justice (“ECJ”), the U.S. legislation blocking American air carriers from participating in the ETS, and problems with emissions related taxes to aviation. Finally, this article presents the alternative to a multilateral international aviation emissions target allowing for civil aviation to organically reach new efficiencies and alternatives.

II. Civil Aviation Emissions and Global Climate Change

A. Climate Change Overview

The atmosphere is a fragile shield that protects the Earth while providing a temperature equilibrium that can sustain life. Typically, as sunlight penetrates the atmosphere, “carbon dioxide traps heat and warms the Earth.” The temperature on Earth is maintained by a delicate balance between energy input from the sun and energy lost back into space.

Since pre-industrial times the increase in GHGs has altered the energy balance in the climate system and is claimed to be one of the leading

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31. See ICAO ENVIRONMENTAL REPORT, supra note 5, at 18, 31 (stating that aviation carbon dioxide emissions only account for two percent of the world’s human-made carbon dioxide emissions and that aviation fuel consumption is anticipated to grow at a rate of 3.0% to 3.5% per year).

32. See AIR TRANSPORT ACTION GROUP, supra note 6, at 4 (explaining that the aviation industry has agreed to improve fleet fuel efficiency by 1.5% per year until 2020); see also Reagan, supra note 10, at 375 (stating that opponents of the EU Directive may challenge the Directive by arguing that EU member-states do not have jurisdiction to set emissions regulations extraterritorially).

33. See Veno, supra note 12, at 661 (explaining that the atmosphere plays an essential role in regulating the Earth’s temperature and keeping it from becoming “a cold, barren place”).

34. Id.

35. See id. (explaining that Earth’s temperature is regulated by a give-and-take between heat coming from the sun and heat lost back into space).
drivers of climate change. GHGs “affect the absorption, scattering, and emissions of radiation within the atmosphere and at the Earth’s surface.”

The subsequent positive or negative radiation changes in the energy balance is expressed as radiative forcing, “which is used to compare warming or cooling influences on the global climate.”

Human activities have increased the atmospheric concentrations of three major GHGs: carbon dioxide, nitrous oxide, and methane. Since 1992, concentrations of carbon dioxide, nitrous oxide, and methane, have increased by 30%, 15%, and 145% respectively. Research from the IPCC shows that “[m]any greenhouse gases remain in the atmosphere for a long time,” and in the case of carbon dioxide and nitrous oxide, several decades. Consequently, if carbon dioxide emissions remained at 1990s levels, “they would lead to a nearly constant rate of increase in atmospheric concentrations for at least two centuries.”

While it is difficult to determine the exact result of climate change in the future—from the dire to the benign—there is no single mitigation measure available. Instead there is a global hodgepodge of legislation and treaties aimed at reducing carbon dioxide output. The result of this patchwork approach is that some policies impact specific industries on a


37. Id. at 37.

38. See id. at 36 n.4 (“Radiative forcing is a measure of the influence a factor has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the factor as a potential climate change mechanism.”).

39. Id. at 37.

40. See Intergovernmental Panel on Climate Change, Aviation and the Global Atmosphere: Summary for Policy Makers 4 (1999) [hereinafter IPCC Report, Aviation and the Global Atmosphere] (explaining that atmospheric concentrations of these three gases have grown significantly and much of the growth is attributable to human activities); see also Synthesis Report, supra note 36, at 37 (“Global atmospheric concentrations of CO₂, CH₄, and N₂O have increased markedly as a result of human activities since 1750.”).


42. See id. (discussing the long length of time that greenhouse gases stay in the atmosphere).

43. Id.

44. See Synthesis Report, supra note 36, at 73 (“A wide range of [climate change] mitigation options is currently available or projected to be available by 2030 in all sectors.”).

45. See id. at 62 (showing the myriad types of policy instruments and actions that countries have taken to affect emissions).
scale much greater than their actual contribution to climate change—which is especially true for international aviation.\footnote{46. See \textit{ICAO Environmental Report}, supra note 5, at 38 (recognizing that the total amount of carbon dioxide emissions from aviation accounts for only two percent of global carbon dioxide emissions).}

\textit{B. Aviation and Climate Change}

Aviation plays a key role in the global economy and serves as the most efficient passenger and cargo transport available.\footnote{47. See \textit{Air Transport Action Group}, supra note 6, at 2 ("Aviation provides the only rapid worldwide transportation network, which makes it essential for global business and tourism. It plays a vital role in facilitating economic growth."); see also Veno, supra note 12, at 672 (explaining that international air transport is important for the world economy because it can carry passengers and cargo over long distances in short time periods).} International aviation has increased rapidly over the last few decades alongside the growth of the world economy.\footnote{48. See IPCC Report, \textit{Aviation and the Global Atmosphere}, supra note 40, at 3 (discussing the correlation between the growth in the world economy and the growth in the aviation industry).} These international flights, however, do contribute to the build-up of anthropogenic gases in the atmosphere.\footnote{49. See Veno, supra note 12, at 672 (discussing the effects that international flights have on greenhouse gas emissions); see also \textit{ICAO Environmental Report}, supra note 5, at 31 ("International flights are responsible for approximately 62\% of [total aviation] emissions.").}

Aircrafts produce the same types of emissions as other vehicles with fossil fuel combustion engines.\footnote{50. See \textit{ICAO Environmental Report}, supra note 5, at 38 (discussing the type of emissions released by aircraft engines and the effect they have on climate change).} Jet engines, like many other vehicles, produce carbon dioxide, water vapor, and nitrous oxide, as well as other trace elements.\footnote{51. \textit{Office of Env’t & Energy, Fed. Aviation Admin., Aviation & Emissions: A Primer 1} (2005) [hereinafter \textit{Aviation & Emissions}] (providing an overview of the emissions released by aircraft engines).} Aircraft engine emissions are comprised of approximately seventy percent carbon dioxide, thirty percent water vapor, and less than one percent other various pollutants.\footnote{52. See \textit{id.} (discussing the composition of aircraft emissions).} In addition to the emissions that take place during flight, "[a]bout 10 percent of aircraft emissions of all types, except hydrocarbons and CO [carbon monoxide], are produced during airport ground level operations and during landing and takeoff."\footnote{53. \textit{Id.} at 2.} The majority of aviation emissions, however, take place at much higher altitudes.\footnote{54. See \textit{ICAO Environmental Report}, supra note 5, at 38 ("[M]ost of these emissions are released directly into the upper troposphere and lower stratospheres.").}
Aircrafts emit carbon dioxide and water vapor directly into the upper troposphere and lower stratosphere where they have a different impact on atmospheric composition. Currently, aviation emissions contribute to approximately two to three percent of the greenhouse gas emissions worldwide. This figure, however, is expected to rise both in terms of absolute emissions and the total percentage. In the last ten years, the airline industry has grown in absolute size, showing an increased diversity in the categorization of airlines operating in the different markets. Thanks to liberalization in many countries, completely new types of airlines have been entering the air transport market. As a result of this growth, emissions from aircrafts have continued to increase every year. The aviation industry, however, remains committed to addressing aviation’s contribution to climate change by aggressively working toward a sustainable future.

III. The European Union Emissions Trading Scheme

A. The Kyoto Protocol and EU ETS

The Kyoto Protocol established a legally binding agreement with the commitment of reducing greenhouse gas emissions by setting target levels of reduction. The Protocol entered into force on February 15, 2005, out-
and requires all Annex I countries to implement procedures to help achieve their target emissions level, including enhancing energy efficiency, protecting and improving sinks, researching and developing new forms of energy, and encouraging appropriate emissions reforms. "As signatories of the Protocol, the EU and its Member States obligated themselves to make measurable greenhouse gas emissions reductions."63

The European Union had long endorsed environmental legislation that favored command-and-control regulations.65 In the 1990s, however, the EU transitioned away from command-and-control in favor of the more American system of market-based regulations.66 After Kyoto was adopted, European Union Member States found that a market-based regulation scheme would be the most cost-effective method of meeting the emissions reductions mandated by the Protocol.67

In order to meet the emissions reductions required by the Kyoto Protocol, the European Union Emissions Trading Scheme was created and began operating in January of 2005, allowing Member States to distribute carbon dioxide credits to companies that emitted large quantities of GHGs.68 By capping the number of credits, the EU essentially created a market for carbon allowances.69 If an operator does not use all the credits allocated to it, then it has the ability to sell the credits to another operator.

62. See id. at art. 1 ("Sink’ means any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.").
63. See id. at art. 2(1)(a)(i)-(viii) ("Each Party included in Annex I in achieving its quantified emission limitation and reduction commitments under Article 3 shall [i]mplement and/or further elaborate policies and measures in accordance with its national circumstances.").
64. Reagan, supra note 10, at 362.
65. See id. at 362 n.120 ("Command-and-control systems are generally programs of centralized regulatory commands issued in excruciating detail via permits to pollution dischargers throughout a jurisdiction in order to implement environmental goals.").
66. See id. at 362 (explaining that the increased support for an EU transition “to market-based regulatory mechanisms, [was] in large part due to the American experience with such regulation”).
67. See id. (describing European support for finding a “low-cost means to attain the emissions reductions mandated by the Protocol”).
68. See EUROPEAN COMM’N, EUROPEAN ACTION AGAINST CLIMATE CHANGE: THE EU EMISSIONS TRADING SCHEME, at 5 (2009) [hereinafter EUROPEAN COMMISSION], available at http://www.ab.gov.tr/files/ardb/evt/1_avrupa_birligi/1_6_raporlar/1_3_diger/environment/eu_emmissions_trading_scheme.pdf (“Launched at the start of 2005, the EU ETS is the world’s first international company-level ‘cap-and-trade’ system of allowances for emitting carbon dioxide (CO2) and other greenhouse gases.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
69. See Abeyratne, supra note 25, at 5 (discussing the structure of the EU ETS program and how carbon allowances can be traded).
that exceeded its allowance. “The theory behind the scheme is that as the demand for credits increases, the price will increase; thus, it will eventually be cheaper for companies to invest in innovative ways to cut emissions than to purchase more credits.” Ideally, emissions cuts would be made at the lowest possible cost to the economy under this scheme. The EC employed a phased introduction of the ETS to allow for periodic review and amendment.

The first phase began in 2005, and was limited to carbon dioxide emissions from industrial installations in energy, metal production, mineral, and paper industries, which account for nearly half of the EU’s carbon dioxide emissions. As the phases progress, more industries will be included to cover more of the GHGs, while progressively tightening the emissions caps. The second phase of the ETS was set to coincide with the first Kyoto Protocol commitment period, which ran from 2008 to 2012.

During these stages of the ETS, EU Member States developed National Allocation Plans, which established how many emissions credits to issue and how to apportion them to individual companies. The EC then reviewed the allocation plans to ensure that they were consistent with the emission reduction commitments set forth in the Kyoto Protocol. The ultimate goal of the ETS is to ensure that the EU is sufficiently reducing its carbon dioxide emissions to comply with the Kyoto Protocol.

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70. See id. (“To comply, facilities can either reduce their emissions or purchase allowances from facilities with an excess of allowances. Progressively tightening caps are foreseen for each new period, forcing overall reductions in emissions.”).
72. See id. (explaining that when the burden to cut emissions is put on the least expensive mechanism available, “emissions reductions will be made at the lowest cost to the economy”).
73. See European Commission, supra note 68, at 8 (describing each phase of the EU ETS implementation).
74. See id. (stating that the first phase of implementation was a pilot phase focusing on establishing a price for carbon allowances and collecting emissions data).
75. See id. (noting that phases II and III will focus on reducing the allowed emissions based on data collected in phase I).
76. See id. (explaining that phase II of the ETS implementation process is meant to coincide with the “first commitment period” of the Kyoto Protocol).
77. See id. at 9 (“Member States are currently required to draw up national allocation plans for each trading period setting out how many allowances each installation will receive each year.”).
78. See id. at 15–16 (explaining that, after member-states construct National Allocation Plans for the distribution of credits, the EC reviews and assesses each allocation plan based on specific criteria).
79. See id. (describing the process by which the EC required member-states to align their allocation plans with the commitments made under the Kyoto Protocol).
B. The Aviation Directive

The Environmental Commission of the EU adopted the Directive to include aviation within the ETS on December 20, 2006. This was introduced into the ETS in two phases. First, starting in 2011, flights between domestic airports would be required to account for their emissions. Then, in 2012, the ETS was set to be extended to cover all flights arriving at or departing from an EU airport. The EU, however, postponed the application of the ETS to flights departing the EU through 2013 pending international action on aviation emissions.

Under the Aviation Directive, EU Member States would allocate carbon dioxide credits to airlines much like the system set up for industrial installments under the ETS. These allocations would be capped based on the 2004–06 emissions levels of commercial airlines. "Airlines only have

80. See Aviation Directive, supra note 29, at 3 (“[A]mending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community.”).


82. See id. (describing the implementation of the EU ETS and noting the projected reduction of 183 million tons of CO₂ emissions).

83. See id. (noting that all airlines will be treated equally under the EU ETS); see also Carl Burleson, The EU Emissions Trading System Proposal, 21 AIR & SPACE L. 22–23 (“For example, under the proposed legislation, on a flight from Los Angeles to Paris, United Airlines would have to obtain permits to cover not only the emissions of the flight in French airspace but in U.S. and international airspace over the Atlantic in order to operate to Paris.”). But see Aviation Directive, supra note 29, at 6 (noting that where a third country puts in place measures to reduce the climate change impact of aviation, the ETS would not apply to flights arriving from that country).

84. See Elisabeth Rosenthal, Your Biggest Carbon Sin May Be Air Travel, N.Y. TIMES, Jan. 26, 2013, at SR4 (“[A]fter airlines and governments in the United States, India and China went ballistic — filing lawsuits, threatening trade actions and prompting legislation — the European Commission said it would delay full implementation for just one year to let the naysayers accede to an alternative global plan to reduce airlines’ carbon footprint.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


86. See id. (“For the trading periods up until 2022, aviation emissions will be capped at the average level for the years 2004–2006. However, should international aviation be brought into a global climate agreement after 2012, this cap could be reviewed.”).
to maintain present [emissions] levels, which differs from other installments that are required to reduce their emissions to 1990 levels." 87 According to the Directive, each aircraft operator, including those from non-EU countries, would be administered under the program by only one Member State. 88 “For EU [aircraft] operators, the administering state [is] the Member State that issued their operating certificate; for the third-country operators, it [will] be the Member State to which most of their emissions can be attributed.” 89 The Aviation Directive essentially integrates the airlines into the ETS market so that airlines can buy and sell allowances from any other industry. 90

Just like any other ETS participants, aircraft operators would be required to monitor their emissions of carbon dioxide and report them to their administering Member State by March 31 each year. 91 Any airline that does not stay within its allotted emissions will have to pay a fine at the end of the year, and could possibly lose its contract to fly to or from EU airports. 92 According to the Convention Between the United States and Other Governments Respecting International Civil Aviation (Chicago

87. Veno, supra note 12, at 675.
88. See Daniel Calleja Crespo & Mike Crompton, The European Approach to Aviation and Emissions Trading, 21 AIR & SPACE LAW., no. 3, 2007, at 1, 20 (explaining that this form of administration avoids duplication and an excessive administrative burden on aircraft operators).
89. Id.; see also Abeyratne, supra note 25, at 5 (“The Scheme would exclude flights by State aircraft, flights under visual flight rules, circular flights (or circuits), flights for testing navigation equipment or for training purposes, rescue flights, and flights by aircraft with a maximum take-off weight of less than 5,700 kilograms (approximately 12,500 pounds).”).
90. See Reagan, supra note 10, at 364 (“The Proposed Directive would integrate the airlines into the prior-existing ETS market so that the airlines could buy and sell allowances across industries.”).
91. See Abeyratne, supra note 25, at 5 (describing how reports will be independently verified by the competent authority of their administering Member State to ensure their accuracy); see also Veno, supra note 12, at 677 (“To monitor emissions airlines must report their annual emissions by multiplying the amount of fuel they consumed that year by a standard emission factor. If the airline is not capable of documenting the amount of fuel used for each flight, then a standardized fuel consumption estimation will be applied.”).
92. See Veno, supra note 12, at 672–77 (discussing the inclusion of aviation in the EU ETS and the penalties that airlines will suffer for failing to stay within their allotted emissions).
all airlines must comply with the laws and regulations of the state in which they arrive and depart, including the Aviation Directive. 94

C. Justification for Including Aviation in the ETS

While the Kyoto Protocol calls for the domestic reduction of aviation emissions for developed nations, it provides for the International Civil Aviation Organization (ICAO) 95 to guide the overall international aviation emissions reduction. 96 In the EU, the inclusion of just domestic aviation would only be a partial solution. 97 The EC contended that for any meaningful reduction to take place international aviation must be included since it is responsible for the vast majority of the aviation industry’s carbon dioxide emissions. 98 “EU GHG emissions from international aviation grew by 87 percent between 1990 and 2004.” 99 Although only three percent of EU greenhouse gas emissions are produced by aviation, “the EC projects that by 2012, emissions from international flights would increase by 150% from 1990 levels.” 100 Furthermore, this projected growth could offset EU Kyoto Protocol reductions by up to twenty-five percent. 101 With the amount of anticipated growth in the international aviation sector, the European

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94. See id. (“The laws and regulations of a contracting State as to the admission to or departure from its territory of passengers, crew or cargo of aircraft . . . shall be complied with . . . upon entrance into or departure from, or while within the territory of that State.”).
95. See Veno, supra note 12, at 673 (“The ICAO is an organization created under the Chicago Convention agreement to oversee international flight regulations and procedures. The ICAO is composed of 188 countries, encompassing the entire field of international civil aviation, and it has legislative ‘authority to promulgate standards and recommended practices (SARPs).’”).
96. See Kyoto Protocol, supra note 15, at art. 2 § 2 (“The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.”).
97. See Reagan, supra note 10, at 364 (“While the inclusion of domestic aviation into the ETS for member-states is a partial solution to the emissions problem, the EC posits that any meaningful emissions reduction measures must also include international aviation because it accounts for the vast majority of EU flights.”).
98. See id. (explaining that international aviation accounts for the vast majority of EU flights).
101. See id. at 365 (explaining that emissions from international flights in the near future could offset existing emission reduction plans).
Commission claims that failing to work toward emissions reduction in this industry would ultimately undermine the overall efforts of the ETS.\footnote{102}

The European Commission acknowledged that under the Kyoto Protocol, authorization over international aviation emissions was delegated to the ICAO.\footnote{103} Since the Protocol was agreed upon in 1997, EU Member States and the ICAO had been working on creating a market-based emissions trading system.\footnote{104} After studying various means to put such a system into practice, the ICAO Committee on Aviation Environmental Protection agreed in 2004 “that an aviation-specific emissions trading system based on a new legal instrument under the ICAO auspices ‘... seemed sufficiently unattractive that it should not be pursued further.’”\footnote{105} Later that same year, the ICAO Assembly announced that work on any further implementation “should focus on two approaches: voluntary emissions trading and the incorporation of international aviation into a State’s existing emissions trading schemes.”\footnote{106} The EC adopted the latter approach in its proposal and continues to cooperate with the ICAO in emission reductions.\footnote{107}

In sum, the EC contends that bringing aviation into the ETS will place pressure on the industry as a whole to mitigate the impacts from GHGs.\footnote{108} Supporters of the regulation project allege that it will provide incentives for international airlines to develop “green” or more efficient technology.\footnote{109} In addition, the proposal could strengthen the carbon market as airlines will be able to trade emissions credits across industry lines.\footnote{110} Conversely, the EU’s proposal has sparked debate over the legal implications of including international aviation in the ETS.\footnote{111}

\begin{footnotes}
\footnotetext[102]{See Rosenthal, supra note 84 (discussing American, Chinese, and Indian efforts to evade participation in the EU ETS).}
\footnotetext[103]{See Reagan, supra note 10, at 365 (expressing the EC’s understanding of which organization currently mandates international aviation emissions).}
\footnotetext[104]{See id. (describing the EC’s efforts to alter the existing international aviation emissions reduction effort).}
\footnotetext[105]{Crespo & Crompton, supra note 88, at 19.}
\footnotetext[106]{Id.}
\footnotetext[107]{See Rosenthal, supra note 84 (“[T]he European Union commissioner [for climate action], said that if the International Civil Aviation Organization fails to come up with a solid, market-based program in September, the European Union will begin collecting the emissions fees for all flights in and out of its airports.”).}
\footnotetext[108]{See Reagan, supra note 10, at 365 (describing how regulation will inevitably change the industry’s emission mitigation efforts).}
\footnotetext[109]{See id. (discussing the possible outcomes of the regulation project).}
\footnotetext[110]{See id. (describing a potential benefit that could arise from the EU’s ETS proposal).}
\footnotetext[111]{See id. (highlighting the adverse reactions from nations and aviation associations outside of the EU’s proposal).}
\end{footnotes}
IV. Implications of the Aviation Directive

The decision to include non-EU operators into the ETS drew broad criticism from international air carriers and the governments of the United States, China, and India. Specifically, the Chinese Aviation Administration ordered Chinese airlines to boycott the ETS and former Secretary of State Hillary Clinton strongly objected to the ETS on legal and policy grounds. In addition, the Aviation Transport Association of America (ATA) and other major U.S. airlines brought a lawsuit before the European Court of Justice, Europe’s highest court, “asserting that the extraterritorial regulation of non-EU operators in the ETS is unlawful and breaches customary international law and international agreements.”

A. International Aviation Law

The EC contends that the Aviation Directive is within its authority under the current international aviation regulatory framework. EU ETS proponents equate the proposal to admission and departure requirements permitted under the Chicago Convention. Article 1 of the Chicago Convention confirms that every State has exclusive sovereignty over the airspace above its territory. Article 6 provides that “[n]o scheduled international air service may be operated over or into the territory of a contracting State, except with the special permission or other authorization of that State, and in accordance with the terms of such permission or authorization.” Furthermore, under Article 11, a contracting State may apply admissions and departure requirements to international aircraft entering or leaving the state, so long as they are applied without distinction to nationality and in accordance with the provisions of the Chicago

112. See Rosenthal, supra note 84 (discussing the lawsuits filed and threats of trade action made by air carriers and governments in response to the EU’s ETS proposal).
113. See Roger Martella et al., Lessons Learned: The EU and its Aviation Directive, 43 TRENDS, Mar./Apr. 2012 at 1 (describing the adverse responses to the EU’s ETS proposal).
114. Id. at 1.
115. See Reagan, supra note 10, at 369 (explaining the EU’s argument that the regulation is legal under the existing aviation regulatory framework).
116. See id. at 369–70 (analogizing the EU’s ETS proposal to the admission and departure requirements permissible under the Chicago Convention and air service agreements (ASAs)).
117. See Chicago Convention, supra note 94, at art. 1 (“The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.”).
118. Id. at art. 6.
Convention.\textsuperscript{119} Based upon these provisions, the EU contends that the Chicago Convention supports the extension of ETS to international aviation.\textsuperscript{120}

On the other hand, opponents of the Aviation Directive can provide an equally compelling case that the regulation is impermissible under the Chicago Convention.\textsuperscript{121} As previously mentioned, Article 1 of the Chicago Convention gives a State exclusive jurisdiction over its territorial airspace.\textsuperscript{122} In this case, however, the EU proposed to extend the ETS to all flights arriving at or departing from an EU airport, while exempting those countries that establish measures to reduce the climate change impact of aviation.\textsuperscript{123}

Under international law, a state can only apply jurisdiction beyond its territorial limits when the conduct being regulated has a substantial effect within its territory.\textsuperscript{124} Although a state can gain jurisdiction over conduct outside its territory, “[A] state may not exercise jurisdiction to prescribe with respect to a person or activity having connections with another state when the exercise of such jurisdiction is unreasonable.”\textsuperscript{125} Essentially, if the extension of jurisdiction is found to be unreasonable, then the state cannot exert authority beyond its borders.\textsuperscript{126}

In addition to the extra-jurisdictional issues associated with the Aviation Directive, the EU ETS also imposed potential penalties and costs associated with compliance on international airlines.\textsuperscript{127} These costs could

\textsuperscript{119} See id. at 11 (“[T]he laws and regulations of a contracting State relating to the admission to or departure from its territory of aircraft engaged in international air navigation . . . shall be applied to the aircraft of all contracting States without distinction as to nationality.”).

\textsuperscript{120} See Reagan, supra note 10, at 370 (describing the EU’s conclusion that the ETS incorporation of aviation is legal because it is similar to the Chicago Convention).

\textsuperscript{121} See id. at 371 (explaining that opponents of the Aviation Directive argue that the plan “amounts to an impermissible operating requirement, tax, or charge, or . . . that the EC lacks jurisdiction to prescribe emissions regulation to operation in international aviation”).

\textsuperscript{122} See Chicago Convention, supra note 94, at art. 1 (“The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.”).

\textsuperscript{123} See Abeyratne, supra note 25, at 6 (describing how the EU is attempting to extend its carbon dioxide emissions trading scheme to include conduct outside of its territory, namely international flights).

\textsuperscript{124} See \textsc{Restatement (Third) of Foreign Relations Law} § 402(1)(c) (1987) (“[A] state has jurisdiction to prescribe law with respect to conduct outside its territory that has or is intended to have substantial effect within its territory . . . .”).

\textsuperscript{125} Id. § 403(1).

\textsuperscript{126} See id. § 403(2)(a)–(h) (describing the factors for determining whether the use of jurisdiction is unreasonable).

\textsuperscript{127} See Rosenthal, supra note 84 (explaining that the EU ETS would cost US airlines $3.1 billion between 2012 and 2020).
functionally be construed as a tax or fee that is not related to the cost of providing aeronautic facilities or services. Article 15 of the Chicago Convention specifically prohibits the imposition of fees on airlines for the right of transit over, exit from, or entry into the contracting State. It seems that the EU’s legislation would require international airlines to pay for emissions allowances simply for the right to land or take off. Although there is not a direct charge placed on airlines, the stringent requirements under the EU ETS would require that airlines pay a ‘charge’ to emit carbon when flying into those airports, and any airlines that do not comply could possibly lose their contract at those airports. The airline receives nothing in return for this charge, with the exception of being able to operate within the EU. Therefore, the Aviation Directive could be construed as a violation of Article 15 of the Chicago Convention.

As a result, the aforementioned EU contention that Article 11 provides authority for the inclusion of aviation in the ETS would be rendered moot. Article 11 is limited in that the laws and regulations of contracting States pertaining to admission and departure must be consistent with the provisions of the Chicago Convention. If the Aviation Directive is found to be in violation of Article 15, the EU will not be able to rely on Article 11 to justify its inclusion of international aviation in the ETS.

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128. See Burleson, supra note 83, at 23 (discussing the variety of problems that have been associated with the EU ETS).
129. See Chicago Convention, supra note 94, at art. 15(b) (“No fees, dues or other charges shall be imposed by any contracting State in respect solely of the right of transit over or entry into or exit from its territory of any aircraft of a contracting State or persons or property thereon.”).
130. See Burleson, supra note 83, at 23–24 (explaining how the EU ETS violates Article 15 of the Chicago Convention by requiring airlines to pay for emissions allowances in order to land or take off within the EU).
131. Veno, supra note 12, at 685.
132. See Burleson, supra note 83, at 23 (describing the reasons that the airline industry is opposed to the EU ETS).
133. See Charles E. Smith, Air Transportation Taxation: The Case for Reform, 75 J. Air L. & Com. 915, 939 (2010) (“It is a well known—but publicly ignored—fact that several foreign governments may violate this sentence [of Article 15 of the Chicago Convention] by charging air passengers a fee merely for the privilege of entering or exiting the country. Chile, for example, charges an ‘Entry Fee’ of $131.”).
134. See Burleson, supra note 83, at 23 (explaining that the EU does not have the authority to promulgate the ETS under Article 11 of the Chicago Convention).
135. See id. at 23–24 (arguing that the EU’s reading of Article 11 of the Chicago Convention would result in virtually no restriction of a signatories right to impose charges for international aviation on airlines, contrary to Article 11).
136. See id. at 24 (discussing the applicability of Articles 11 and 15 of the Chicago Convention to the EU ETS).
viability of any challenge to the Aviation Directive under Article 15 would ultimately hinge on what constitutes a charge or a tax.\textsuperscript{137}

\textbf{B. European Court of Justice}

On December 21, 2011, the European Court of Justice rejected the claims of an airline trade association and three U.S. airlines that the inclusion of international air carriers in the EU ETS violated customary international law and international treaties.\textsuperscript{138} In deciding the case, the ECJ examined two questions.\textsuperscript{139} First, the court determined whether the plaintiff airlines and trade association—as individuals and not state actors—could use international agreements and customary international law to challenge the Aviation Directive.\textsuperscript{140} Second, the court looked at whether those laws, if applicable, would invalidate the Directive.\textsuperscript{141}

From the outset, the ECJ stated that the Chicago Convention did not bind the EU.\textsuperscript{142} The court reasoned that although all twenty-seven EU Member States were a party to the treaty, the EU, as a separate entity had not signed the agreement.\textsuperscript{143} Rather, the EU was merely an observer under the Chicago Convention.\textsuperscript{144} Therefore, the court determined that plaintiffs could not use the Chicago Convention to challenge the validity of the Aviation Directive.\textsuperscript{145}

\begin{footnotesize}
\begin{enumerate}
\item See Reagan, \textit{supra} note 10, at 374 (describing how EU representatives argue that emissions trading is distinct from a charge or tax and how opponents to the EU’s proposal argue is a charge or tax because it is a unilaterally imposed cost).
\item See id. ¶ 45 (setting out the issues left to be addressed in this case); see also \textit{JANE A. LEGGETT ET. AL., CONG. RESEARCH SERV., R42392, AVIATION AND THE EUROPEAN UNION’S EMISSION TRADING SCHEME 23} (2012), \textit{available at} http://www.fas.org/sgp/crs/row/R42392.pdf (summarizing the European Court of Justice’s opinion).
\item See \textit{Air Transp. Ass’n of Am., Inc.} ¶ 45 (noting that the court must examine customary international law, the Chicago Convention, the Open Skies Agreement, and the Kyoto Protocol in order to determine whether the EU directive is challengeable).
\item See \textit{id.} (explaining that the court will undergo a similar analytic structure as the first issue, whether the EU directive is challengeable).
\item See \textit{id.} ¶ 71 (explaining that EU Member States have not given over all control of aviation in their countries to the EU).
\item See \textit{id.} ¶¶ 69–72 (describing the reason that the Chicago Convention does not apply to the EU).
\item See \textit{id.} ¶¶ 69–70 (explaining that the EU has not assumed “exclusive competence in the entire field of international civil aviation” because some Member States have retained powers within the realm of the Chicago Convention).
\item See \textit{id.} ¶ 72 (“It follows that in the context of the present reference for a preliminary ruling the Court cannot examine the validity of [the Aviation Directive] in the light of the Chicago Convention as such.”).
\end{enumerate}
\end{footnotesize}
Conversely, the court found that the EU was indeed bound by the Kyoto Protocol. The airlines and trade association argued that the Kyoto protocol specifically named ICAO as the vehicle for aviation emissions reductions, and accordingly, that the EU must refrain from independent action. The court, however, found that in order for an individual to challenge the validity of the Aviation Directive under an international agreement, the specific provision relied upon must be “unconditional and sufficiently precise so as to confer on persons subject to European Union law the right to rely thereon in legal proceedings in order to contest the legality of an act of European Union law.” With respect to the ICAO provision in the Kyoto Protocol, the court stated:

[T]hat provision, as regards its content, cannot in any event be considered to be unconditional and sufficiently precise so as to confer on individuals the right to rely on it in legal proceedings in order to contest the validity of Directive 2008/101. Consequently, the Kyoto Protocol cannot be relied upon in the context of the present reference for a preliminary ruling for the purpose of assessing the validity of Directive 2008/101.

Consequently, the plaintiffs could not rely upon either the Chicago Convention or the Kyoto Protocol in their challenge of the Aviation Directive.

Despite not allowing challenges to the Aviation Directive under the Chicago Convention or Kyoto Protocol, the court did allow the airlines and trade association to rely on the Open Skies Agreement and some principals of international customary law. Similar to Article 15 of the Chicago Convention, Article 11 of the Open Skies Agreement prohibits customs

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146. See id. ¶¶ 73–74 (evaluating whether the Kyoto Protocol precludes the court from determining the Aviation Directive’s validity and whether the Kyoto Protocol’s provisions give those subject to EU law the right to rely on Kyoto in order to challenge other EU laws).
147. See id. ¶¶ 43, 77 (stating that pleading the Aviation Directive was invalid).
148. Id. ¶ 74.
149. Id. ¶¶ 77–78.
150. See id. ¶¶ 72, 78 (rejecting both laws as a basis to examine the Aviation Directive).
151. See id. ¶¶ 87, 94, 100, 111 (allowing evaluation of the Aviation Directive in light of the Open Skies Agreement and international law); see also Leggett et al., supra note 139, at 25 (noting the plaintiff could “challenge the [Aviation] Directive pursuant to the customary international law principles of (1) complete state sovereignty over its airspace; (2) freedom of flight over the high seas; and (3) the high seas are free from state sovereignty”).
taxes or fees from being placed on fuel that is on board the aircraft.\textsuperscript{152} As such, the plaintiffs asserted that the EU ETS constituted an impermissible duty, tax, fee or charge on fuel consumption under the Open Skies Agreement.\textsuperscript{153}

In rejecting the claim that the EU ETS was a tax, the court acknowledged that the cost imposed on aircraft operators was, in part, based upon fuel consumption.\textsuperscript{154} The ECJ, however, ruled that “there is no direct and inseverable link between the quantity of the fuel held or consumed by an aircraft and the pecuniary burden on the aircraft’s operator in the context of the allowance trading scheme’s operation.”\textsuperscript{155} Indeed, the court went on to distinguish the EU ETS from a tax by noting that under the scheme, an airline could potentially make a profit by burning less fuel and selling the leftover allowances.\textsuperscript{156} Ultimately, it was this distinction between a market-based measure and a tax that lead the ECJ to find the EU ETS permissible under Article 11 of the Open Skies Agreement.\textsuperscript{157}

The implication of this decision is that the ECJ sees a tax as only a fixed value.\textsuperscript{158} Taxes, however, often fluctuate based on the value of what is being taxed.\textsuperscript{159} For instance, taxes on fuel or real estate that are based on a

\begin{tabular}{l}
\textsuperscript{152} See Air Transp. Ass’n of Am., Inc. ¶ 136 (discussing arguments by the airlines and trade associations that fuel loads are exempted from duties, taxes, fees and charges under Article 11(1) and 2(c) of the Open Skies Agreement).
\textsuperscript{153} See id. (discussing Air Transportation Association of America’s contention that, “only charges based on the cost of the service provided can be imposed by the European Union” and that the scheme in the EU ETS directive does not fall within this exception); see also Leggett et al., supra note 139, at 25–26 (discussing the airlines’ and trade associations’ argument that the Aviation Directive “imposes an impermissible tax or duty levied on airline fuel”).
\textsuperscript{154} See Air Transp. Ass’n of Am., Inc. ¶ 141 (noting that aircraft fuel consumption was part of the formula which calculated emissions); see also Katherine B. Andrus, Beyond Aircraft Emissions: The European Court of Justice’s Decision May have Far-Reaching Implications, 24 AIR & SPACE LAW. No. 4, 13, 16 (2012) (noting that the ECJ distinguishes costs from a fuel charge because it is a market-based measure).
\textsuperscript{155} See id. (“Nor can it be ruled out that an aircraft operator, despite having held or consumed fuel, will bear no pecuniary burden resulting from its participation in the allowance trading scheme, or will even make a profit by assigning its surplus allowances for consideration.”); see also Leggett et al., supra note 139, at 26 (noting the ECJ argument that the airlines could make a profit by burning less fuel and selling excess emission allowances).
\textsuperscript{156} See Air Transp. Ass’n of Am., Inc. ¶ 143–44 (noting a difference between the EU Aviation Directive and a Swedish scheme that taxed fuel consumption and constituted an unlawful excise duty on aviation).
\textsuperscript{157} See Andrus, supra note 154, at 16 (arguing that the ECJ implies a tax “must always use a fixed value”).
\textsuperscript{158} See id. (arguing that there are many examples which contradict the view that a tax is a fixed value).
\end{tabular}
percentage of the price will vary based upon the market price.\textsuperscript{160} "In the case of the [EU] ETS, it can just as easily be viewed as a tax on fuel that simply uses a different currency (i.e. allowances) that fluctuates in value."\textsuperscript{161} While there is no direct charge per ton on the fuel consumed—and subsequent carbon emitted—the chosen currency does not change the fact that the EU ETS operates as a tax.\textsuperscript{162}

\textbf{C. EU Emissions Trading Scheme Prohibition Act of 2011}

In response to the EU ETS, a historically divided 112th Congress swiftly approved—with large bi-partisan support—the European Union Emissions Trading Scheme Prohibition Act of 2011 (EU ETS Prohibition Act).\textsuperscript{163} Arguably one of the greatest legislative accomplishments of 2012, the Act essentially functions as the title indicates: it prohibits U.S. aircraft operators from participating in the EU ETS.\textsuperscript{164} The EU ETS Prohibition Act allows the Secretary of Transportation to prohibit U.S. carriers from complying with the EU ETS based upon a public interest determination.\textsuperscript{165} In making the public interest determination the Secretary must take into account: “(1) the impacts on U.S. consumers, U.S. carriers, and U.S. operators; (2) the impacts on the economic, energy, and environmental security of the United States; and (3) the impacts on U.S. foreign relations, including existing international commitments.”\textsuperscript{166}

\textsuperscript{160.} \textit{See id.} ("[A] fuel tax assessed as a percentage of the value of fuel consumed would fluctuate along with the price of fuel. Similarly, real estate taxes are typically calculated as a percentage of a property’s value, which in turn is based roughly on its market price, which may rise or fall.").

\textsuperscript{161.} \textit{Id.}

\textsuperscript{162.} \textit{See id.} (arguing that because the cost imposed on aircraft operators is based on fuel consumption and charged at a rate set by the government, it constitutes a tax even if it could also be considered a market-based measure).

\textsuperscript{163.} \textit{See European Union Emissions Trading Scheme Prohibition Act of 2011, 49 U.S.C. § 40101 ("An Act To prohibit operators of civil aircraft of the United States from participating in the European Union’s emissions trading scheme, and for other purposes."); see also Rosenthal, supra note 84 ("[O]ne bill glided through Congress with broad bipartisan support and won a quick signature from President Obama . . . .").}

\textsuperscript{164.} \textit{See id.} ("The Secretary of Transportation shall prohibit an operator of a civil aircraft of the United States from participating in the emissions trading scheme unilaterally established by the European Union . . . ."); \textit{see also Leggett et al., supra note 139, at 31 (noting that one possible consequence of the legislation is the exclusion of operators serving the EU from the EU aviation market).}


\textsuperscript{166.} \textit{Id.}
In addition, the EU ETS Prohibition Act instructs the Secretary of Transportation and the Administrator of the Federal Aviation Administration to “use their authority to conduct international negotiations, including using their authority to conduct international negotiations to pursue a worldwide approach to address aircraft emissions.”  

It also directs the Administrator to ensure that U.S. carriers are held harmless under the EU ETS.

The EU ETS Prohibition Act was, in part, ultimately effective; shortly after its passage, the EU, bending to international outcry, announced that it would delay implementation for a year. But the EU continued to pressure the ICAO to develop a market-based measure, threatening to resume collecting emissions fees on all flights beginning in September of 2013. That effort has met with mixed success. Although the ICAO has since agreed to develop a plan over the next three years for an aviation emissions market to come online in 2020, ICAO did not allow the EU to subject airlines to its emissions scheme in the meantime.

D. Taxing Is No Solution

On international flights, government taxes and fees can add up to $350 to the base fare of a ticket. If allowed to rise unfettered, tax increases could erode passenger demand, undermining the numerous public and economic policy goals that aviation supports. “The problem with the
European trading scheme is that it began with a market-based measure—a tax. 174

A market-based measure is designed to influence behavior by providing financial incentives and disincentives for certain results. 175 Taxes operate in a similar fashion, promoting the change of behavior to limit overall tax liability. 176 For a market-based measure, the only real difference is that the market, rather than the government, determines the exact financial burden or benefit. 177 The government, however, is still imposing a cost to influence behavior whether it is through the creation of the market or through a tax. 178

This fact goes to the root of the problem with the EU ETS, the need for incentives. 179 International aviation already has the proper incentive to increase efficiency and reduce emissions, which can be summed up in two words: fuel costs. 180 Jet fuel represents airlines’ largest cost, edging close to thirty percent of all operating expenses. 181 “Annually, a 1 cent increase in a gallon costs U.S. airlines $175 million; a one dollar increase in a barrel costs them $415 million.” 182 This provides all the incentives airlines need to reduce fuel consumption and, as a result, emissions. 183 Indeed, U.S. airlines

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174. Rosenthal, supra note 84 (quoting Nancy Young, the vice president for environmental affairs of Airlines for America).
175. See Andrus, supra note 1544, at 16 (explaining that a market-based measure differs from a tax in the mechanism that is used and not the predictability of cost compliance).
176. See id. (“[T]he target of a tax may be expected to operate within certain limits to avoid paying higher taxes, or to invest in new equipment to receive a tax break.”).
177. See id. (“The primary difference is that, for a market-based measure, the ‘market,’ rather than the government, sets the amount of the financial penalty or reward.”).
178. See id. (“[I]t is still the government imposing that cost, whether it is styled a tax, charge, or market-based measure.”).
179. See Leggett et al., supra note 139, at 18–19 (demonstrating that the incentives for airlines to comply with the Aviation Directive are minimal when airlines pass the costs onto their customers).
180. See id. at 20 (arguing that higher fuel costs alone are sufficient to encourage efficiency and increased biofuel use, curbing emissions).
183. See Leggett et al., supra note 137, at 20 (“Rising fuel expenses also require a rising share of airlines’ revenues, from around 12%–15% in 2002 to around 26%–35% in 2010.”).
have reduced their fuel intensity (energy consumed per passenger mile) by forty-one percent, more than any other mode of transportation. In addition, airlines are investing in a host of advances that will continue to save fuel and reduce emissions. These include improved aircraft management, modernized aircraft fleets, and biomass-based fuels. Since the current market structure already provides incentives for airlines to reduce emissions there is no need for unilateral market-based measures or carbon taxes on international aviation.

V. Conclusion

The Aviation Directive was developed to help the EU reach its target emission reductions under the Kyoto Protocol. The Kyoto Protocol, however, specifically designated the ICAO as the entity that should regulate emissions from international aviation. Furthermore, the Chicago Convention charges the ICAO with creating uniformity in international aviation regulation. Therefore, regardless of the ECJ opinion, the ICAO is the only appropriate body to decide whether it is even appropriate to develop, implement, and direct an international aviation emissions initiative.

The Aviation Directive embodies the fundamental flaw where unilateral action is forced upon other state actors in a misguided effort to address a perceived problem that is already being addressed on the

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184. See id. at 6 (discussing the improvement in airline fuel efficiency between 1990 and 2008).
185. See id. at 6–7 (noting that more efficient aircraft designs, alternative fuels, and improved air traffic control will further reduce fuel usage).
186. See id. at 7 (noting that air traffic modernization efforts will reduce emissions by a predicted fourteen million tons, modernized aircraft fleets will lead to a twenty-five percent reduction in CO$_2$ emissions, and the use of biomass fuels “can have a net CO$_2$ emissions approaching zero”).
187. See id. at 19 n.57 (arguing that the cost of fuel is a more significant driver of aviation fuel demand than carbon allowances).
188. See supra notes 95–96 and accompanying text (outlining the Kyoto Protocol’s and ICAO’s roles).
189. See Kyoto Protocol, supra note 15, at art. 2, § 2 (assigning ICAO as one of several bodies responsible for reducing emissions).
190. See Chicago Convention, supra note 94, at art. 37 (charging the ICAO with adopting and amending international standards to ensure the highest degree of collaboration between contracting states).
191. See Reagan, supra note 10, at 380 (“International aviation emissions reductions should be aggressively pursued through the ICAO because it is responsive to the political, technical, and legal implications raised by the regulation.”).
The EU should not apply the ETS to international air carriers and should stop subverting the global efforts to reduce emissions. The airline industry is committed to aggressive emissions reductions including “an annual average fuel and CO₂ efficiency improvement of 1.5 percent through 2020 and carbon-neutral growth from 2020, with an aspirational goal of a 50 percent reduction in CO₂ by 2050 relative to 2005 levels.” If, and only if, airlines cannot live up to these commitments should ICAO proceed with a tax or market-based measure seeking to limit emissions.

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192. See Sean Lengell, *Europeans Eye Tough Emissions Rules for Airlines*, WASH. TIMES, Dec. 21, 2006, at A3 (quoting Federal Aviation Association spokeswoman Laura Brown) (“Such a unilateral approach [by the EU] will prove unworkable and will undercut rather than support international efforts to implement system improvements to better manage aviation emissions impacts.”).

193. See Veno, *supra* note 12, at 687 (“If they impose this scheme despite the dissatisfaction of so many key players, they could in turn create an adverse effect of increasing the amount of carbon emissions from international aviation traffic.”).


195. See Leggett et al., *supra* note 139, at 23 (outlining the ATA arguments against the Aviation Directive, in particular “that any environmental standards or market-based mechanisms to reduce GHG from aviation should be implemented through ICAO”).
Clean Air v. Electric Reliability: 
The Case of the Potomac River Generating Station

James W. Moeller

Initially, let me emphasize that [the] EPA completely agrees with the goal of maintaining the reliability of the electricity grid. The lights have not gone out in the past, due to Clean Air Act regulations, and our rules won’t cause them to go out in the future.

Abstract

Environmental activists considered the shutdown of the Potomac Station a victory for environmental sustainability and a victory for the cause of clean air. Additionally, citizens of Alexandria, Virginia found this to be a victory over the “outdated” polluting coal burning power plant. Looking at the history of the Potomac Station, however, shows that without significant increases in transmission capacity to the mid-Atlantic, the Potomac Station could never have been shut down. This article addresses the case of the Potomac Station and the role of the Department of Energy, the Environmental Protection Agency, the Virginia Department of Environmental Quality, and the Federal Energy Regulatory Commission in the shutdown of the Potomac Station to show that without an expansion in transmission capacity, the environmental concerns would not be enough to shut down the Potomac Station.

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## I. Introduction and Background

### A. Clean Air v. Electric Reliability

A plethora of proposed and promulgated regulations under the Clean Air Act (CAA)\(^2\) has ignited a debate over the impact of Environmental Protection Agency (EPA) regulations on the reliability of the U.S. electric power grid. In the last several years, final and proposed rules on, for example, cross-state air pollution,\(^3\) revised air quality standards

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CLEAN AIR V. ELECTRIC RELIABILITY

for ozone, national emissions standards for hazardous air pollutants, and greenhouse gas emissions, have raised concerns that new CAA regulations could force the shutdown of coal-fired electric power plants critical to electric reliability. The ensuing debate over clean air versus electric reliability acquired additional momentum in June 2013 when President Obama announced a national plan to address climate change and new standards for coal-fired power plants.


8. See, e.g., Juliet Eilperin, Obama Unveils Climate Agenda, WASH. POST, June 26, 2013, at A-1 (“President Obama delivered his most forceful push for action on global
In the context of this debate, an obscure federal statute has suddenly gained hypothetical prominence.\textsuperscript{9} Section 202(c) of the Federal Power Act authorizes the Department of Energy (DOE) to require the generation, transmission, or distribution of electric power in wartime or in other national emergencies:

During the continuance of any war in which the United States is engaged, or whenever the Commission determines that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, or of fuel or water for generating facilities, or other causes, the Commission shall have authority, either upon its own motion or upon complaint, with or without notice, hearing, or report, to require by order such temporary connections of facilities and such generation, delivery, interchange, or transmission of electric energy as in its judgment will best meet the emergency and serve the public interest.\textsuperscript{10}

DOE issuance of orders under the statute is rare. In December 2000, the DOE issued several orders under Section 202(c) in response to an electric warming on Tuesday, declaring that his administration would impose tighter pollution controls on coal- and gas-fired utilities.”).

\textsuperscript{9} See, e.g., The American Energy Initiative, Part 12, supra note 7, at 394–96 (discussing coal and current electricity generation in response to EPA regulations); see also Electrical Outages: Hearing Before the S. Comm. on Energy and Natural Resources, 112th Cong. 41–45 (2012) (statement of Patricia Hoffman, Assistant Secretary, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy) (stating that the Department of Energy’s order required the Mirant power station to continue generating electricity, regardless of the violation of federal environmental law and even though there was not an immediate need for power generation, only a concern that there may be a need for additional electrical capacity).

\textsuperscript{10} 16 U.S.C. § 824a(c) (2012); see generally 10 C.F.R. §§ 205.370–79 (regulating emergency interconnections of electric facilities and transfers of electricity to alleviate an emergency electric power shortages). The DOE proposed regulations to implement Section 202(c) in January 1981. See Emergency Interconnection of Electric Facilities and the Transfer of Electricity to Alleviate an Emergency Shortage of Electric Power, 46 Fed. Reg. 71 (proposed Jan. 2, 1981) (proposing a rulemaking regarding the regulations pursuant to section 202(c) and 202(d)). These regulations to implement Section 202(c)) were promulgated in August 1981. See Emergency Interconnection of Electric Facilities and the Transfer of Electricity To Alleviate an Emergency Shortage of Electric Power, 46 Fed. Reg. 39,984 (Aug. 6, 1981) (to be codified at 10 C.F.R. pt. 205 § 370).
power shortage in California. In August 2003, in response to a massive blackout throughout the Northeast, an order was issued under the statute to require the operation of a transmission line from Connecticut to Long Island. In September 2005, the DOE issued two orders under Section 202(c) in response to Hurricane Rita. Finally, the DOE issued an order in September 2008 in response to Hurricane Ike.

To ensure electric reliability, the DOE could use the statute to thwart the shutdown of a power plant unable to comply with new EPA regulations. Since its enactment in 1935, Section 205 has only been used in one instance to require the operation of a power plant despite its violation of CAA requirements. On August 24, 2005, Mirant Potomac River, LLC (Mirant Potomac) shut down the Potomac River Generating Station (Potomac Station), a 482-megawatt (MW) power plant in the city of

11. See, e.g., Notice of Issuance of Emergency Orders Under Section 202(c) of the Federal Power Act, 65 Fed. Reg. 82,989 (Dec. 29, 2000) (providing notice of the emergency order and subsequent amendment to the order to address a shortage of electric energy in California); see also Amended Order Pursuant to Section 202(c) of the Federal Power Act, 65 Fed. Reg. 82,990 (Dec. 20, 2000) (providing notice of amended order); Order Pursuant to Section 202(c) of the Federal Power Act (Jan. 11, 2001), available at http://energy.gov/sites/prod/files/202%28c%29%20order%20January%202001.pdf (ordering entities to generate electricity).

12. See Dep’t of Energy Order No. 202–03–1 (Aug. 14, 2003) (ordering the Cross-Sound Cable Company to operate the Cross-Sound Cable as necessary to resolve disruptions in energy transmission in the Northeast United States and Southeast Canada); Dep’t of Energy Order No. 202–02–1 (Aug. 16, 2002) (addressing the operation of the transmission line from Connecticut to Long Island); see also Dep’t of Energy Order No. 202–03–2 (Aug. 28, 2003) (extending the August 14, 2003 order); Dep’t of Energy Order No. 202–03–4 (May 7, 2004) (terminating the August 14, 2003 order); see generally Regional Energy Reliability and Security: DOE Authority to Energize the Cross Sound Cable: Hearing Before the Subcomm. on Energy and Air Quality of the H. Comm. on Commerce and Energy, 108th Cong., 2nd Sess. (2004) (“Following the blackout last August 14, Secretary of Energy used his emergency powers to order the cable put into operation. Testimony today will address how the cable was used to stabilize the grid in the northeast and how it can help relieve transmission congestion in New York and the New England RTO.”).

13. See Dep’t of Energy Order No. 202–05–1 (Sept. 28, 2005) (authorizing and directing CenterPoint Energy to connect to transmission lines to restore energy services to Entergy Gulf States, Inc. and electrical cooperatives in Texas); Dep’t of Energy Order No. 202–05–2 (Sept. 30, 2005) (authorizing and directing TXU Electric Delivery to temporarily provide electrical energy to Deep East Electric Cooperative, a utility normally served by Entergy Gulf States, Inc.).


15. See Proposed Budget for Fiscal Year 2012 for the Department of Energy: Hearing Before the S. Comm. on Energy and Natural Resources, 112th Cong. 70 (2011) (responses of Hon. Steven Chu to questions from Senator Murkowski) (“The [DOE] is aware of only one instance where there was a possible conflict between an emergency order issued under FPA section 202(c) and environmental statutes.”).
Alexandria, Virginia. A sixty-year-old coal-fired power plant, Potomac Station sold electric power to the Potomac Electric Power Company (PEPCO), which provides electric power to Washington, D.C. and to adjacent counties in Maryland. Mirant Potomac initiated the shutdown after the Virginia Department of Environmental Quality (DEQ) ordered “such action as necessary” for the protection of human health and the environment in the area around Potomac Station.

In response to the shutdown, the District of Columbia Public Service Commission (PSC), on August 24th, filed an emergency petition and complaint with the DOE and the Federal Energy Regulatory Commission (FERC). Filed under Section 202(c), the petition sought a DOE order that would direct Mirant Potomac to resume the operation of Potomac Station. On December 20th, almost four months after the shutdown, and in response to the PSC petition, DOE issued an order to Mirant Potomac to restart Potomac Station.

Last December, following a prolonged campaign by environmental activists, Potomac Station was retired. The Sierra Club and the American

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16. See Leef Smith, Mirant Power Plant to Close Temporarily, WASH. POST, Aug. 25, 2005, at B1 (reporting the closing of the Mirant power plant); see also Leef Smith, Power Plant Faces Shutdown Over Pollutants, WASH. POST, Aug. 23, 2005, at B1. (detailing the wattage specifics and some of the complaints regarding the plant’s environmental effects on the surrounding community).


19. See § 824a(c) (authorizing the Commission to require generation of electric energy).

20. See Emergency Pet. & Compl., supra note 188 (responding to the impending shutdown of the Potomac Station).

21. See Dep’t of Energy Order No. 202-05-3 (Dec. 20, 2005) (ordering that the Potomac Station restart producing electric duty due to a shortage of electric energy); see also Emergency Order to Resume Limited Operation at the Potomac River Generating Station, Alexandria, VA, in Response to Electricity Reliability Concerns in Washington, D.C., 71 Fed. Reg. 3279 (Jan. 20, 2006) (describing the DOE order and the subsequent response and actions by the Center on Environmental Quality).

22. See Patricia Sullivan, GenOn Power Plant in Alexandria Set to Close, WASH. POST (Sept. 29, 2012), http://articles.washingtonpost.com/2012-09-29/local/35494994_1_genon-
Clean Skies Foundation aided local activists.\(^{23}\) The plant was permanently shut down, however, only after measures, years in the making, were put into place to ensure electric reliability for Washington, D.C.\(^ {24}\)

The case of the Potomac Station shutdown over clean air concerns, its restart under Section 202(c) due to electric reliability concerns, and ultimate retirement over clean air concerns, indicate that environmental activism did not force the shutdown of Potomac Station.\(^ {25}\) Instead, careful and farsighted transmission expansion planning, which ensured electric reliability for Washington, D.C., permitted the retirement of the power plant.\(^ {26}\)

Ironically, the transmission expansion planning that permitted the retirement of Potomac Station\(^ {27}\) was not supported by the environmental activists that sought to shut down the power plant.\(^ {28}\) In fact, some of those activists opposed the construction of a transmission line\(^ {29}\) that supported a determination that the retirement of Potomac Station would have no adverse

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26. See Analysis Grp., Inc., supra note 244, at 12 (discussing the transmission expansion plan that was undertaken to ensure reliable energy to the D.C. area).

27. See id. (discussing the transmission expansion plan undertaken to ensure reliable energy to the D.C. area).


consequences for electric reliability for Washington, D.C.\textsuperscript{30} It appears, therefore, that those activists were working at cross purposes.

The foreseeable use by the DOE of Section 202(c) to thwart the shutdown of a coal-fired power plant unable to comply with new EPA regulations suggests a need to update the seventy-five year old statute. In particular, a power plant unable to comply with new CAA requirements, if ordered to generate electric power to maintain electric reliability, would be forced to choose between compliance with a DOE order and compliance with the CAA.\textsuperscript{31} The statute should be updated to clarify the legal liability of the power plant for compliance with the DOE order.

B. Background

1. Potomac Station

PEPCO constructed Potomac Station between 1949 and 1957.\textsuperscript{32} In December 2000, PEPCO, in response to deregulation of electric power in Maryland,\textsuperscript{33} sold Potomac Station and three Maryland electric power plants to Southern Energy, Inc. (SEI), an affiliate of Southern Company.\textsuperscript{34} SEI

\textsuperscript{30} See Analysis Grp., Inc., supra note 244, at 11 (“According to PEPCO, construction of these lines was anticipated to resolve all reliability concerns, including those that would result from the retirement of the PRGS.”).

\textsuperscript{31} See infra note 73 and accompanying text (noting that it is necessary to violate CAA requirements in order to comply with a DOE order).

\textsuperscript{32} See Analysis Grp., Inc., supra note 244, at 3 (stating that the five turbines were built between 1949 and 1957).


\textsuperscript{34} See, e.g., Potomac Electric Power Co., Order Authorizing Disposition of Jurisdictional Facilities, Disclaiming Jurisdiction Over Passive Investors, Granting Waivers of Codes of Conduct, and Granting Waiver of Certain Requirements Under Order Nos. 888 and 889, 93 Fed. Energy Reg. Comm’n Rep. (CCH) ¶ 61,240 (2000) (discussing and approving the sale of the Potomac Station to SEI). In addition to Potomac Station in Alexandria, Virginia, PEPCO sold the 2,339-MW Chalk Point Station in Prince George’s County, Maryland; the 837-MW Dickerson Station in Montgomery County, Maryland; and the 1,412-MW Morgantown Station in Montgomery County. See id. ¶¶ 61,766 (discussing PEPCO’s proposed transfer of four power generating stations); see also Dana Hedgpeth, PEPCO to Sell Four Power Plants, Wash. Post, June 9, 2000, at E4 (“Potomac Electric Power Co. will sell four of its power-generating plants in Maryland and Virginia for $2.65 billion to Atlanta-based Southern Energy Inc., a unit of Southern Co.”). PEPCO ultimately sold the four plants for $2.75 billion. See Business in Brief, Wash. Post, Dec. 20, 2000, at E2 (reporting that PEPCO sold the four power plants for $2.75 billion).
placed Potomac Station under the control of Southern Energy Potomac River, LLC, which, in February 2001, changed its name to Mirant Potomac. Soon thereafter, Mirant Potomac concluded an agreement with Mirant Americas Energy Marketing, LP (MAEM) for the sale of electric power from Potomac Station to MAEM, and MAEM concluded two agreements with PEPCO for the sale of electric power from MAEM to PEPCO.

In July 2003, Mirant Corporation filed for bankruptcy in the U.S. Bankruptcy Court for the Northern District of Texas. An amended plan for the reorganization of Mirant Corporation was approved in December 2005. In January 2006, Mirant Corporation emerged from bankruptcy.

On December 3, 2010, Mirant Corporation merged with RRI Energy, Inc. (RRI). The surviving corporation, RRI, changed its name to GenOn Energy, Inc. (GenOn). Two years later, NRG Energy, Inc. (NRG) acquired GenOn, which became a subsidiary company of NRG.
2. Clean Air Act Regulation

Pursuant to Section 110 of the CAA, the Commonwealth of Virginia maintains an EPA-approved State Implementation Plan (SIP) to provide for the attainment of National Ambient Air Quality Standards (NAAQS). In Section 113 of the CAA, the EPA is authorized to enforce the Virginia SIP.

In September 2000, the DEQ, pursuant to the Virginia Air Pollution Control Law (APCL), and in accordance with the regulations promulgated thereunder, issued a permit to PEPCO to operate Potomac Station. The three-page permit included nine conditions. Incorporated into the SIP, the permit limited Potomac Station emissions of nitrogen oxides (NO\textsubscript{x}) to 1,019 tons each year from May 1st through September 30th (Ozone Season). Compliance with this limit would begin in 2003 and would require continuous emissions monitoring. An emissions report for each Ozone Season would be submitted to the DEQ by October 30th each year.

Under the APCL, the Virginia Air Pollution Control Board (APCB) promulgates regulations to implement the statute. The DEQ enforces the statute and the regulations promulgated thereunder. The DEQ also issues

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44. See 42 U.S.C. § 7410 (2012) (articulating SIPs); see also 40 C.F.R. §§ 52.2420–52.2465 (2007) (laying out the SIP for Virginia under the CAA). The SIP was revised in December 2000 to reflect the issuance of a DEQ operating permit to PEPCO to operate Potomac Station. See Approval and Promulgation of Air Quality Implementation Plans, 65 Fed. Reg. 78,100 (Dec.14, 2000) (revising the SIP to reflect the issuance of a DEQ operating permit to PEPCO to operate Potomac Station).


47. See VA. ADMIN. CODE §§ 5-10-10 to 5-510-250 (2013) (establishing ambient air quality standards and authorizing the DEQ to grant operating permits).

48. See Commonwealth of Virginia Operating Permit, Stationary Source Permit to Operate (Sept. 18, 2000) (discussing permit issuing under 9 VA. ADMIN. CODE § 5-80-800 C.2.b).

49. See id. (establishing several limitations including a NO\textsubscript{x} cap).

50. See Approval and Promulgation of Air Quality Implementation Plans, 65 Fed. Reg. 78,100 (Dec. 14, 2000) (revising the SIP to reflect the issuance of a DEQ operating permit to PEPCO to operate Potomac Station).

51. See Stationary Source Permit to Operate, supra note 488, at Permit Condition 3.

52. See id. at Permit Condition 4 (discussing the monitoring requirement).

53. See id. at Permit Condition 5 (discussing the submission of an emissions report).

54. See VA. CODE ANN. § 10.1-1308 (2011) (describing the Board’s process in creation of regulations and providing a description of the regulations).

55. See VA. CODE ANN.§ 10.1-1307.3 (2007) (stating that under the APCL, the Executive Director of the Virginia Department of Air Pollution Control enforces the statute.
permits under the APCL.\textsuperscript{56} Thus, the DEQ is authorized to issue special orders to require compliance with the APCL, with regulations promulgated thereunder by the APCB, and with permits issued by the DEQ under the APCL.\textsuperscript{57} In addition, the APCL authorizes civil penalties and injunctions for violations of the statute and of APCB regulations promulgated thereunder.\textsuperscript{58}

3. Electric Reliability and Transmission Planning

PEPCO owns the transmission lines that provide power service to the metropolitan D.C. region.\textsuperscript{59} PJM Interconnection, L.L.C. (PJM), a FERC-approved regional transmission organization for a thirteen-state area concentrated in the Mid-Atlantic region, operates those transmission lines and the entire transmission system for the Mid-Atlantic region. PJM, an acronym for Pennsylvania-Jersey-Maryland, provides transmission service to fifty four million people in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and Washington, D.C.\textsuperscript{60} PJM also manages wholesale bulk power markets in the Mid-Atlantic region.\textsuperscript{61}

Under the FERC-approved PJM Open Access Transmission Tariff (OATT),\textsuperscript{62} PJM is required to operate the Mid-Atlantic transmission system and the regulations promulgated thereunder). In 1992, DEQ assumed the programs and functions of the Department of Air Pollution Control. See \textit{VA. CODE ANN.} § 10.1-1183 (2013) (stating that the DEQ assumed the programs and functions of the Department of Air Pollution Control in 1992); see \textit{generally} \textit{VA. CODE ANN.} §§ 10.1-1182–10.1-1197.4 (2013) (codifying the DEQ’s responsibilities to control air pollution); 9 \textit{VA. ADMIN. CODE} §§ 15-11-10–15-30-170 (2013) (laying out the responsibilities of the DEQ).

56. See \textit{VA. CODE ANN.} § 10.1-1322 (2012) (establishing that under the APCL, the Department of Air Pollution Control issues permits).

57. See \textit{VA. CODE ANN.} § 10.1-1186 (2012) (stating that issuing special orders is a power of the Board that the Director may delegate as he sees fit).


61. See Fact Sheets, supra note 59 (stating that PJM is involved in the coordination of the movement of wholesale electricity throughout the Mid-Atlantic region).

in accordance with, *inter alia*, electric reliability standards adopted by the North American Electric Reliability Corporation (NERC).\(^{63}\) NERC reliability standards are enforceable by FERC under the Energy Policy Act of 2005.\(^{64}\)

Because the reliability of the electric grid in the Mid-Atlantic region is the responsibility of PJM, transmission expansion is planned and supervised by PJM.\(^{65}\) To plan for the enhancement and expansion of

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\(^{63}\) See, e.g., OATT, Attachment K, Appendix ¶ 1.7.11(a) (setting out the minimum emergency procedure requirements); Amended and Restated Operating Agreement of PJM Interconnection, L.L.C., Third Revised Rate Schedule FERC No. 24 (Sept. 29, 2006) (Operating Agreement), Schedule 1 ¶ 1.7.11(a).


\(^{65}\) See PJM INTERCONNECTION, PJM 2010 REGIONAL TRANSMISSION EXPANSION PLAN 1 (2011) [hereinafter 2010 RTEP], available at http://www.pjm.com/documents/reports/rtep-documents/2010-rtep.aspx (explaining that regional transmission planning and addressing reliability are the primary responsibilities for PJM as a FERC-approved Regional
transmission facilities to ensure electric reliability, PJM has developed an annual Regional Transmission Expansion Plan (RTEP) each year since 1997. To develop each annual plan, PJM employs a process that utilizes a five-year and a fifteen-year window. Within those windows, PJM analyzes anticipated increases in demand for electric power, potential requests to interconnect new power plants to the transmission system, anticipated retirements of old power plants, and other variables that affect the need for transmission. PJM also assesses transmission projects proposed by the public utilities that belong to PJM and that own the transmission facilities that PJM operates.

II. Potomac Station Shutdown and Section 202(c)

A. Federal and State Clean Air Act Violations

1. EPA Notice of Violation

The shutdown of Potomac Station in August 2005 was preceded by violations of CAA requirements identified by the EPA and by the DEQ. It
also was preceded by an unsuccessful attempt by the City of Alexandria to force the shutdown of the plant.\textsuperscript{74}

In January 2004, the EPA issued a Notice of Violation (NOV) to Mirant Potomac under the CAA.\textsuperscript{75} The NOV alleged a violation of limits on NO\textsubscript{x} emissions from Potomac Station under the DEQ 2000 operating permit.\textsuperscript{76}

In September 2004, the EPA filed with the U.S. District Court for the Eastern District of Virginia a proposed consent decree with Mirant Potomac to settle the NOV.\textsuperscript{77} Virginia and Maryland were signatories to the proposed consent decree, which would have imposed conditions on Potomac Station as well as on Chalk Point Station in Prince George’s County, Maryland; the Dickerson Station in Montgomery County, Maryland; and the Morgantown Station in Charles County, Maryland.\textsuperscript{78} In

Potomac River, LLC (Dept. of Envtl. Quality Sept. 10, 2003) (notice of violation) [hereinafter DEQ NOV], available at http://alexandriava.gov/uploadedFiles/tes/info/2003-09-10%20VaDEQ%20Mirant%20NOx%20NOV.pdf (stating that Mirant’s NO\textsubscript{x} emissions for 2003 exceeded the emissions limit of Mirant’s Permit and thus violated a condition of the Permit) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

\textsuperscript{74} See Council Votes Against Mirant, \textit{WASH. POST}, Nov. 18, 2004, at T4 (explaining that the Alexandria City Council voted to revoke the operating status of Mirant Potomac River power plant in 2004).

\textsuperscript{75} See \textit{EPA NOV}, supra note 7373, at 1 (“This Notice of Violation is issued to Mirant Corporation for violations of the Clean Air Act.”).

\textsuperscript{76} See id. at 2–3 (alleging that Mirant reported NO\textsubscript{x} emissions exceeding the DEQ permit limit by 155 tons). On August 26, 2003, Mirant Potomac advised DEQ that NO\textsubscript{x} emissions from Potomac Station from May 1 through August 26 totaled 1,174 tons. See id. at 3 (“On August 26, 2003, [DEQ] was informed by Mirant that the NO\textsubscript{x} emissions . . . beginning with the commencement of the 2003 ozone season was approximately 1,174 tons. The reported amount exceeded . . . Permit Condition 3 of the Permit to Operate by approximately 155 tons.”). By the end of ozone season in 2003, NO\textsubscript{x} emissions for the year totaled 2,139 tons. See id. (“By the end of the 2003 ozone season, the emissions of NO\textsubscript{x} from the plant totaled approximately 2,139 tons, approximately 965 tons in excess of the emission limit in Permit Condition 3.”).


\textsuperscript{78} See Consent Decree No. 1:04-cv-1136 ¶¶ 2, 16 (explaining that the Consent Decree is binding on Mirant, and that the “Mirant System” includes the Chalk Point Plant, Dickerson Plant, Morgantown Plant, and Potomac River Plant). Chalk Point Station was
particular, the consent decree would have required a reduction in aggregate NO\textsubscript{x} emissions from the four electric power plants from 36,500 tons in 2004 to 16,000 tons by 2010.\footnote{See id. ¶ 49 (requiring Mirant to comply with NO\textsubscript{x} tonnage limitations starting at 36,500 tons in 2004 and falling each year until they reach 16,000 tons by 2010).}

In addition, and with respect to Potomac Station, the consent decree would have required Mirant Potomac to: (i) install and operate, by May 1, 2005, low-NO\textsubscript{x} burners on Unit Nos. 3, 4 and 5 to reduce NO\textsubscript{x} emissions;\footnote{See id. ¶ 42 (stating that Potomac Station must install and operate low-NO\textsubscript{x} burners for certain units as long as those units are in operation).} (ii) cease operation, by May 1, 2005, of Unit Nos. 3, 4, and 5 unless it had installed separated over-fire air technology to reduce NO\textsubscript{x} emissions;\footnote{See id. ¶ 43 (stating that unless Potomac Station has installed and continuously operated “SOFA” technology, it must discontinue operation of Potomac Plant Units 3, 4, and 5).} and (iii) limit NO\textsubscript{x} emissions throughout the Ozone Season to 1,750 tons in 2004, 1,625 tons in 2005, 1,600 tons in 2006–2009, and 1,475 tons thereafter.\footnote{See id. ¶ 44 (setting limits on Potomac Station’s ozone season NO\textsubscript{x} emissions from 2004 onward).}

The consent decree contemplated two civil penalties imposed on Mirant Potomac: a $250,000 fine payable to the U.S. and a second $250,000 fine payable to the Commonwealth of Virginia.\footnote{See Consent Decree, supra note 78, ¶¶ 71, 73 (requiring Mirant to pay $250,000 to the federal government and $250,000 to the Commonwealth of Virginia within thirty days of the Consent Decree).} Finally, the consent decree would have required Mirant Potomac to undertake nine environmental projects, specified in an appendix to the decree, for Potomac Station.\footnote{See id. ¶ 64 app. A (explaining that Mirant shall comply with the terms of the Consent Decree, which include nine different environmental projects meant to reduce emissions). The nine projects concerned bottom ash and fly ash silo vent filtration, coal pile wind erosion and dust suppression, coal-conveying system dust suppression, ash-loading system upgrade, ash-loading system dust suppression, coal railcar unloading system dust suppression, settled dust investigation, truck washing facilities, and Mirant Corporation financial participation in the Clean Air Partners Project of the Commonwealth of Virginia. See id. at app. A (discussing the nine projects).} A failure by Mirant Potomac to spend a minimum of $1 million on the nine projects would have required the expenditure of additional

owned by Mirant Chalk Point, LLC while Dickerson and Morgantown Stations were owned by Mirant Mid-Atlantic, LLC. See id. at 1 (stating the underlying facts of the consent decree). All three plants were operated by Mirant Mid-Atlantic, LLC. See id. (noting the station operator).
funds, for increased reductions of particulate matter (PM) and fugitive dust emissions, until the $1 million objective was achieved.\footnote{See id. \S 65 (stating that if Mirant completes each of the nine projects in Appendix A, but spends less than $1 million on them, it must either spend the balance of the $1 million on a project or must pay the balance as a penalty).}

In response to public comments on the proposed consent decree, the terms of the agreement were revised, and a proposed amended consent decree was filed with the Eastern District of Virginia in May 2006.\footnote{See Amended Consent Decree, United States v. Mirant Potomac River, LLC, No. 1:04-CV-1136 (E.D. Va. Apr. 20, 2007) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Notice of Lodging of Consent Decree Under the Clean Water Act, the Clean Air Act, and the Resource Conservation and Recovery Act, 71 Fed. Reg. 30,163 (May 25, 2006) (stating that the amended consent decree was filed on May 8, 2006, modifying the original as a consequence of public comments).} Like the original consent decree, the amended consent decree required a reduction in aggregate NO\textsubscript{x} emissions from the four electric power plants from 36,500 tons in 2004 to 16,000 tons by 2010;\footnote{See Amended Consent Decree, supra note 86, \S 57 (requiring that Mirant comply with tonnage limitations for NO\textsubscript{x}, which begin at 36,500 tons for 2004 and fall each year until they reach 16,000 tons for 2010).} and required Mirant Potomac to install and operate the low-NO\textsubscript{x} burners on Unit Nos. 3, 4 and 5,\footnote{See id. \S 50 (stating that the Potomac Station must install and operate low-NO\textsubscript{x} burners for certain units as long as those units were in operation).} cease operation of Unit Nos. 3, 4 and 5 unless it installed separated over-fire air technology,\footnote{See id. \S 51 (stating that unless the Potomac plant has installed and continuously operated “SOFA” technology, it must shut down operation of Potomac Plant Units 3, 4, and 5).} and limit NO\textsubscript{x} emissions throughout the Ozone Season to 1,750 tons in 2004, 1,625 tons in 2005, 1,600 tons from 2006–2009, and 1,475 tons thereafter.\footnote{See Amended Consent Decree, supra note 86, \S 52 (setting limits on Potomac Plant’s ozone season NO\textsubscript{x} emissions from 2004 onward).}

In addition, and also like the original consent decree, the amended consent decree imposed on Mirant Potomac a $250,000 fine payable to the U.S.,\footnote{See id. \S 79 (requiring that within thirty days of the entry of the Amended Consent Decree, Mirant must pay a civil penalty of $250,000 to the United States).} imposed a second $250,000 fine payable to the Commonwealth of Virginia,\footnote{See id. \S 81 (requiring Mirant to pay a civil penalty of $250,000 within thirty days of the entry of the Amended Consent Decree).} and required Mirant Potomac to undertake the original nine environmental projects for Potomac Station.\footnote{See id. \S 72 (stating that Mirant shall implement each of the nine projects in Appendix A).} In contrast to the original consent decree, however, the amended consent decree imposed on Potomac Station annual NO\textsubscript{x} emissions limits as well as NO\textsubscript{x} emissions limits for the
The amended consent decree required Mirant Potomac to limit annual NO\textsubscript{x} emissions to 3,700 tons from 2005 to 2010 and in each year thereafter.\textsuperscript{95} In January 2007, the EPA requested that the Eastern District approve the amended consent decree.\textsuperscript{96} In April 2007, over three years after the issuance of the EPA NOV, the court approved the amended consent decree and entered judgment in the case.\textsuperscript{97}

2. DEQ Consent Order

In addition to an NOV issued by EPA, the alleged violation of limits on NO\textsubscript{x} emissions from Potomac Station during the 2003 Ozone Season also resulted in the issuance of an NOV by DEQ in September 2003.\textsuperscript{98} Like the EPA NOV, the DEQ NOV also alleged a violation of the DEQ 2000 permit to operate Potomac Station, which limited Potomac Station NO\textsubscript{x} emissions to 1,019 tons each year during the Ozone Season.\textsuperscript{99} The NOV was revised after the close of the Ozone Season.\textsuperscript{100}

No civil penalties or injunctions, however, were issued.\textsuperscript{101} One year after the DEQ NOV was issued, the state enforcement proceeding was resolved.\textsuperscript{102} In September 2004, Mirant Potomac accepted a consent order

\textsuperscript{94} See id. ¶ 52 (limiting the annual, as well as Ozone Season, NO\textsubscript{x} emissions).

\textsuperscript{95} See id. (requiring that from 2005 onward, the annual tonnage limit for NO\textsubscript{x} is 3,700 tons).

\textsuperscript{96} See Kirstin Downey, Courts Reject Alexandria Power Plant Moves, WASH. POST, Apr. 21, 2007, at B4 (discussing the Amended Consent Decree between the EPA and Mirant).

\textsuperscript{97} See id. (stating that federal district court approved the amended consent decree).

\textsuperscript{98} See DEQ NOV, supra note 73, at 1 (discussing the terms of the notice of violation). The NOV was issued soon after DEQ issued a report on PM emissions from Potomac Station. See Chris L. Jenkins, Digging Up Dirt on Mystery Ash in Alexandria, WASH. POST, Nov. 20, 2003, at T14 (discussing a DEQ report that associated a significant portion of soot buildup with Potomac Station).

\textsuperscript{99} See id. at 2 (stating that Mirant’s Potomac Station emissions exceeded the 1,019 tons allowed under its Permit).


\textsuperscript{101} See DEQ NOV, supra note 73, at 2–3 (stating that while the DEQ had the authority to impose a civil penalty up to $10,000, the notice of violation only required Mirant to contact DEQ and inform the agency of their planned corrective action).

\textsuperscript{102} See AIR POLLUTION CONTROL BD., COMMONWEALTH OF VA. DEP’T OF ENVTL. QUALITY, ORDER BY CONSENT ISSUED TO MIRANT POTOMAC RIVER, LLC § A (2004)
issued by the APCB. In particular, Mirant Potomac agreed under the consent order to perform a refined modeling analysis to assess the effect of “downwash” from Potomac Station on concentrations of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), and PM for comparison to applicable NAAQS in the area around the plant.

Mirant Potomac also agreed that, if the modeling analysis indicated a violation of NAAQS for those pollutants, then a plan and schedule would be submitted to the DEQ within ninety days to eliminate and prevent the violation. Finally, the consent order observed that the DEQ had undertaken a review of the permit to operate Potomac Station.

The consent order imposed the requirement for the “downwash” analysis in part on the basis of an analysis, commissioned by residents of a condominium building near Potomac Station, which concluded that plant emissions might violate applicable NAAQS. The consent order observed that “[a]lthough the Sullivan Screening does not establish conclusively that emissions from the Facility result in exceedances [sic] of the NAAQS at Marina Towers, the [DEQ] believes that the results of the Sullivan Study warrant that further comprehensive analysis be conducted in accordance with DEQ and EPA approved modeling procedures.”


103. See id. at 6 (stating that Mirant Potomac River voluntarily agreed to this order dated Sept. 23, 2004).

104. See id. § D ¶ 1 (stating that Mirant agreed to do a refined modeling analysis to assess the effect of “downwash” on concentrations of various pollutants). Downwash “means the effect that occurs when aerodynamic turbulence induced by nearby structures causes pollutants from an elevated source (such as a smokestack) to be mixed rapidly toward the ground resulting in higher ground-level concentration of pollutants.” Id. § B ¶ 11.

105. See id. § D ¶ 4 (explaining that if modeling analysis shows that emissions exceed NAAQS standards, Mirant must submit a plan to eliminate the excess to the DEQ).

106. See id. § C ¶ 1 (stating that DEQ is in the process of modifying Potomac Station’s Stationary Source Permit to Operate).


108. 2004 Consent Order, supra note 102, § C ¶ 4.
3. Alexandria Ordinance

In addition to the January 2004 EPA NOV and the September 2003 DEQ NOV, the City of Alexandria launched a legal initiative of its own for alleged violations of NO\textsubscript{x} emission limits from Potomac Station during the 2003 Ozone Season.\textsuperscript{109} The initiative also was in response to citizen concerns, raised in 2003, with PM emissions from Potomac Station.\textsuperscript{110} To address those concerns, the City, in October 2004, formed a Mirant Community Monitoring Group.\textsuperscript{111} Thereafter, in response to NO\textsubscript{x} emissions and PM emissions,\textsuperscript{112} Alexandria, in December 2004, voted to revoke the municipal permit to operate Potomac Station.\textsuperscript{113}

In particular, the City Council unanimously adopted a municipal ordinance to amend the City of Alexandria Zoning Ordinance.\textsuperscript{114} The municipal ordinance provided that a coal-burning power plant, located in a zone in which the operation of the plant is not a permitted use or a special use permit use, “shall be deemed a nonconforming use, and shall be subject to abatement.”\textsuperscript{115} Under the abatement provision of the Alexandria Zoning


\textsuperscript{110} See Chris L. Jenkins, Digging Up Dirt on Mystery Ash in Alexandria, WASH. POST, Nov. 20, 2003, at T14 (discussing how two Alexandria residents presented a report on the public health impact of Potomac Station PM emissions to Alexandria in August 2004, raising community concerns about Mirant’s PM emission); Spencer S. Hsu, Power Plant Study Raises Concern, WASH. POST, May 18, 2002, at B3 (citing a study that estimated that pollution from five power plants near Washington contributed to more than 260 premature deaths).

\textsuperscript{111} See Arlington Briefs, WASH. POST, Oct. 21, 2004, at T5. (“The Alexandria City Council has voted to create the Mirant Community Monitoring Group to deal with issues involving the Mirant Potomac River Power Plant.”).

\textsuperscript{112} See Juliet Eilperin, Areas With Dirtiest Air Named, WASH. POST, Dec. 18, 2004, at A20 (explaining that dangerous levels of soot pollution exist throughout large parts of Maryland, Virginia, and Washington, D.C.). In December 2004, the EPA released a list of counties in the U.S. with dangerous concentrations of PM emissions. See id. (discussing U.S. counties with dangerous concentrations of PM emissions, including Washington, D.C. and “large swathes of Maryland and much of Northern Virginia”).

\textsuperscript{113} See Council Votes Against Mirant, WASH. POST, Nov. 18, 2004, at T4. (“The Alexandria City Council voted 7–0 on Saturday to revoke the operating status of the Mirant power plant.”).

\textsuperscript{114} See generally An Ordinance to Amend, supra note 109 (amending section 12-200 of the City of Alexandria Zoning Ordinance).

\textsuperscript{115} See ALEXANDRIA, VA., ZONING ORDINANCE § 12-216(A) (1992) (stating that any electrical power generating plant that produces power by coal combustion may be subject to abatement if located in a non-permitted zone).
Ordinance, the power plant could be shut down after seven years. In addition, the municipal ordinance provided that a nonconforming plant is prohibited from building alterations that would extend the life of the electric power plant and from installing or replacing fixtures used for the generation of electric power.

In addition, the City Council unanimously approved the revocation of two special use permits, issued by the City of Alexandria in 1989, for facilities and plans related to the operation of Potomac Station. The special use permits, the revocation of which was unanimously recommended by the Planning Commission of the City of Alexandria, were issued not for the operation of the plant per se but for incidental facilities and plans. The legal rationale for the revocation was based in
part on the January 2004 EPA NOV. Under the Alexandria Zoning Ordinance, a special use permit can be revoked for “fail[ure] to comply with any law.”

The legal gambit launched by the City of Alexandria met stiff resistance. In January 2005, Mirant Potomac sued the City Council in state court. The Circuit Court for the City of Alexandria, for reasons stated in open court, entered judgment for Mirant Potomac in February 2006. The Circuit Court declared the municipal ordinance that deemed a power plant a nonconforming use under the Alexandria Zoning Ordinance invalid, and vacated the City Council revocation of the two special use permits.

the ordinance provide, however, that “[n]o use shall be conducted in any manner which would render it noxious or offensive by reason of dust, refuse matter, odor, smoke, gas, fumes, noise, vibration or glare.” Id. § 4-1306(A). The operation of Potomac Station predates the special use permit provisions of the Alexandria Zoning Ordinances. See Sullivan, supra note 22 (noting that the Potomac River Generating Station has operated for two generations).


122. ALEXANDRIA, VA., ZONING ORDINANCES § 11-506(A) (2007).


124. See Alexandria City Council v. Mirant Potomac River, LLC, 643 S.E.2d 203, 206–08 (Va. 2007) (stating the circuit court’s conclusions). The Circuit Court concluded, first, that the municipal ordinance violated section 10.1–1321.1 of the Virginia Code. See id. at 207 (arguing that the grounds for this violation do not need to be addressed because the court found a violation of VA. CODE ANN. § 15.2–2307). Second, the Circuit Court concluded that the municipal ordinance violated section 15.2–2307. See id. at 206–07 (finding that the City Council’s action impaired Mirant’s vested right to use the property under section 15.2–2307). The Circuit Court concluded, third, that the municipal ordinance constituted “piecemeal downzoning” that was unsupported by changed circumstances. See id. at 206 (stating the Circuit Court’s reasons for ruling against the City Council). Finally, the Circuit Court concluded that the revocation of the special use permits under section 11-506(A) of the Alexandria zoning ordinances for a violation of “any law” required a nexus between the violation of law and the subject matter of the special use permits which nexus the City of Alexandria failed to establish. See id. at 208 (finding that the City’s construction of the special use permit did not establish the requisite nexus, unlike the trial court’s construction).

125. See Mirant Potomac River, LLC v. Alexandria City Council, No. CH05001092, Order Entering Final Judgment, 1 (Va. Cir. Ct. Feb. 24, 2006) (invalidating Ordinance 4366 and reversing the revocation of Mirant’s use permits); see also City Still Fighting to Close Power Plant, WASH. POST, Jan. 26, 2006, at T2 (stating that although the Circuit Court set aside the revocation of Mirant’s permit, the City would appeal).
The City appealed the judgment to the Supreme Court of the Commonwealth of Virginia. In April 2007, the Supreme Court upheld the judgment of the Circuit Court. The Court concluded that, because the municipal ordinance “impaired an established vested right to operate” Potomac Station, the ordinance violated the state vested rights statute. The Court also concluded that the revocation of the two special use permits was unlawful.

126. See Alexandria City Council, 643 S.E.2d at 204 (describing the City of Alexandria’s appeal).
127. See id. (stating that the Circuit Court did not err).
128. See id. (stating that the amendment violated the Virginia Code because it impaired Mirant’s vested right to operate the plant).
129. See VA. CODE ANN. § 15.2–2307 (2010) (stating that “[n]othing in this article shall be construed to authorize the impairment of any vested right.”). Under the statute, “a landowner acquires a vested property right to conduct nonconforming use on its property if that use was in existence on the effective date of zoning ordinance which would make the use nonconforming.” Mirant Potomac, 643 S.E.2d at 206; see, e.g., Holland v. Board of Supervisors, 441 S.E.2d 20, 22 n.* (Va. 1994) (stating that a landowner could acquire a vested right for a nonconforming use if it began before the effective date). Commenced in 1949, the operation of the Potomac Station predates the 1992 special use permit provisions of the Alexandria Zoning Ordinance. See Mirant Potomac, 643 S.E.2d at 204–05 (discussing the history of the Potomac Station). Because the Virginia Supreme Court concluded that the ordinance violated the state vested rights statute, it declined to address the alternate grounds of the Circuit Court decision. See Mirant Potomac, 643 S.E.2d at 207 (“In light of our holding . . . we need not address the alternate grounds cited by the circuit court as a basis for its holding regarding the Text Amendment.”).
130. See Mirant Potomac, 643 S.E.2d at 207–08 (affirming the circuit court’s reversal of the city’s revocation of the permits). The Supreme Court affirmed that that the revocation of the special use permits under section 11-506(A) of Alexandria zoning ordinances for a violation of “any law” required a relationship between the violation of law and the special use permits. See id. at 208 (“[T]he circuit court did not err in construing the phrase ‘any law’ in § 11–506(A) of the zoning ordinance as any law having a nexus to the purpose of the SUP . . . .”). The ordinance provides that “the city council may revoke or suspend any special use permit approved by it upon proof that the holder of the permit has failed to comply with the law, including, without limitation, the conditions subject to which the special use permit was granted.” ALEXANDRIA VA., ZONING ORDINANCES § 11-506(A) (emphasis added). The Virginia Supreme Court concluded that “this provision reflects an intent to base the revocation of the SUP on activities related to the SUP.” Mirant Potomac, 643 S.E.2d at 208. Thus the permits could be revoked for a violation of the Alexandria Zoning Ordinance but not for a violation of the APCL or of the CAA. See id. at 209 (discussing the nexus requirement of section 11-506(A)).
B. State Shutdown and Federal Intervention

1. DEQ Order

The City of Alexandria ultimately failed to force the shutdown of Potomac Station. Where the City failed, however, the DEQ succeeded. In accordance with the September 2004 consent order, Mirant Potomac performed a refined modeling analysis to assess the effect of “downwash” from Potomac Station on concentrations of SO\(_2\), NO\(_2\), CO, and PM for comparison to applicable NAAQS in the area around the plant (Downwash Analysis). Published in August 2005, the Downwash Analysis concluded that “worst-case modeling results” indicate that the downwash from Potomac Station would result in violations of the NAAQS for SO\(_2\), PM, and NO\(_2\) “assuming that the facility operates at maximum possible load for the entire year.”

Also in August 2005, Alexandria released its own ambient air quality analysis of Potomac Station. Prepared by a consultant, the analysis concluded that maximum short-term impacts of emissions of PM and SO\(_2\) exceeded ambient air quality standards by “between five and eighteen times” and that maximum annual impacts of PM, SO\(_2\) and NO\(_2\) exceeded standards by “between three and twelve times.” The analysis of annual impacts indicated “that residents in these areas [near Potomac Station] are chronically exposed to concentration [of air pollutants] in excess of health-based standards.”

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133. Id. at 6-1. Several conservative assumptions were incorporated into the analysis. “For example, modeling assumed that all combustion sources at the power plant are operating at maximum load for the entire year even though the power plant operates about 60% capacity in a typical year.” Id. at 1-3. The Downwash Analysis observed that the condominium building near Potomac Station, the residents of which building commissioned the Sullivan Study, “was constructed without considering the effects of pre-existing emissions from the power plant . . . .” Id. at 5-3.


135. Id. at 3–16.
The consent order that required the Downwash Analysis also provided that if the modeling analysis indicated a violation of NAAQS for specified pollutants, then a plan and schedule would be submitted to the DEQ within ninety days to eliminate and prevent the violation. Thus the Downwash Analysis stated that “Mirant will propose a plan and schedule to eliminate these exceedances on a timely basis. This plan and schedule will be submitted by November 14 in accordance with the Consent Order.”

Before the plan and schedule were submitted, however, the DEQ, in response to the Downwash Analysis, ordered Mirant Potomac, on August 19, 2005, to “immediately undertake such action as is necessary” for the protection of human health and the environment in the area around Potomac Station. The order was issued under an administrative regulation that authorizes the DEQ to shut down a power plant subject to the APCL. In immediate response to the order, Mirant Potomac reduced the output of Potomac Station from 482 MW to 175 MW and met with DEQ officials to explore options for compliance. On August 24th, however, Mirant Potomac decided to shut down the power plant.

The reaction to the shutdown was instantaneous. Concern for electric reliability in Washington, D.C. prompted the PSC, on August 24th, to file an emergency petition and complaint with the DOE and FERC. The PSC argued that “the proposed shutdown will have a drastic

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136. See 2004 Consent Order, supra note 102, at 4 (requiring Mirant to submit a plan to ensure compliance with Standards of Performance).
137. Downwash Analysis at 6-1.
138. See Letter from Robert G. Burnley, supra note 177, at 2 (directing Mirant Potomac to advise DEQ by August 24 of actions that will be taken to eliminate and prevent violations of the NAAQS for SO\textsubscript{2}, PM, and NO\textsubscript{2}).
139. See 9 VA. ADMIN. CODE § 5-20-180(I) (stating that the APCB may shut down a facility if necessary to prevent a violation of any primary ambient air quality standard).
140. See Smith, Power Plant Faces Shutdown Over Pollutants, supra note 16616 (stating that Mirant reduced output and planned to meet with the DEQ to discuss compliance).
CLEAN AIR V. ELECTRIC RELIABILITY

and potentially immediate effect on the electric reliability in the greater Washington, D.C., area and could expose hundreds of thousands of consumers, agencies of the Federal Government and critical federal infrastructure to curtailments of electric service, load shedding and, potentially, blackouts.”

The PSC petition and complaint requested that the DOE issue an order to Mirant Potomac to require the restart of Potomac Station. The petition and complaint also requested that FERC commence an administrative hearing and “take immediate action” to prevent a Potomac Station shutdown and to avoid curtailments in electric service in the Washington area. The petition and complaint sought relief from the DOE under Section 202(c) of the Federal Power Act.

In the PSC-initiated proceeding before the FERC, seventeen parties intervened, seven parties and three individuals filed comments, and protests were filed by the DEQ and by the Southern Environmental Law Center (SELC). Mirant Potomac and PEPCO filed answers to the protests and

[hereinafter DOE Petition] (requesting that the DOE to take action) (on file with the

FERC Petition, supra note 143, at 1.

See DOE Petition, supra note 143, at 2 (“DCPSC requests that the Secretary issue orders . . . and direct Mirant to continue the operation of the Potomac River Plant until further orders are issued.”).

See FERC Petition, supra note 143, at 2 (requesting a hearing and immediate action to prevent Mirant from ceasing action).

See id. (requesting relief from the FERC under Section 207 and Section 309 of the Federal Power Act); 16 U.S.C. § 824f (2012) (providing that the Commission can determine the service to be furnished by order, rule, or regulation when a state commission complains that a public utility is affected). Section 309 provides that “[t]he Commission shall have power to perform any and all acts, and to proscribe, issue, make, amend, and rescind such orders, rules, and regulations as it may find necessary . . . .” 16 U.S.C. § 825h (2012).

See Order on Petition and Complaint, FERC No. EL05-415-000, at 3 (2006) (describing the various responsive pleadings) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). DEQ argued that FERC “should not issue any order requiring restoration of operations at the Potomac River Plant without giving due consideration to the impacts of that order on the air quality and health of the citizens of Virginia . . . .” Motion to Intervene and Protest of Robert G. Burnley, Dir., the Commonwealth of Virginia Dep’t of Envtl. Quality, No. EL05-415-000, at 4 (FERC 2005) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). The SELC argued that Potomac Station shutdown was not an “emergency” within the meaning of Section 202(c). See Protest of the Southern Envtl. Law Ctr., No. EL05-415-000, at 2–4 (FERC 2005) (“Section 202(c) may be invoked only . . . when an emergency actually ‘exists’ . . . . In this case . . . DCPSC cedes that no emergency exists . . . . DCPSC’s alleged emergency is purely conjectural.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). The SELC also argued that the DOE and the FERC could not authorize the continued operation of
The DEQ also filed a motion to deny the petition and complaint. Answers to the motion followed. Potomac Station because the plant could not be operated in compliance with federal and state air pollution control requirements. See id. at 4–7 (arguing that Mirant cannot operate the plant in compliance with state mandates and the FERC cannot force Mirant to violate the regulations).

149. See Order on Petition and Complaint at 3 (2006) (“Mirant and PEPCO filed answers to the protests and comments.”). Mirant Potomac clarified that it was required by DEQ to shut down Potomac Station. See Motion for Leave to Answer and Answer of Mirant Potomac River, LLC, No. EL05-145-000, at 2–3 (FERC 2005) (clarifying that Mirant was required to close and did not have an option) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). Mirant Potomac also argued that a request for a permanent shutdown of the plant is beyond the scope of the FERC complaint proceeding. See id. at 4 (asserting that the relief requested involves matters beyond the scope of this proceeding . . .

150. See Order on Petition and Complaint, supra note 148, at 8–9 (discussing the DEQ’s motion and PJM and PEPCO’s answer). PJM and PEPCO filed a joint answer to the DEQ motion which argued that (i) the DEQ motion is procedurally deficient, (ii) the electric reliability issues raised in the petition and complaint implicate serious risks to public health, safety and security; (iii) there is no conflict between the relief requested and applicable federal and state law; (iv) the relief requested would not frustrate DEQ enforcement of the APCL; (v) the requested relief requires no NEPA review; and (vi) FERC is authorized to act on the petition and complaint under Section 207. See Answer of Potomac Elec. Power Co. and PJM Interconnection, L.L.C., to Motion of Robert G. Burnley, No. EL05-145-100, at 6–25, (FERC 2005) (asserting six counterarguments to the arguments raised in the DEQ motion) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). The PSC also filed an answer to the DEQ motion which argued that (i) the DEQ motion is an impermissible late protest; (ii) FERC is authorized to act under Section 207 and Section 309 and should grant the requested relief; (iii) there is no conflict between the relief requested and applicable law; (iv) the relief requested would not frustrate DEQ enforcement of the APCL; and (v) the requested relief requires no NEPA review. See Answer of the District of Columbia Pub. Serv. Comm’n to Motion of Robert G. Burnley, No. EL05-145-100, at 8–25 (FERC 2005) (raising five arguments against the DEQ motion) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Motion for Leave to File a Consolidated Answer and Consolidated Answer of Robert G. Burnley, No. EL05-145-100, at 1–2 (FERC 2005) (answering the October 13 joint answer by PEPCO and PJM and the October 26 answer of the DCPSC) (on
An extended shutdown of Potomac Station was not anticipated.\textsuperscript{152} Indeed, Mirant Potomac restarted the power plant on September 21, albeit at a reduced level.\textsuperscript{153} On November 15, the DOE requested that FERC not take action on the PSC petition and complaint because the DOE expected to take action in the near future.\textsuperscript{154}

2. DOE Order

On December 20, in response to the PSC petition and complaint, the DOE issued an order to Mirant Potomac under Section 202(c) to resume the generation of electric power at Potomac Station to the extent required to provide the “central D.C. area” with electric service.\textsuperscript{155} The order was issued upon a determination “that an emergency exists due to a shortage of electric energy.”\textsuperscript{156} The order was effective immediately and was set to expire on October 1, 2006.\textsuperscript{157}

The DOE order explained that the central D.C. area depended on Potomac Station and on two existing 230-kV PEPCO transmission lines for electric power.\textsuperscript{158} The plant, the DOE reasoned, must be operational if one file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}; Motion for Leave to Answer and Answer of Potomac Elec. Power Co., No. EL05-145-100, at 1 (FERC 2005) (answering the November 10, 2005 DEQ consolidated answer of Burnley) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

\textsuperscript{152} See, e.g., Leef Smith, \textit{Power Plant Likely to Reopen, Analysts Say}, \textit{WASH. POST}, Aug. 28, 2005, at C6 (discussing industry analysts’ statements that the plant would likely open quickly).

\textsuperscript{153} See Annie Gowen, \textit{Mirant Will Restart Controversial Va. Plant}, \textit{WASH. POST}, Sept. 21, 2005, at B7 (stating that Mirant announced a limited reopening of the plant even though critics were angry); see also Jerry Markon, \textit{Mirant Plans to Request Plant’s Reopening}, \textit{WASH. POST}, Sept. 15, 2005, at T3 (describing plans by Mirant to propose a reopening of the plant).

\textsuperscript{154} See Letter to the Hon. Joseph T. Kelliher, Chairman, FERC, from Kevin M. Kolevar, Dir., Office of Elec. Delivery and Energy Reliability, DOE (Nov. 15, 2005) (requesting no action be taken on docket number EL05-145) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).


\textsuperscript{156} DOE Order at 1.

\textsuperscript{157} See id. at 10 (“This order is effective immediately and will terminate at 12:01 a.m. October 1, 2006.”).

\textsuperscript{158} See id. at 2–3 (observing that there are no transmission lines that connect the Benning Road and Buzzard Point electric power plants to the central D.C. area).
line is out of service.\textsuperscript{159} In addition, the plant must otherwise remain operational to minimize the start-up time for full power generation in the event of simultaneous line failures.\textsuperscript{160} The order required the submission of a plan to ensure compliance with these operational requirements.\textsuperscript{161}

The DOE order indicated that PEPCO had filed an application with the PSC to construct two additional 230-kV transmission lines to provide electric power to the central D.C. area.\textsuperscript{162} The construction of the lines would require eighteen to twenty-four months even though the DOE stated that it expected the PSC to expedite approval of the application.\textsuperscript{163} In response to arguments raised by the DEQ, the DOE concluded that no NEPA analysis was required to issue the order.\textsuperscript{164}

In consideration of environmental concerns, however, the DOE ordered Mirant Potomac to resume the generation of power “in a manner that provides reasonable electric reliability, but that also minimizes any adverse environmental consequences from operation of the Plant.”\textsuperscript{165} For this reason, the DOE declined to impose additional operational requirements.\textsuperscript{166}

On December 30, Mirant Potomac submitted the Operating Plan of Mirant Potomac River, LLC in Compliance with Order No. 202-05-03 (“Operating Plan”).\textsuperscript{167} The Operating Plan proposed a Temporary Phase as

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\textsuperscript{159} See id. at 10 (“[D]uring any period in which one or both of the 230-kV lines serving the Central D.C. area is out of service, whether planned or unplanned, Mirant will operate the [Potomac Station] to produce the amount of power . . . needed to meet demand in the Central D.C. area . . . .’’); see also id. at 4 (stating that since 2000, there have been thirty-four instances of one-line outages for maintenance and seven instances of unplanned one-line outages and two instances of two-line failures).

\textsuperscript{160} See id. at 10 (“Mirant shall keep as many units in operation, and shall take all other measures to reduce the start-up time of units not in operation, for the purpose of providing electricity reliability . . . .’’).

\textsuperscript{161} See DOE Order, supra note 155, at 10 (requiring Mirant to submit this plan within ten days).

\textsuperscript{162} See id. at 3 (stating PEPCO had applied to construct two lines that would power central D.C.).

\textsuperscript{163} See id. at 11 (“DOE expects that the DCPSC will take all reasonable actions to augment electrical reliability and to reduce electricity demand in the central D.C. area.”).

\textsuperscript{164} See id. at 5 (stating that DOE did not believe this was a “major action” and it consulted with the Council of Environmental Quality (CEQ) to make that determination).

\textsuperscript{165} Id. at 8–9.

\textsuperscript{166} See id. at 10 (“The [DOE] is not prepared to order actions that could cause more localized NAAQS exceedances than are necessary in order to assure adequate electric reliability for the Central D.C. area.”).

well as an Intermediate Phase. A Long-Term Phase was addressed in
general terms but was “not the focus” of the plan. In the Temporary
Phase, Unit No. 1 operated on a limited basis and subject to operational
limitations. The Operating Plan sought DOE approval for expanded
operation of Unit No. 1 throughout the Temporary Phase subject to a SO₂
emissions cap.

The Operating Plan offered two alternatives for the Intermediate
Phase. Under the first alternative, which Mirant Potomac proposed and
DOE selected on January 4th, Units Nos. 1–2 would operate up to sixteen
hours per day and one of the other three units would operate without
restriction. Under the second option, Units Nos. 3–5 would operate
unconstrained up to twelve hours per day with low-sulfur coal. The
Operating Plan indicated that Mirant Potomac had ordered a system for the
injection into each unit of sodium sesquicarbonate (trona), which is used to
control SO₂ emissions. Finally, each unit in the Intermediate Phase would
be subject to an SO₂ emissions cap.

Addressed in general terms, a Long-Term Phase contemplated an
increase in the height of the smoke stacks for Potomac Station in an effort
to mitigate the adverse impact of “downwash” from Potomac Station.

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168. See id. at 1 (stating that Mirant “anticipates a phased-in resumption of operation”
of the Potomac Station and that the Temporary Phase commenced on September 21, when
Mirant Potomac resumed the operation of Potomac Station at a reduced level).
169. See id. at 2 (discussing the focus of the operating plan).
170. See id. at 3–4 (proposing a limited plan for Unit No. 1); see also Leef Smith,
Alexandria Pushes to Shut Mirant, WASH. POST, Mar. 21, 2006, at B2 (stating that Mirant
Potomac believed trona injections were a unique technique and could be patented).
171. See Operating Plan, supra note 167, at 4 (proposing an SO₂ emissions cap of 7.4
tons per day).
172. See id. at 1–2 (reporting that the operation of Potomac Station under the first
option would result in no NAAQS exceedances and the operation of Potomac Station under
the second option would dramatically reduce reliability risks but would result in NAAQS
exceedances for one pollutant); see also Jerry Markon, Mirant Plan Breaks Emission Cap,
WASH. POST, Jan. 12, 2006, at T3 (discussing Mirant’s plan to use the second option under
the Operating Plan).
173. See Mirant’s Compliance Plan, 71 Fed. Reg. 3280 (authorizing Mirant to
implement Option A).
174. See Operating Plan, supra note 167, at 4 (“Mirant proposes to operate the two
cycling units . . . up to 16 hours per day each . . . .”).
175. See id. at 5 (“Under Option B, Mirant would operate the three base load units
continuously with up to 12 hours per day at full load . . . .”).
176. See id. at 6 (discussing the five systems Mirant had rented).
177. See id. at 7 (“Mirant will operate such unit subject to a unit-specific 24 hr daily
SO₂ emission rate cap.”).
178. See id. at 8–9 (“Mirant continues to explore the most effective method of
reconfiguring [heightening] the stacks in some manner . . . to mitigate against the downwash
effect . . . .”).
The power plant, however, is just one mile south of Ronald Reagan Washington National Airport. A stack height increase would therefore require an approval from the Federal Aviation Administration (“FAA”). The Operating Plan indicated that Mirant Potomac had submitted a proposal for the increase to the FAA.

Although the DOE concluded that no NEPA analysis was required to issue the order, in January 2006, the Department, in accordance with DOE NEPA regulations, issued a notice to advise the public of the DOE order and to “set forth the steps it intends to take in the future to comply with [NEPA] in the matter.” In particular, the DOE, in consultation with the Council on Environmental Quality (CEQ), decided to: (i) prepare a Special Environmental Analysis (SEA) of the DOE order; (ii) provide opportunities for public involvement; (iii) continue consultations with appropriate agencies on relevant environmental issues; and (iv) develop measures that would mitigate the environmental impact of the DOE order.

To allow time for the completion of the SEA, the DOE extended the DOE Order, which was to expire on October 1, 2006, through December 1, 2006, and again through February 1, 2007 to allow public review and comment on the SEA.

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179. See Downwash Analysis, supra note 132, at 2-1 (describing the location of the airport).
180. See 49 U.S.C. § 44718 (“[I]f the Secretary decides that constructing or altering a structure may result in an obstruction of the navigable airspace . . . the Secretary shall conduct an aeronautical study to decide the extent of any adverse impact on the safe and efficient use of the airspace, facilities, or equipment.”); see also 14 C.F.R. Part 77 (regulating objects affecting navigable airspace).
181. See e.g., Mirant Potomac River, LLC, Aeronautical Study No. 2005-AEA-2959-OE (FAA Feb. 2, 2006) (determining that the proposed stack height increase would pose no hazard to air navigation) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Jerry Markon, FAA Has 2nd Look At Mirant, WASH. POST, Dec. 1, 2005, at VA03 (reporting that Mirant had requested a more detailed study from the FAA on the increases in stack height).
182. See, e.g., 10 C.F.R. § 1021.343(a) (2005) (providing the DOE with the ability to disregard NEPA requirements under certain scenarios); see also 40 C.F.R. § 1506.11 (2007) (discussing the CEQ NEPA requirements).
183. See generally 10 C.F.R. Part 1021 (2007) (establishing procedures for the DOE to comply with NEPA requirements).
185. See id. at 3281 (providing four alternate arrangements for implementation).
3. FERC Order

Within three weeks of the DOE order, the FERC issued an order in the PSC-initiated proceeding. The FERC order “supplements the [DOE] actions by focusing on a more permanent and comprehensive solution to be provided by the transmission entities.” Thus the order directed PJM and PEPCO, pursuant to Section 207 of the Federal Power Act, to file with the FERC a long-term plan to maintain power service for the Washington metropolitan region and to file a plan to provide power service pending the implementation of the long-term plan.

Whereas the DOE reacted to the Potomac Station shutdown with a mandated resumption of electric power generation, the FERC reacted with a mandated expansion of local electric power transmission to ensure electric reliability in Washington, D.C. The legal basis for the FERC order was the FERC-approved OATT.

The FERC order concluded that the planned or inadvertent loss of power from Potomac Station could result in a violation of NERC reliability standards. Thus FERC ordered PJM and PEPCO to develop and implement a long-term plan for the construction and operation of adequate and sufficient local electric transmission facilities to ensure electric reliability for Washington, D.C.


188. Id. at 61,037 ¶ 2; see also id. at 61,042 ¶ 28 (“[W]e address establishing transmission solutions to the reliability problems in the Washington, D.C. area.”).

189. See generally 16 U.S.C. § 824(f) (giving FERC the authority to determine whether interstate electricity service is inadequate and provide order to compel sufficient service).

190. See FERC Order, supra note 187, at 61,037 ¶ 2 (“[W]e are issuing this order under section 207 of the FPA to require PJM Interconnection, L.L.C. (PJM) and Potomac Electric Power Company (PEPCO) to file a long-term plan to maintain adequate reliability in the Washington, D.C. area and surrounding region, and a plan to provide adequate reliability pending implementation of this long-term plan.”).

191. See id. at 61,041 ¶ 24 (“The Commission directs [PJM and PEPCO] to develop and implement comprehensive long-term plans for the operation, planning and construction of transmission facilities to address the current reliability risks to the system.”).


193. See FERC Order, supra note 187, at 61,041 ¶ 24, 61,042 ¶ 30 (observing that the likelihood that a single 230-kv PEPCO transmission line will fail is significant); see also id. at 61,042 ¶ 25 (noting that without generation from Potomac Station, routine transmission line maintenance poses an electric reliability concern).

194. See id. ¶ 31 (“Therefore, in coordination with the Department of Energy order, the Commission orders PJM and PEPCO to jointly develop a plan to maintain adequate reliability . . . .”).
FERC ordered PJM and PEPCO to file within one month a short-term plan to provide electric power to the metropolitan D.C. region in coordination with the DOE. The plan was to provide for the duration of the DOE order as well as for the period between the expiration of the DOE order and the implementation of the long-term plan. Finally, the FERC order required the submission of monthly progress reports on the implementation of the plans.

In February 2006, PEPCO and PJM filed the Potomac River Substation Transmission Reliability Plan (Reliability Plan), which addressed long-term as well as short-term electric reliability concerns and proposed operational measures as well as local transmission line construction to resolve those concerns. Information on short-term operational measures, however, was not made public pursuant to FERC regulations for the protection of critical energy infrastructure information.

With respect to long-term local transmission line construction, the Reliability Plan stated, “the prudent course of action is to expedite upgrades of the transmission system for the particular local area served by the Potomac River Plant and substation.” The plan observed that PEPCO “has committed to construct” two additional 230-kV transmission lines to provide electric power to the Washington region. Because the lines would not become operational until June 2007, the Reliability Plan proposed an extension of the DOE order until that time. The long-term local transmission line construction would ensure electric reliability for the metropolitan D.C. region. In addition, however, PEPCO and PJM explained that “PJM is planning for the overall reliability of the greater Washington, D.C. area [and] will continue to review these

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195. See id. (“This plan . . . shall be submitted to the Commission within one month from the date of this order.”).
196. See id. (“PJM and PEPCO are to jointly submit monthly progress reports on the implementation of such plans to the Commission.”).
198. See 18 C.F.R. §§ 388.112–388.113 (providing for special treatment of information deemed as critical energy infrastructure information (CEII)).
199. Reliability Plan supra note 197, at 3.
200. See id. at 6–7 (proposing the construction of two additional 69-kV transmission lines to provide electric power to the Blue Plains sewage treatment plant in Southeast D.C.).
201. See id. at 6. (“Without an extension of this order . . . operation of the PEPCO transmission system may revert to the unacceptable reliability level that existed prior to the December 20 DOE Order.”).
202. See id. at 7 (“[T]he long-term construction plan proposed . . . is anticipated to alleviate all operating constraints discussed herein . . . .”).
larger matters through its Regional Transmission Expansion Planning ("RTEP") process.\textsuperscript{203} Thus the Reliability Plan assured the FERC that "PJM is evaluating, and will continue to evaluate, within its RTEP process, the need for additional transmission facilities on the Pepco and neighboring systems that may be required to address the potential permanent loss of 482 MW of Potomac River Plant generation on the Pepco system."\textsuperscript{204}

In March, FERC sought clarification from PEPCO and PJM on proposed operational measures in the Reliability Plan to address short-term electric reliability concerns.\textsuperscript{205} Following the submission of a clarification, FERC accepted the Reliability Plan.\textsuperscript{206} Between March 2006 and August 2007, PEPCO and PJM submitted monthly progress reports on the implementation of the Reliability Plan describing the progress on the construction of the two additional 230-kV transmission lines to provide electric power to the Washington region as well as on the two additional 69-kV transmission lines to provide electric power to the Blue Plains sewage treatment plant in Southeast D.C.\textsuperscript{207} The report for July 2006 indicated that the two additional 69-kV transmission lines had been completed and placed in service.\textsuperscript{208}

The report for June 2007 indicated that the two additional 230-kV transmission lines had been completed and placed in service.\textsuperscript{209} Thus in August 2007 FERC issued an order that terminated the requirement for

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\textsuperscript{203} Id. at n.7.
\textsuperscript{204} Id. at 7.
\textsuperscript{205} See generally Letter from Joseph McClelland, Dir., Div. of Reliability, Office of Energy Mkts. and Reliability, FERC to Kirk J. Emge, Gen. Counsel, & Craig Glaser, Vice President of Fed. Gov’t Policy, PEPCO (Mar. 6, 2006) (“Please provide a complete assessment of the reliability impacts of transferring load from the Potomac River substation to other nearby substations . . . .”) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).
\textsuperscript{206} See Letter From Div. of Reliability, Office of Energy Mkts. and Reliability, FERC, to Kirk J. Emge, Gen. Counsel, PEPCO (June 5, 2006) (“[Y]our submittal filed in [Docket No. EL05-145-000] is accepted for informational purposes.”) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).
\textsuperscript{207} See, e.g., Letter from Helen M. Hight, Assistant Gen. Counsel, PEPCO, to FERC (Mar. 8, 2006) (including a progress report on design, permitting, procurement, and related activities) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).
\textsuperscript{208} See Letter from Helen M. Hight, Assistant Gen. Counsel, PEPCO, to Magalie R. Salas, Sec’y, FERC (Aug. 8, 2006) (explaining that Feeder No. 69021 was placed in service on July 15, 2006) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).
\textsuperscript{209} See Letter from Amy L. Blauman, Assistant Gen. Counsel, PEPCO, to Magalie R. Salas, Sec’y, FERC (July 13, 2007) (“The construction of the 230 kV lines is now complete and PEPCO has finalized the implementation of its related work plan.”) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).
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monthly progress reports.\footnote{210}{See Order on Reporting Requirements 120 Fed. Energy Reg. Comm’n Rep. (CCH) ¶ 61,185, ¶ 1 (2007) (“In this order, the Commission terminates the requirement for submission of monthly progress reports . . . .”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).} The order required, however, a final report on specific electric reliability issues affecting the Washington, D.C. area, on improvements implemented to resolve those issues, and on outstanding electric reliability issues.\footnote{211}{See id. ¶ 6 (directing PEPCO and PJM to submit one more report detailing specific regional reliability issues including voltage and other concerns mentioned in the 2006 RTEP).}

The order found that “construction of the new transmission lines into Washington, D.C. near [Potomac Station] has provided new capacity to adequately serve load absent [Potomac Station].”\footnote{212}{Id. ¶ 5.} Nonetheless, FERC reported that, to ensure electric reliability in the event of a Potomac Station shutdown, additional transmission improvement was required;\footnote{213}{See id. ¶ 6 (addressing reliability concerns).} despite the two additional 230-kV transmission lines, the Washington, D.C.-Baltimore area needed additional voltage support;\footnote{214}{See id. (”[I]n addition to the construction of the two transmission lines, voltage support was needed in the Baltimore-Washington, D.C. area.”).} and that PJM, PEPCO and Baltimore Gas & Electric Company (BGE) must develop a regional long-term plan to ensure electric reliability for the region.\footnote{215}{See id. (”[A] more detailed, joint PJM, PEPCO, and Baltimore Gas & Electric Company study was necessary to develop a regional long-term plan.”).} Thus the order required a final report on reliability issues affecting the Washington, D.C. area.\footnote{216}{See Order on Reporting Requirements, supra note 210, ¶ B (“PEPCO and PJM are hereby required to file a report with the Commission that identifies and addresses the specific regional reliability issues affecting the Washington, D.C. area . . . .”).}

In September 2007, PJM filed the required report, which identified the specific electric reliability issues that would arise in the event of a Potomac Station shutdown.\footnote{217}{See Letter From Jeffrey W. Mayes, Senior Counsel, PJM, to Kimberly D. Bose, Sec’y, FERC (Sept. 27, 2007) (stating that this letter was filed in satisfaction of the Commission’s requirement) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).} The report also identified a potential overload on the 500-kV Doubs-Mt. Storm transmission, and transmission enhancements required to meet the need for additional voltage support in the event of a shutdown.\footnote{218}{See id. at 3 (“PJM also identified an additional thermal overload on the Mt. Storm to Doubs 500 kV line for the outage of the Bedington to Black Oak 500 kV line.”).} Finally, the report detailed all transmission
upgrades for PEPCO and BG&E region. In January 2008, the FERC accepted the report and closed the proceeding.

4. PSC Order

The commitment to construct two additional 230-kV transmission lines to provide electric power to the metropolitan D.C. region was apparent in October 2005, within two months after the Potomac Station shutdown, when PEPCO filed an application with the PSC to construct the transmission lines. Filled under Section 34-302 of the D.C. Code, the application also proposed the construction of two additional 69-kV transmission lines to provide electric power to the Blue Plains sewage treatment plant in Southeast D.C. The application requested an approval from the PSC by December 31, 2005.

The PSC held a one-day administrative hearing on the PEPCO application on February 2, 2006. PEPCO, PJM, the District of Columbia, and the Office of the People’s Counsel of the District of Columbia (“OPC”) participated in the hearing. In March 2006, the commission issued an order that authorized the construction of the transmission lines. The order

219. See id. at 4–7 (providing tables that show completed upgrades).
222. See D.C. CODE § 34-302 (“No person shall begin the construction of a gas plant or an electric plant without first having obtained the permission and approval of the [PSC].”); see generally D.C. MUN. REGS. tit. 15, ch. 21 (detailing provisions for construction of electric generating facilities and transmission lines).
223. See Emergency Application, supra note 221, at 2 (proposing the construction two 69-kV Overhead Transmission Lines).
224. See id. (requesting an order by December 31, 2005).
226. See id. 225 at 2 (listing the participants).
227. See Order No. 13,895 ¶ 1 (D.C.P.S.C. 2006) (“By this Order, the Public Service Commission of the District of Columbia (‘Commission’) grants the Emergency Application
concluded that it is “clearly and unequivocally” in the public interest to allow the construction of the transmission lines.

In a separate order issued soon thereafter, the PSC established a working group in response to the DOE Order to assess the reasonableness of energy conservation, i.e., demand response, programs in the area to which Potomac Station provides electric power. The working group was tasked with an investigation of the potential for reduced demand for electric power through demand response programs. In May, the working group, which consisted of, inter alia, PEPCO, PJM, the District of Columbia, the OPC, and FERC, reported that it had failed to reach a consensus on the implementation of near-term demand response programs in the downtown area of D.C. After a period for public comment, the PSC accepted the working group report in September 2006.

III. Retirement of Potomac Station

A. Federal and State Clean Air Act Violations

1. EPA Notice of Violation

Throughout the turbulent DEQ, DOE, FERC, and PSC proceedings and orders regarding Potomac Station, clean air and electric reliability, which resulted in the shutdown and restart of Potomac Station as well as in...
the Operating Plan and the Reliability Plan, the EPA maintained a watchful eye on Potomac Station. For example, the EPA evaluated the response of Mirant Potomac to the August 19, 2005, DEQ order that precipitated the shutdown and, in December 2005, advised Mirant Potomac that it had failed to “immediately undertake such action as is necessary” for the protection of human health and the environment in the area around Potomac Station. Although Mirant Potomac had shut down Potomac Station on August 24th, it had failed to shut down the plant on August 19th.

As a result of this failure, on December 22, 2005 the EPA issued an NOV to Mirant Potomac under the CAA. The NOV alleged a violation of the Virginia SIP, which the EPA is authorized to enforce under Section 113 of the CAA, and the administrative regulation under which the August 19, 2005 DEQ order was issued. The NOV resulted in the issuance, in June 2006, of an EPA Administrative Compliance Order (ACO), to which Mirant Potomac consented.

The ACO imposed operational limitations on Potomac Station when the two existing 230-kV PEPCO transmission lines that provide...
electric power to the central D.C. area were both in service. If either of the lines was out of service, then Potomac Station was required under the ACO to generate the amount of electric power required to meet the PJM-determined demand in the central D.C. area. In addition, the ACO limited annual nitrogen oxide emissions from Potomac Station to 3,700 tons. Finally, the ACO directed Mirant Potomac to cooperate with the DEQ in the development of emissions limits for the DEQ permit to operate Potomac Station.

2. DEQ Operating Permits

The ACO issued by the EPA in June 2006 expired on May 31, 2007. On June 1, 2007 the DEQ issued an interim operating permit to Mirant Potomac to operate Potomac Station. The permit limited Potomac Station SO$_2$ emissions to 3,813 tons per year, established hourly and daily SO$_2$ emissions limits, and required the continued operation of devices, installed pursuant to the ACO, to measure SO$_2$ concentrations.

In July 2008, DEQ issued a permanent operating permit to operate Potomac Station. The twenty-three page permit included fifty-one

242. See Administrative Compliance Order, supra note 240, at art. IV § B (discussing operational limits imposed on Potomac Station). In addition to operational limits, the ACO imposed a schedule for the installation of trona injection systems, required the adoption of additional measures in the event of elevated concentrations of SO$_2$, and mandated the installation of devices to measure SO$_2$ concentrations. See id. (listing orders imposed on Potomac Station in addition to operational limitations).

243. See id. at art. IV § C (discussing the amount of energy to be generated).

244. See id. at art. IV § D (“At all times, Mirant shall not emit more than 3700 tons of NO$_x$ per year . . . .”).

245. See id. at art. IV § E (detailing permitting requirements). The day after the ACO was issued, the DOE directed Mirant Potomac to operate Potomac Station in accordance with the ACO when the two existing 230-kV PEPCO transmission lines that provide electric power to the central D.C. area are both in service and to operate the plant in accordance with the DOE Order if one or both of the lines is out of service. See Letter From Kevin Kolevar, Dir., Office of Electricity Delivery and Energy Reliability, DOE, to Robert Driscoll, CEO, Mirant Mid-Atlantic, LLC (June 2, 2006) (directing Mirant Potomac’s plant operations) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

246. See Administrative Compliance Order, supra note 2400, at art. XI ¶ 24 (providing effective date and expiration date).

247. See Commonwealth of Virginia, Stationary Source Permit to Operate (June 1, 2007) [hereinafter Stationary Source Permit 2007].

248. See id. ¶ ¶ 5–10 (establishing emission limits and hourly and daily quotas, and requiring continued measurement of emissions).

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conditions, which limited \( \text{SO}_2 \) emissions to 3,813 tons per year, limited \( \text{NO}_2 \) emissions to 3,700 tons per year, and limited \( \text{NO}_2 \) emission during Ozone Season to 1,475 tons after 2009;\(^{250} \) required emissions controls on \( \text{SO}_2 \), \( \text{NO}_2 \), and PM; required compliance with federal regulations on continuous emissions monitoring systems; set forth specifications for the coal to be burned in the boilers; and required that Potomac Station “reduce the level of operation at the facility if the [APCB] determines that this is necessary to prevent a violation of any primary ambient air quality standard.”\(^{251} \)

The permit reflected the terms of an agreement between Mirant Potomac and the City of Alexandria for measures to reduce PM emissions from Potomac Station.\(^{252} \) Under the agreement, Mirant Potomac agreed to place $34 million in an escrow account to be spent on plant modifications to reduce PM emissions and to control fugitive dust from the plant site.\(^{253} \) In return, the City agreed to not oppose the issuance of the DEQ permit or the contemplated plant modifications.\(^ {254} \)

Finally, the permit authorized Mirant Potomac to reconfigure the smoke stacks of Potomac Station to consolidate the five stacks into two stacks.\(^ {255} \) Until the reconfiguration was completed, Potomac Station would operate in accordance with the June 1, 2007 permit.\(^ {256} \) Once the reconfiguration was completed, that permit would be superseded and Potomac Station would operate in accordance with the July 31, 2008 permit.\(^ {257} \) The consolidation would disperse plant emissions over a broadened area.\(^ {258} \)

\(^{250} \) See id. at 13 (providing facility-wide emissions limits).
\(^{251} \) Id. at 23; see also id. at 4-8 (detailing emissions controls, system monitoring requirements, and fuel requirements).
\(^{252} \) See id. at Exhibit 1 (discussing terms of the Project Schedule and Agreement).
\(^{253} \) See id. (“Whereas Mirant has agreed to deposit thirty-four million dollars ($34,000,00.00) in an interest bearing escrow account (“Escrow Account”) pursuant to the terms of an escrow agreement for the purpose of implementing air pollution control technology to reduce stack and fugitive particulate matter emissions from the Facility . . . .”).
\(^{254} \) See id. (discussing the city’s authority to protect its citizens and its desire for a comprehensive state operating permit).
\(^{255} \) See id. at 3 (detailing stack reconfiguration); see also Daniel Deane, City to Pursue ‘All Available’ Options Against Mirant, WASH. POST (Aug. 30, 2007), http://www.washingtonpost.com/wp-dyn/content/article/2007/08/28/AR2007082801950.html (reporting on a DEQ meeting to discuss whether stack reconfiguration required a permit) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\(^{256} \) See Stationary Source Permit 2008, supra note 249, at 3 (discussing facility operation while the stacks are being reconfigured).
\(^{257} \) See id. (discussing operation after reconfiguration is complete).
\(^{258} \) See David A. Fahrenthold, Power Plant Still Battling to Stay Open, WASH. POST (Sept. 13, 2007), http://www.washingtonpost.com/wp-
The formulation of the environmental requirements set forth in the permanent operating permit provided for public participation, which revealed that, despite those requirements, the well-publicized efforts of environmental activists to close Potomac Station over clean air concerns would continue. The public participation also revealed a degree of popular resentment toward the DEQ, which, it was believed, “has been too lenient toward the Mirant plant.”

Two years later, the DEQ issued a permit to operate Potomac Station during the Ozone Season. The permit supplemented the July 2008
permit and superseded the September 2000 permit.\textsuperscript{263} The permit provided that, beginning with the 2010 Ozone Season, total NO\textsubscript{x} emissions could not exceed 890 tons.\textsuperscript{264} The permit also cautioned that a violation of a NAAQS could force the shutdown of the plant:

\begin{quote}
Regardless of any other provision of this section, the owner of any facility subject to the Regulations for the Control and Abatement of Air Pollution shall, upon request of the Board, reduce the level of operation at the facility if the Board determines that this is necessary to prevent a violation of any primary ambient air quality standard. Under worst-case conditions, the Board may order that the owner shut down the facility if there is no other method of operation to avoid a violation of the primary ambient air quality standard.\textsuperscript{265}
\end{quote}

Finally, the permit could be revoked for violations of NAAQS or of permit conditions.\textsuperscript{266}

\section*{3. DEQ Consent Orders}

Although the DEQ operating permits authorized Potomac Station to continue to generate electric power, the DEQ continued to require strict compliance with clean air requirements.\textsuperscript{267}

For example, just prior to the issuance of the operating permit in July 2008, Mirant Potomac agreed to the issuance of a consent order for violations of the APCL and the APCB regulations promulgated thereunder.\textsuperscript{268} In particular, the consent order found that, on February 23, 2007, while Potomac Station operated under the DOE Order, and during a scheduled transmission line outage required to complete the installation of

\textsuperscript{263} See id. (noting the permit’s relationship to prior permits).
\textsuperscript{264} See id. at 4 (defining the limits of NO\textsubscript{x} emissions).
\textsuperscript{265} Id. at Condition 10.
\textsuperscript{266} See id. at Condition 12 (allowing the permit to be revoked).
\textsuperscript{267} See generally Order by Consent Issued to Mirant Potomac River, LLC for the Mirant Potomac River Generating Station, Registration No. 70228 (July 2, 2008) [hereinafter Order by Consent 2008] (requiring compliance with the DEQ permit) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\textsuperscript{268} See id. (“Mirant agrees that written procedures, protocols, and training of Plant personnel may provide for minimizing excess emissions.”).
the two additional 230-kV transmission lines, SO\textsubscript{2} emissions increased.\textsuperscript{269} The DEQ concluded that Potomac Station lacked appropriate operating, maintenance, and training procedures for its air pollution control equipment during the scheduled outage.\textsuperscript{270}

In addition, an unannounced site visit on January 30, 2008 revealed that windscreens for coal pile dust suppression were in a state of disrepair.\textsuperscript{271} A follow-up site visit on February 13, 2008 revealed that the windscreens, which constitute air pollution control equipment, had not yet been repaired.\textsuperscript{272} The consent order imposed a civil fine of $52,000.\textsuperscript{273} Mirant Potomac also agreed to develop and implement operating procedures to minimize air emissions and to maintain air pollution control equipment.\textsuperscript{274}

Unannounced site visits on November 21, 2008 and December 10, 2008 again revealed that the windscreens were in a state of disrepair.\textsuperscript{275} In March 2009, Mirant Potomac agreed to the issuance of an amendment to the prior consent order.\textsuperscript{276} The amendment imposed a civil fine of $26,000, and Mirant Potomac agreed to install a new coal pile fence.\textsuperscript{277}

A subsequent consent order documented violations of the operating permit and resulted in a civil fine of $275,562 as well as corrective actions to address those violations.\textsuperscript{278} Conducted between February and September

\textsuperscript{269} See id. § C(3) (“On February 23, 2007, a fence-line ambient air monitor on Mirant’s property detected increased levels of SO\textsubscript{2}.”).

\textsuperscript{270} See id. § C(5) (determining that Mirant lacked the proper procedures for the operation of the plant).

\textsuperscript{271} See id. § C(8)-(9) (reporting on the unannounced site visit and associated findings).

\textsuperscript{272} See id. § C(15) (discussing DEQ findings of the February 13, 2008 DEQ unannounced visit).

\textsuperscript{273} See id. § C (listing the terms of the agreement).

\textsuperscript{274} See Order by Consent 2008, supra note 167, at app. A (discussing Mirant’s agreed terms).


\textsuperscript{276} See generally Amendment to Order by Consent Issued to Mirant Potomac River, LLC for the Potomac River Generating Station, Reg. No. 70228 (Mar. 9, 2009) (amending the order due to Mirant’s failure to maintain and operate the plant’s air pollution control equipment) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{277} See id. § C (detailing the terms of the agreement).

\textsuperscript{278} See Order by Consent Issued to GenOn Potomac River, LLC for the Potomac River Generating Station, Registration No. 70228 (May 6, 2011) [hereinafter Order by Consent 2011] (listing the terms of the 2011 agreement and order) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also
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2010, DEQ audits of Potomac Station compliance with the APCL, APCB regulations, and the operating permit found, inter alia, that: (i) data from the Continuous Emissions Monitoring System (CEMS) for PM was incomplete and unreliable; (ii) the plant had burned bituminous coal with an excessive ash content; and (iii) the plant had controlled SO$_2$ emissions with injections of sodium bicarbonate instead of with sodium sesquicarbonate (trona). These findings documented violations of, inter alia, conditions five, twenty-five and twenty-six of the permit. Thus DEQ imposed a civil fine of $275,562.

In addition, the consent order required GenOn to develop procedures to ensure the proper use of PM-CEMS data, the use of coal with an acceptable ash content, and the proper use of sodium sesquicarbonate injections.

Finally, a DEQ inspection in July 2011 revealed inadequate emissions controls on PM and excessive NO$_x$ emissions for several test periods. The inspection resulted in a consent order that included a $280,704 civil fine.

Christy Goodman, Coal-Burning Plant Penalized $275,000, WASH. POST, May 12, 2011, at A18 (“Alexandria’s coal-burning power plant must pay $275,500 in civil penalties to the state for numerous permit violations, including excessive visible emissions and not turning in paperwork on emissions monitoring.”).

279. See Order by Consent 2011, supra note 278, § C (discussing the findings of fact and conclusions of law).

280. See id. (noting violations of the plant’s permit).

281. See id. § D (listing orders and agreements).

282. See id. at app. A (providing a schedule for compliance).


B. Environmental, Health, and Reliability Assessments

1. DOE Environmental Assessment

The restart of Potomac Station under the DOE Order triggered environmental, health, and reliability assessments, all of which ultimately informed a decision to retire the power plant.\(^{285}\)

In November 2006, the DOE, in accordance with the January 2006 notice, prepared and published, in consultation with the CEQ, an SEA of the DOE Order.\(^ {286}\) The SEA stated that the DOE Order was “the product of the best available balance between providing electricity reliability to the Central D.C. area and protecting the environment and human health in Alexandria, Virginia, until the additional 230-kV lines are in service.”\(^ {287}\) The DOE invited public comment on the SEA.\(^ {288}\) The SEA offered no recommendations per se, but summarized the environmental impact of power plant operations on air, human health, water, ecological resources, waste management, transportation, and environmental justice.\(^ {289}\)

The SEA also discussed three options for future DOE action. First, the DOE could allow the DOE Order to expire before the completed installation of the two additional 230-kV transmission lines, which “would likely place the Central D.C. area in risk of a potential blackout.”\(^ {290}\)


\(^{286}\) See Dep’t of Energy, Special Envtl. Analysis for Actions Taken Under Dep’t of Energy Emergency Orders Regarding Operation of the Potomac River Generating Station in Alexandria, Virginia, DOE/SEA-04 (Nov. 29, 2006) [hereinafter Special Environmental Analysis] (“In emergency situations, . . . [NEPA] regulations call for agencies to consult with CEQ to determine what alternative arrangements the agency will take in lieu of preparing an [EIS] . . . . DOE is issuing this SEA in compliance with the ‘alternative arrangements’ plan agreed upon with CEQ.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\(^{287}\) Id. at S-5.

\(^{288}\) See Notice of Availability of a Special Environmental Analysis; Potomac River Generating Station, 71 Fed. Reg. 69,102 (Nov. 29, 2006) (“DOE is providing the public an opportunity to comment before the Secretary considers whether to allow the Order to expire, extend the Order, or extend the Order with mitigation measures.”).

\(^{289}\) See Special Environmental Analysis, supra note 286, at S-5 to S-8 (summarizing the environmental impact of the plant). The SEA assessed emissions of SO\(_2\), PM, and NO\(_2\) as well as emissions of mercury, CO, and contributions of power plant operations on global climate change. See id. S-9 to S-11 tbl. S-1 (illustrating power plant contributions of emissions).

\(^{290}\) Id. at 108. “[B]lackouts can cause, and historically have caused, significant health and environmental impacts.” Id.
the DOE could extend the DOE Order. Third, the DOE could extend the order with mitigation measures, and, for example, (i) require Mirant Potomac “to improve plant operations and pollution control measures,” (ii) require Mirant Potomac to reduce the exposure of Alexandria residents to plant pollutants, (iii) manage the demand for electric power in the central D.C. area, (iv) use alternative sources for the generation of electric power, and (v) “expedite the installation of the two additional 230-kV transmission lines,” the completion of which was scheduled for July 1, 2007.

To respond to public comment on the SEA, and to allow time for the installation of the two additional 230-kV transmission lines, the DOE, in January 2007, extended the DOE Order through July 1, 2007. In response to public criticism of the assumptions and approach employed in the SEA, the extension affirmed that the environmental analysis was accurate, appropriate, reasonable, and sound.

The extension addressed, but for the most part rejected, the five mitigation measures delineated in the SEA. For example, in view of the EPA ACO, the extension rejected the imposition of additional pollution

291. See id. at 109 (stating that an extension of the current order as the second option for future DOE action).

292. Id. at 110 (explaining that the DOE could require Mirant Potomac to increase the height of the smoke stacks for Potomac Station to the FAA-approved height of fifty feet).

293. See Special Environmental Analysis, supra note 286, at 109 (noting that the DOE could require Mirant “to reduce exposure to pollutants to . . . nearby residents”).

294. See id. at 112 (stating that the DOE could require the PSC to develop an electric conservation, or demand response, program). “Reducing electrical demand in the Central D.C. area would reduce the need for operation of the Plant.” Id.

295. See id. at 113 (suggesting that “specific facilities” and government agencies could use temporary or back-up sources of energy, or the DOE could encourage Federal agencies to use alternative sources of energy).

296. Id.

297. See id. at 113 (“Pepco notified DOE on September 7, 2006, that the expected installation date of the new 230-kV lines is now June 21, 2007, instead of July 1, 2007.”); see also id. at 114 (noting that the DOE could also encourage the construction of additional transmission lines from other plants near to the central D.C. area).


299. See id. at 4–5 (stating that the DOE’s SEA research “used a reasonable set of assumptions, sound methodology, and an appropriate level of detail”).

300. See generally id. at 5–7 (reviewing the possible mitigation measures).
DOE also rejected the proposed relocation of Alexandria residents, for the duration of NAAQS “exceedances,” to reduce the exposure of those residents to plant pollutants. Finally, the extension observed that the PSC had undertaken several demand response programs and had approved the PEPCO application for the installation of two additional 230-kV transmission lines.

The DOE Order expired on July 1, 2007. On June 29th, PEPCO had completed the installation of the two additional 230-kV transmission lines. In addition to Potomac Station, therefore, there were four high-voltage transmission lines to ensure electric reliability for the central D.C. area.

2. ATSDR Health Assessment

In addition to the environmental assessment of the DOE Order, the federal government conducted a health assessment of emissions from Potomac Station at the request of the City of Alexandria. In January 2006, the Director of the Health Department for Alexandria requested that the federal Agency for Toxic Substances and Disease Registry (ATSDR) review available emissions and other environmental data related to Potomac Station.

301. See id. (“The ACO contains detailed provisions designed to protect air quality. DOE believes imposing additional pollution mitigation measures . . . is not necessary.”).
302. See id. at 6–7 (stating that there is insufficient evidence to justify payment for the relocation of Alexandria residents).
303. See id. (discussing how the installation of the additional power lines is on schedule and that they will “alleviate the reliability situation”).
304. See id. (“By its terms, Order No. 202-07-2 expired on July 1, 2007.”).
306. See Order No. 202-07-2, supra note 2988, at 1 (noting that PEPCO has two 230-kV transmission lines, requests permission to add two more, and that the Mirant plant would not need to remain open with these additional lines).
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Station and assess if the data indicated a potential health risk for Alexandria citizens.308

In January 2007, ATSDR responded to the request with a “health consultation” letter.309 Based on data provided by Mirant Potomac, Alexandria, the DEQ and EPA, ATSDR concluded that short-term acute SO$_2$ exposures could pose a health hazard to vulnerable populations.310 The agency, however, “cannot determine at this time if a public health hazard exists” and identified the need for additional information.311

Thereafter, and in response to that need, the ATSDR undertook an Exposure Investigation to measure ambient air concentrations of SO$_2$, PM, and metals.312 The agency also compared and analyzed emissions data it collected with emissions data Mirant Potomac had collected.313 In December 2009, ATSDR submitted its health consultation for peer review.314 In July 2010, ATSDR released for public comment a report based on its review of ambient air monitoring data for Potomac Station.315

Based on data collected before July 2008, the report concluded that (i) breathing SO$_2$-contaminated air around Potomac Station could pose a health hazard to sensitive populations (e.g., people with asthma) with

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308. See id. at 7 (stating that on Jan. 24, 2006 the Alexandria Health Department sent a letter “requesting ATSDR’s review of existing environmental data related to Mirant PRGS’s operations, assessing the potential for health effects for nearby residents”).

309. See id. at app. B (reporting on an initial review of air dispersal modeling).

310. See id. (listing Mirant, City of Alexandria, the DEQ, and the EPA as groups that provided information for the report, and ATSDR conclusions).

311. See id. (“Because of the uncertainty in the air dispersal model and the need to collect additional monitoring data, we cannot determine at this time if a public health hazard exists. ATSDR’s evaluation has identified the need for . . . additional data.”).

312. See id. at 8 (noting that ATSDR conducted an “Exposure Investigation to measure at multiple locations near Mirant PRGS ambient air concentrations” of SO$_2$, PM, and metals).

313. See id. at app. J (“The City of Alexandria negotiated with Mirant to obtain the facility’s more comprehensive set of sulfur dioxide monitoring data . . . .”).

314. See id. at 8 (listing in the table that in December 2009 ATSDR submitted the health consultation for peer review).

elevated breathing rates (due to, e.g., exercise);\textsuperscript{316} (ii) breathing SO\textsubscript{2}-
contaminated air would not pose a health hazard to the general population
or to sensitive populations with normal breathing rates;\textsuperscript{317} (iii) residents
who breathe PM-contaminated air over many years could experience
adverse health effects;\textsuperscript{318} (iv) levels of metals in the air around the power
plant, including those of arsenic and chromium, were less than anticipated,
and concentrations of arsenic and chromium were consistent with
“background” levels throughout the U.S.;\textsuperscript{319} and (v) ATSDR could not
assess the health effect of breathing combined pollutants (e.g., SO\textsubscript{2} and
PM).\textsuperscript{320}

The report recommended that the DEQ continue efforts to reduce
SO\textsubscript{2} emissions from Potomac Station and PM emissions in Alexandria.\textsuperscript{321}
The agency also recommended reducing exposure to PM and SO\textsubscript{2}.\textsuperscript{322}

In March 2011, ATSDR issued its final health consultation for
Potomac Station.\textsuperscript{323} The conclusions and recommendations were consistent
with the July 2010 report released for public comment.\textsuperscript{324} The report,
however, included a discussion of the smoke stack reconfiguration
completed in January 2009.\textsuperscript{325} The reconfiguration was “expected to
enhance atmospheric dispersion of emissions but not expected to affect
respective emissions rates.”\textsuperscript{326} Like the prior report,\textsuperscript{327} the final report

\textsuperscript{316} See 2011 Mirant Health Consultation, supra note 315, at 40 (addressing
the effects of breathing air polluted with SO\textsubscript{2} on “sensitive populations”).

\textsuperscript{317} See id. at 41 (“Breathing air around Mirant PRGS contaminated with sulfur
dioxide is not expected to harm the health of the general population . . . .”).

\textsuperscript{318} See id. (“ATSDR concludes that breathing for many years Alexandria, VA air
contaminated with PM\textsubscript{2.5} could harm people’s health.”).

\textsuperscript{319} See id. at 41–42 (describing the metals tests and the level of metals in the air
around Mirant).

\textsuperscript{320} See id. at 42 (noting that “ATSDR could reach no conclusion regarding” mixtures
exposure).

\textsuperscript{321} See id. at 40–41 (recommending that the DEQ continue its efforts to reduce sulfur
dioxide and PM emissions).

\textsuperscript{322} See 2011 Mirant Health Consultation, supra note 315, at 42 (noting that
“ATSDR recommends reducing exposure to sulfur dioxide . . . [and] to PM”).

\textsuperscript{323} See generally id. at 44 (referring to the 2011 health consultation as the final
report). Alexandria and GenOn Energy, which acquired the plant from a merger with Mirant,
have been working on agreements to upgrade the technology at the plant for reduced
emissions). See id. at 42–44 (providing a timeline of emission reduction efforts).

\textsuperscript{324} See id. at app. J (noting that the additions from the 2011 final report “did not
change the conclusions and recommendations published in the public comment version

\textsuperscript{325} See id. (listing the 2009 Mirant “stack merge project” as an addition to the 2011
report).

\textsuperscript{326} Id. at 1.
discussed PM emissions from automobiles but cautioned that the discussion “is not meant to imply that either mobile sources or [Potomac Station] sources are more important than the other.”

3. PJM Reliability Assessments

The ongoing environmental and health assessments of Potomac Station coincided with ongoing assessments of the need for Potomac Station to ensure electric reliability for Washington, D.C. Responsible for electric reliability in Washington, D.C. and in the Mid-Atlantic region in general, PJM has for years kept a watchful eye on the sixty-year-old power plant along the Potomac River. Even before the DEQ issued its shutdown order in August 2005, PJM had evaluated the need for Potomac Station to ensure electric reliability in the area to which PEPCO provides electric power.

The evaluation assumed the shutdown of Potomac Station and analyzed the ability of existing transmission lines in the Mid-Atlantic region to import electric power to Washington, D.C. to replace the power lost from Potomac Station. PJM concluded that “[t]he retirement of the Potomac River generation would result in insufficient import capability and several of the affected . . . [transmission lines] would be overloaded.” In other words, the Mid-Atlantic transmission grid was inadequate to import enough power to Washington, D.C. to replace the power lost due to a Potomac River shutdown.

The PJM RTEP for 2005, published in February 2006, reflected the proposed construction by PEPCO of two additional 230-kV transmission

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327. See 2010 MIRANT HEALTH CONSULTATION, supra note 315, at 36 (“Note that this section is not meant to imply that either mobile sources or Mirant PRGS sources are more important than the other.”).
328. Id. at 36.
329. See Paula KEPOS & THOMAS DERDAK, 6 INTERNATIONAL DIRECTORY OF COMPANY HISTORIES 553 (1992) (noting that the plant was built by PEPCO in 1949).
331. See id. at 1 (“The purpose of this system reliability evaluation is to identify any potential transmission system limitations that would violate PJM Reliability Planning Criteria for supply to the Potomac River load after the retirement of the Potomac River generation.”).
332. Id. at 2.
333. See id. (concluding that the closing of the Potomac River plant would overload several nearby transmission facilities).
The report highlighted, however, the uncertain future of Potomac Station. “Both the interim status and the final status of the Mirant Potomac River plant remain in flux as various state and federal regulatory and legislative bodies pursue the legal due process options at their respective disposal.” In addition, “[w]hile currently in question, the final retirement date of this plant has not yet been established, pending owner Mirant’s consideration of the plant upgrades needed to meet environmental standards.”

The PJM RTEP for 2006, published in 2007, explained that the Southwestern PJM area in the Mid-Atlantic region encompassed the transmission facilities owned by PEPCO and by BGE. “Expansion planning experience and results over the past decade has revealed that these two transmission owner zones warrant specific planning attention, because of shared issues regarding generation activity, load growth, generation deactivation, and reliance on transfers to meet load requirements.”

The report also confirmed the uncertain future of Potomac Station:

Nonetheless, in addition to the [power plant] deactivations cited above, the potential shut-down of Mirant’s Potomac River generating plant near Washington, D.C., could mean an additional 482 MW of deactivated capacity . . . . The Potomac River plant remains available under certain circumstances through July 2007, the results of an order of the Secretary of Energy under section 202 of the FPA. Nevertheless, the plant’s shutdown in August 2005 immediately caused violations of reliability criteria, which will not be fully rectified until various RTEP upgrades are completed in 2008. The final status of the Mirant plant has not yet been established, pending the outcome of regulatory

335. See id. (“While currently in question, the final retirement date of this plant has not yet been established . . . .”).
336. Id.
337. Id.
339. Id.
decisions on whether and to what extent the plant must be upgraded to meet environmental standards.\footnote{Id. at 71; see also id. at 222 (“The final status of the Mirant plant has not yet been established, pending the outcome of regulatory decisions on whether and to what extent the plant must be upgraded to meet environmental standards.”).}

The 2006 RTEP explained that “[t]he electricity needs of the Washington-Baltimore-Northern Virginia area are supplied not only by local generation, but also by significant energy transfers into those areas.”\footnote{Id. at 75; see also id. at 216, 298 (addressing the power concerns of the Washington, D.C. suburban areas in Maryland and Virginia, and how these areas draw electricity from outside sources).} Given this dependence on “bulk power transfers from western sources” in PJM, the report emphasized the need to ensure electric reliability in the area through a high-voltage transmission line from southwestern Pennsylvania to northern Virginia.\footnote{See id. at 75 (concluding that if another high voltage transmission line is not built to feed the Washington, D.C. area, then there will be overload on current transmission facilities); see also id. at 215 (“A new . . . transmission line is needed to avoid reliability criteria violations in 2011 and maintain power transfers to serve [the Washington, D.C. area].”}). Such a line would accommodate large energy imports to serve the Washington region.\footnote{See id. at 215 (addressing the need for a new high-voltage transmission line to serve the electricity needs of the Washington, D.C. area).} PJM observed, however, that “[i]n view of the considerable time required to build transmission to help meet load requirements with remote generation, planning and implementation of additional transmission capability must begin now in order ensure that it will be available when required.”\footnote{Id. at 125.}

In light of this urgency, PJM, in the RTEP for 2006, approved the construction of the 500-kV transmission line from the Junction 502 substation in southwestern Pennsylvania to the Mt. Storm substation in eastern West Virginia, to the Meadowbrook substation in Northern Virginia, and to the Loudoun substation in Northern Virginia.\footnote{See id. at 8–9, 11, 92, 102 (noting PJM’s approval of the 502 Junction-Mt. Storm-Meadow Brook-Loudon 500kV transmission line to increase the flow of electricity to the Washington, D.C. area).}

Finally, the report cautioned that additional power plant retirements would undermine electric reliability in the Washington-Baltimore-Northern Virginia area.\footnote{See id. at 222 (“[T]he potential shut-down of Mirant’s Potomac River generating plant near Washington, D.C. . . . could mean an additional 482 MW of deactivated capacity.”).}
More specifically, [DOE] has ordered the owner of the Potomac River plant . . . to keep the plant operational and to generate power under certain conditions through at least July 2007. Environmental pressures may still require the plant to shut down permanently after PEPCO completes installation of two new 230 kV transmission circuits. 

The PJM RTEP for 2007, published in February 2008, was silent on the subject of Potomac Station but reiterated that the Trans-Allegheny Interstate Line (TrAIL) would provide “backbone” transmission to facilitate power transfers from western PJM to Washington, Baltimore, and Northern Virginia. Published in February 2009, the PJM RTEP for 2008 reflected a “retool” of the 2007 RTEP with revised assumptions regarding, e.g., energy demand forecasts, energy conservation, and power plant retirements. The revised assumptions included the withdrawal by Potomac Station of a request for plant deactivation, i.e., retirement. The withdrawal appeared to be related to the July 2008 issuance by the DEQ of the operating permit and the agreement between Mirant Potomac and the City of Alexandria for measures to reduce PM emissions from Potomac Station.  

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347. Id. at 126 (emphasis added).
352. See id. at 60 (noting that the unit deactivation request for Potomac River was withdrawn).
of the plant.\textsuperscript{354} Thus there was no need for PJM to assume in its reliability assessments that the Potomac Station would be unavailable.

The PJM RTEP for 2009, published in February 2010,\textsuperscript{355} confirmed that Potomac Station “previously identified for potential deactivation . . . [was] modeled in-service.”\textsuperscript{356} PJM explained the revised assumptions regarding Potomac Station:

Changes in generation resource status has a significant impact on RTEP results. For example, the Potomac River generating facility in Virginia, a 482 MW facility that serves the D.C. area . . . has been modeled differently over the last few years. Potomac River was modeled as in-service in the 2006 RTEP because of its then-current operational status, was modeled as out-of-service in the 2007 and 2008 RTEPs due to a regulatory order requiring the station to shut down, and has again been modeled in-service during retool analyses in 2008 and 2009 as a result of efforts by the facility owner to remediate environmental issues . . . Assuming that the Potomac River facility is able to satisfy environmental regulations, it will continue to be modeled in service.\textsuperscript{357}

The PJM RTEP for 2010, published in February 2011,\textsuperscript{358} was silent on the subject of Potomac Station but reported that TrAIL was expected to meet a required June 1, 2011 in-service date, and that Virginia, West Virginia, and Pennsylvania all had issued state certificates for the

\begin{itemize}
\item \textsuperscript{354}See id. at 1 (authorizing the Mirant to operate “in accordance with the Conditions of this permit”).
\item \textsuperscript{356}See PJM Interconnection, 2009 REGIONAL TRANSMISSION EXPANSION PLAN 95 (2010) [hereinafter 2009 RTEP], available at http://www.pjm.com/~media/documents/reports/2009-rtep/2009-rtep-report.aspx (noting that units, including Potomac River, were once on the list for deactivation, but were treated as being in-service for purposes of the 2009 generation model) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item \textsuperscript{357}Id. at 102.
\item \textsuperscript{358}See 2010 RTEP, supra note 65, at i–ii (explaining the release of the 2010 Regional Transmission Expansion Plan on Feb. 28, 2011).
\end{itemize}
construction of the transmission line. The report observed that “[t]he TrAIL project itself was added to the RTEP in 2006 primarily [as] the result of overloads on the Mt. Storm to Doubs line.”

In its 2005 reliability assessment, PJM had concluded that “[t]he retirement of the Potomac River generation would result in insufficient import capability and several of the affected [transmission lines] would be overloaded.” One of those affected transmission lines was the 500-kV Doubs-Mt. Storm transmission line.

The operation of TrAIL, designed to accommodate large energy imports to serve the Washington region, would reduce the threat of overloads on the 500-kV Doubs-Mt. Storm transmission line and thus, it seemed, permit the shutdown of Potomac Station. Indeed, in the 2009 RTEP, Potomac Station was modeled in-service, but in the PJM RTEP for 2011, published in February 2012, Potomac Station was identified for anticipated deactivation. The report indicated that a reliability assessment had confirmed that a plant shutdown would have no adverse impact of electric reliability. Published in February 2013, the PJM RTEP for 2012 confirmed that Potomac Station was scheduled to be deactivated in October 2012.

A review of eight successive PJM transmission expansion planning reports for PJM reveals shifting assumptions about the availability of

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359. See id. at 9 (discussing the TrAIL in-service date, as well as state action on the project).
360. Id.
362. See id. (listing the Doubs-Mt. Storm transmission line as one of the affected transmission lines by the Potomac River retirement).
364. See 2010 RTEP, supra note 3585, at 9 (“The TrAIL project itself was added to the RTEP in 2006 primarily the result of overloads on the Mt. Storm to Doubs line.”).
365. See 2009 RTEP, supra note 356, and accompanying text.
367. See id. (noting that the Potomac River unit had no impacts identified in the reliability analysis).
Potomac Station to provide electric power for the Washington, D.C. region and thus to contribute to regional electric reliability. Ultimately, however, following the installation of the two additional 230-kV transmission lines to serve the metropolitan D.C. area, and the construction of TrAIL to facilitate bulk power imports into the Washington, D.C. area, PJM concluded that Potomac Station was not required to ensure electric reliability for Washington, D.C.369

C. Potomac Station Retirement

In July 2011, within two months after TrAIL became operational, the PSC requested that PJM evaluate the potential impact on electric reliability of the deactivation (retirement) of Potomac Station.370 PJM responded with a Deactivation Study for the plant that concluded that the plant’s retirement would cause no violations of NERC reliability standards in 2012 but that transmission upgrades would be required to avoid an adverse impact on electric reliability by 2016.371 The Deactivation Study detailed the required transmission upgrades, which could be completed by May 2016.372

Also in July 2011, New York City Mayor Michael R. Bloomberg used the Potomac Station for a backdrop to announce a $50 million contribution by Bloomberg Philanthropies to the Sierra Club for its Beyond Coal campaign, a nationwide campaign to eliminate coal-fired power plants.373 That same week, an analysis commissioned by the American Clean Skies Foundation concluded that Potomac Station was “no longer needed from a reliability point of view” and that its retirement would result

369. See id. (noting that a “Reliability Analysis” of the Potomac River Station was completed and that no impacts were identified).
371. See id. at 1 (explaining that a plant retirement would not cause any violations of NERC reliability standards but would require future plant upgrades).
372. See id. at 2 (outlining which transmission systems need to be upgraded by 2016 in order to avoid becoming overloaded).
373. See Christian Torres & Juliet Eilperin, Mayor Bloomberg Gives $50 Million to Fight Coal-Fired Power Plants, WASH. POST, July 21, 2011, at A6 (stating that Mayor Bloomberg’s donation was intended to eliminate stations like the Potomac Station).
in an overall reduction in pollutants that contribute to local and regional air quality problems.\textsuperscript{374}

On August 29, 2011, GenOn and Alexandria executed an amendment to the July 2008 agreement between Mirant Potomac and the City of Alexandria for measures to reduce PM emissions from Potomac Station.\textsuperscript{375} Under the amendment, GenOn agreed to retire Potomac Station in exchange for the return of the $34 million that had been placed in an escrow account to be spent on plant modifications to reduce PM emissions and to control fugitive dust from the plant site.\textsuperscript{376} The amendment provided that GenOn “agrees to Retire the Facility on October 1, 2012 subject to PJM finding that the Facility is no longer needed for reliability.”\textsuperscript{377}

The decision to retire Potomac Station followed a prolonged campaign by environmental activists to close the power plant.\textsuperscript{378} The stated reasons for the retirement were numerous and complex, however, and did not include political pressure from environmental activists.\textsuperscript{379} GenOn explained that the decision was driven by economics and not activism.\textsuperscript{380} The company attributed the retirement to “a stagnating demand for energy” associated with the U.S. economic downturn as well as the cost of compliance with new CAA regulations.\textsuperscript{381} “GenOn says it wasn’t activism but the changing economics of running a 482-megawatt coal-fired plant that caused the closure.”\textsuperscript{382} Those changing economics also included significant reductions in the price of natural gas, which make gas-fired electric power more attractive.\textsuperscript{383} The next day, GenOn, in accordance with the PJM

\textsuperscript{374} See Analysis Grp., Inc., Potomac River Generating Station: Update on Reliability and Env’tl. Considerations 21 (2011) (“Our review . . . suggests that . . . the plant [is] no longer needed from a reliability point of view . . . . Its retirement would likely lead to overall reductions of pollutants . . . , in light of other more efficient and less-polluting plants replacing . . . PRGS . . . .”).

\textsuperscript{375} See Mirant Cmty. Monitoring Grp., Amendment to Project Schedule and Agreement, at 3–6 (Aug. 29, 2011) (outlining the amendment to the 2008 Potomac Station agreement).

\textsuperscript{376} See id. at 4 (“Upon retirement of the Facility, all funds in the Escrow Account shall be distributed to GenOn . . . .”).

\textsuperscript{377} Id.

\textsuperscript{378} See, e.g., Patricia Sullivan, Accidental Activists Close to Seeing Coal Plant Shut, WASH. POST, Sept. 4, 2011, at C1 (describing efforts by environmentally conscious citizens to shut down Potomac Station).

\textsuperscript{379} See id. (explaining GenOn’s rationale for closing Potomac Station).

\textsuperscript{380} See id. (“The prospect of increasingly expensive pollution controls, a looming deadline to commit to spending $32 million, a stagnating demand for energy because of the world’s economic doldrums and the possibility of more rigorous Environmental Protection Agency regulations were all factors . . . .”).

\textsuperscript{381} See id. (“It was a good business decision.” (quoting a spokeswoman)).

\textsuperscript{382} Patricia Sullivan, Powering Down, WASH. POST, Sept. 30, 2012, at C1.

\textsuperscript{383} See id. (explaining the other economic factors that are forcing the plant closure).
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OATT,\textsuperscript{384} advised PJM that it intended to retire Potomac Station.\textsuperscript{385} In response, PJM advised GenOn that the plant’s retirement would cause no violations of NERC reliability standards.\textsuperscript{386} “Since there are no reliability violations associated with deactivation of this generating station . . . [Potomac Station] may be deactivated at any time.”\textsuperscript{387}

In September 2012, GenOn advised the DEQ that Potomac Station would close on October 1, 2012.\textsuperscript{388} GenOn would work with the DEQ toward a mutual determination that Potomac Station is permanently shut before the end of 2012.\textsuperscript{389} This determination would require, \textit{inter alia}, the removal of coal, coal ash, and trona from the plant site.\textsuperscript{390} In December, the DEQ concurred in a determination that Potomac Station had shut down permanently and thus revoked its July 2008 and July 2010 operating permits.\textsuperscript{391}

\textbf{IV. Lessons Learned and Conclusion}

\textit{A. Environmental Activism and Electric Reliability}

The case of the Potomac Station shutdown over clean air concerns, its restart under Section 202(c) due to electric reliability concerns, and ultimate retirement over clean air concerns offer several useful lessons relative to the current debate over clean air versus electric reliability.

\textsuperscript{384} See PJM OATT, Part V, Generation Deactivation, Section 113, Notices (“When a Generation Owner desires to deactivate a generating unit located in the PJM Region, such Generation Owner, or its Designated Agent, must provide notice of such proposed Deactivation in writing to [PJM] no later than 90 days prior to the proposed Deactivation Date for the generating unit.”).

\textsuperscript{385} See Letter From Michael J. Kormos, Senior Vice President, Operations, PJM, to Carrie Hill Allen, Assistant Gen. Counsel, GenOn Energy, Inc. (Sept. 29, 2011) (explaining that GenOn received PJM’s notice requesting deactivation of Potomac Station and intended to comply) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

\textsuperscript{386} See \textit{id}. (discussing the deactivation of Potomac Station).

\textsuperscript{387} \textit{id}.

\textsuperscript{388} See Sullivan, \textit{supra} note 382 (“[A]s of midnight Sunday, the 63-year-old coal-fired power plant will permanently shut down.”).

\textsuperscript{389} See \textit{id}. (stating that the full shut down of Potomac Station would take until the end of the year).

\textsuperscript{390} See \textit{id}. (outlining what materials will need to be removed from Potomac Station’s land).

\textsuperscript{391} See Letter from Thomas A. Faha, Director, Northern Regional Office, DEQ, to William Lee Davis, President, GenOn Potomac River, LLC (Dec. 20, 2012) (explaining that GenOn and DEQ mutually determined that the Potomac River Generating Station will be permanently shut down).
Last December, following a prolonged campaign by environmental activists, Potomac Station was retired.\textsuperscript{392} Local activists were aided by the Sierra Club, which has undertaken a nationwide campaign to eliminate coal-fired power plants, and the American Clean Skies Foundation.\textsuperscript{393} The plant was permanently shut down, however, only after measures, some years in the making, were put into place to ensure electric reliability for Washington, D.C.\textsuperscript{394} Undertaken by PJM, which is responsible for electric reliability in Washington, D.C. and in the Mid-Atlantic region in general, those measures included local transmission expansion as well as regional transmission expansion.\textsuperscript{395}

In February 2006, in response to a FERC mandate, PJM and PEPCO filed with FERC the Reliability Plan.\textsuperscript{396} The plan proposed short-term and long-term local transmission construction that would “expedite upgrade of the transmission system for the particular local area served by the Potomac River Plant and substation.”\textsuperscript{397}

The Reliability Plan explained, however, that “PJM is planning for the overall reliability of the greater Washington, D.C. area [and] will continue to review these larger matters through its Regional Transmission Expansion Planning (“RTEP”) process.”\textsuperscript{398} Thus, the Reliability Plan assured FERC that “PJM is evaluating, and will continue to evaluate, within its RTEP process, the need for additional transmission facilities on the Pepco and neighboring systems that may be required to address the potential permanent loss of 482 MW of Potomac River Plant generation on the Pepco system.”\textsuperscript{399}

The 2006 RTEP explained that “[t]he electricity needs of the Washington-Baltimore-Northern Virginia area are supplied not only by local generation, but also by significant energy transfers into those areas.”\textsuperscript{400} Given this dependence on “bulk power transfers from western sources” in PJM, the report emphasized the need, to ensure electric reliability in the area, for a high-voltage transmission line from

\begin{footnotesize}
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\item \textsuperscript{392} See Sullivan, supra note 378 (describing the efforts by environmentally conscious citizens to shut down the Potomac Station).
\item \textsuperscript{393} See Torres & Eilperin, supra note 373 (explaining that reputable environmental organizations have joined efforts to retire the Potomac Station).
\item \textsuperscript{394} See Letter from Michael J. Kormos, to Betty Ann Kane, supra 3700, at 1–2 (describing the additions necessary to properly satisfy Washington D.C.’s electricity needs).
\item \textsuperscript{395} See id. at 2 (outlining the specific transmission expansion necessary to fulfill the Mid-Atlantic region’s electricity needs).
\item \textsuperscript{396} See Reliability Plan, supra note 197, at 1 (discussing the response of PJM and PEPCO to the FERC mandate).
\item \textsuperscript{397} Id. at 3.
\item \textsuperscript{398} Id. at n.7.
\item \textsuperscript{399} Id. at 7.
\item \textsuperscript{400} 2006 RTEP, supra note 338, at 75.
\end{itemize}
\end{footnotesize}
southwestern Pennsylvania to northern Virginia. \(^{401}\) Such a line would accommodate large energy imports to serve the Washington region. \(^{402}\) Thus, PJM, in the RTEP for 2006, approved the construction of TrAIL. \(^{403}\)

Environmental activism, therefore, did not force the shutdown of Potomac Station. Instead, local and regional transmission expansion planning, which ensured electric reliability for Washington, D.C., permitted the retirement of the power plant. \(^{404}\)

The environmental activists that sought the shutdown of Potomac Station, however, did not support regional PJM transmission expansion. \(^{405}\) Indeed, the Sierra Club was opposed to Potomac Station as well as to TrAIL, the construction of which supported the PJM determination that the retirement of Potomac Station would have no adverse consequences for electric reliability in the Washington, D.C. area. \(^{406}\)

Approved by PJM in 2006, TrAIL would be a 244-mile, 500-kV transmission line from the Junction 502 substation in southwestern Pennsylvania to the Mt. Storm substation in eastern West Virginia, to the Meadowbrook substation in Northern Virginia, and to the Loudoun substation in Northern Virginia. \(^{407}\) Thus, the construction of the transmission line would require state certificates from Virginia, West Virginia, and Pennsylvania. \(^{408}\) “Under their traditional jurisdiction over land use, the states permit and site interstate electric power facilities that traverse their boundaries.” \(^{409}\)

In West Virginia, for example, Trans-Allegheny Interstate Line Co., Inc. (TrAILCO) filed an application with the Public Service Commission of West Virginia (West Virginia PSC) in March 2007 for a

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\(^{401}\) See id. (“PJM’s regional planning studies show that additional transmission capability is essential . . . . Unless a major new, high-voltage transmission circuit is constructed between . . . southwestern Pennsylvania and . . . Virginia by 2011, existing 500 kV transmission facilities serving this critical load center will become overloaded.”).

\(^{402}\) See id. (explaining that the proposed transmission line would fulfill Washington’s energy needs).

\(^{403}\) See id. at 69 (describing PJM’s acceptance of the TrAIL plan).

\(^{404}\) See id. at 75 (discussing how the shutdown of the Potomac Station would be impossible if the expansion plan had not been approved).

\(^{405}\) See Sullivan, supra note 378 (discussing environmentalists’ apprehensions about the PJM transmission expansion plan).

\(^{406}\) See id. (describing reputable environmental organizations apprehensions about TrAIL).

\(^{407}\) See 2006 RTEP, supra note 338, at 75 (explaining the details of the expanded transmission line).

\(^{408}\) See id. at 75 (outlining the necessary certification for the expanded transmission line).

certificate to construct and operate the West Virginia segment of TrAIL. In particular, the Sierra Club filed a petition that requested “an order denying the certificate.” In an opening statement, the organization argued that the adverse environmental impacts of the proposed transmission line would outweigh the need for bulk energy imports from western PJM to the Washington-Baltimore-Northern Virginia area. The adverse impacts would include those associated with the construction of the transmission line as well as with those associated with the coal-fired power plants that would generate the power for the bulk energy imports.

In a subsequent brief, the Sierra Club argued that the application for a certificate to construct and operate TrAIL failed to demonstrate a need for the transmission line and that the economic and environmental costs of the transmission line would outweigh its benefits. The brief, as well as a reply brief, argued that the need for bulk energy imports to the Washington-Baltimore-Northern Virginia area could be addressed with reduced demand for electric power through demand response programs, i.e., energy conservation.

In April 2008, TrAILCO, the Staff of the West Virginia PSC, the Consumer Advocate Division of the West Virginia PSC, and the West

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412. Id.

413. See Opening Statement of the Sierra Club at 3, In re Trans-Allegheny Interstate Line Co., No. 07-0508-E-CN (Jan. 8, 2008) (describing the adverse impacts that the expanded transmission line will have on the environment) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

414. See id. at 2–3 (discussing why the adverse environmental impacts outweigh the need for another transmission line).


416. See id. at 17 (discussing other alternatives to the transmission line expansion).
Virginia Energy Users Group filed with the West Virginia PSC a proposed settlement in the certificate proceeding.\textsuperscript{417} The Sierra Club opposed the settlement.\textsuperscript{418} Nonetheless, following a hearing on the proposed settlement, the West Virginia PSC, in August 2008, granted a certificate for the West Virginian segment of TrAIL.\textsuperscript{419}

The Sierra Club filed a petition for rehearing of the order granting the certificate.\textsuperscript{420} The Sierra Club argued, \textit{inter alia}, that the West Virginia PSC, in its review of the application for a certificate for the West Virginia segment of TrAIL, had ignored the adverse environmental impact of the coal-fired power plants that would generate the electric power transmitted over TrAIL.\textsuperscript{421} In February 2009, the West Virginia PSC denied the Sierra Club petition.\textsuperscript{422} The Sierra Club filed a petition for review of the West Virginia PSC orders with the Supreme Court of Appeals for West Virginia in March 2009.\textsuperscript{423} In a one-page order, the court denied the petition in April 2009.\textsuperscript{424}


\textsuperscript{418} See The Sierra Club, Inc. Initial Brief in Opposition to April 15, 2008 Joint Settlement at 9, In re Trans-Allegheny Interstate Line Co., No. 07-0508-E-CN (May 16, 2008) (explaining that the Sierra Club is filing a brief in opposition to the proposed certification) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).


\textsuperscript{420} See Petition for Reconsideration Under Rule 19.3 of the Rules of Practice and Procedure Before the Public Service Commission, at 1, In re Trans-Allegheny Interstate Line Co., No. 07-0508-E-CN (Aug. 6, 2008) (stating that the Sierra Club wants the transmission line expansion to be reconsidered) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).

\textsuperscript{421} See id. at 11 (explaining the environmental impacts of increased greenhouse gases that would arise because of TrAIL).

\textsuperscript{422} See W. Va. P.S.C. Commission Order, at 1, In re Trans-Allegheny Interstate Line Co., No. 07-0508-E-CN (Feb. 13, 2009) (“This order (i) denies the petitions for reconsideration filed by the Sierra Club . . . .”) (on file with the \textsc{Washington and Lee Journal of Energy, Climate, and the Environment}).


The Sierra Club thus lost its bid to thwart the construction of TrAIL. \(^{425}\) Ironically, the ultimate construction of the transmission line contributed significantly to electric reliability in the Mid-Atlantic and thus allowed the retirement of Potomac Station, a sixty-year-old power plant whose pollution would exceed that of a modern coal-fired power plant that would transmit electric power over TrAIL. This irony suggests that the Sierra Club may have been working at cross-purposes. It seems that the organization, which actively sought the shutdown of the sixty-year-old Potomac Station, should have supported the construction of a transmission line that would ensure electric reliability for Washington, D.C. and thus permit the retirement of Potomac Station.

**B. Amending Section 202(c)**

The foreseeable use by the DOE of Section 202(c) to thwart the shutdown of a coal-fired power plant unable to comply with new EPA regulations suggests the possible need to update the 75-year-old statute.

Indeed, concerns that the DOE could again use the statute to hinder the shutdown of coal-fired power plants unable to comply with new CAA requirements have prompted efforts in Congress to amend the statute. \(^{426}\) For the past several years, Congress has attempted to amend Section 205 to provide that compliance with an order under the statute will not be considered a CAA violation. \(^{427}\)

In August 2012, Representative Pete Olson (R-TX) introduced H.R. 4273, \(^{428}\) the Resolving Environmental and Grid Reliability Conflicts Act of 2012, to “clarify that compliance with an emergency order under section 202(c) . . . may not be considered a violation of any Federal, State, or local environmental law or regulation.” \(^{429}\) The legislation would have required DOE to ensure that an order under Section 202(c) “minimize any adverse environmental impacts.” \(^{430}\) An environmental law violation that results

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unpublished decision) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

425. See id. (explaining that the West Virginia Supreme Court denied review of the P.S.C.’s certification, the last possible option in an effort to thwart the expanded transmission line).

426. See, e.g., Resolving Environmental and Grid Reliability Conflicts Act of 2012, H.R. 4273, 112th Cong. pmbl. (2012) (“An Act to clarify that compliance with an emergency order under section 202(c) of the Federal Power Act may not be considered a violation of any Federal, State, or local environmental law or regulation . . . .”).

427. See id. (explaining that the law has finally been changed to not consider compliance with an order issued under the Federal Power Act a CAA violation).

428. Id.

429. Id. at pmbl.

430. Id. § 2(a)(2).
from power generation under such an order, however, “shall not be considered a violation of such environmental law.”

The Subcommittee on Energy and Power of the House Committee on Energy and Commerce held a hearing on H.R. 4273 on May 12, 2012. DOE took no position on the bill but clarified that “Section 202(c) orders are not intended to provide a long-term alternative to environmental compliance. They are available only under limited emergency situations, and are temporary solutions to imminent reliability threats.” The DOE also urged power plants to “start planning and working with” transmission planning organizations and other entities with ultimate responsibility for electric reliability “to resolve any reliability issues” that may arise in connection with CAA requirements.

The EPA also took no position on the bill and testified that its new CAA regulations would not threaten electric reliability and thus created no particular need to amend Section 202(c). A power plant forced into retirement because it is unable to comply with those regulations “is an average of more than fifty years old, relatively inefficient, and does not have modern pollution control equipment.” Finally, the EPA observed that “[t]he Nation’s power grid is strong and resilient because numerous agencies and organizations fulfill their obligations to maintain the Nation’s electric reliability.”

FERC testified that it supported the concept behind H.R. 4273. “That is . . . generators of electricity should not be put in a position of having to choose whether to violate Section 202(c) of the Federal Power Act or whether to violate the Clean Air Act when certain generating facilities are needed for crucial electric reliability needs.” The PSC supported the bill “[b]ecause the proposed legislation would enable

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431. Id.
433. Id. at 43 (prepared statement of Patricia Hoffman, Assistant Secretary, Office of Electricity Delivery and Energy Reliability, DOE).
434. See id. at 44 (“Electricity generation owners must start planning and working with their grid operators, and if need be EPA, early on to identify and resolve any reliability issue arising in connection with EPA rules.”).
435. See id. at 50–59 (prepared statement of Regina A. McCarthy, Assistant Administrator of Air and Radiation, EPA) (explaining the EPA’s view that section 202(c) does not need to be amended).
436. Id. at 55.
438. See id. at 59–61 (presenting the prepared statement of FERC Commissioner Philip D. Moeller and elaborating on FERC’s reasons for supporting the amendment).
439. Id. at 63.
generation companies to operate electric plants without fear of penalties for violations of other laws when required to do so by emergency orders of FERC and DOE.”

After the subcommittee hearing on H.R. 4273, the House Committee on Energy and Commerce approved the bill.441 On August 1, 2012, the House approved the bill.442 Referred to the Senate, the bill died in committee.443

Last January, Rep. Olson introduced H.R. 271, the Resolving Environmental and Grid Reliability Conflicts Act of 2013, which is identical to H.R. 4273.444 The House Committee on Energy and Commerce approved the bill on May 20th, the House approved H.R. 271 on May 22nd, and the bill has been referred to the Senate.445

The logic behind the support for the bill is compelling. If, to ensure electric reliability, the DOE orders the restart of a power plant shut down because it is unable to comply with new CAA requirements, then the plant should not be liable for violations of those requirements. Given recent concerns that new CAA regulations could force the shutdown of coal-fired power plants critical to electric reliability and given the foreseeable use by the DOE of Section 202(c) to thwart the shutdown of such power plants, an amendment to the statute should be enacted to clarify the legal liability of a power plant that complies with a DOE order under the statute and thus violates a CAA requirement.

C. Conclusion

Clean air concerns forced the shutdown of Potomac Station in August 2005.446 In December 2005, electric reliability concerns prompted the DOE to issue an unprecedented order under Section 202(c) to require its

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440. Id. at 119.
441. See H.R. 4273, supra note 426 (explaining that the bill was approved by the House Committee on Energy and Commerce).
442. See id. at 4 (stating that H.R. 4273 “[p]assed the House of Representatives August 1, 2012”).
443. See id. (stating that the bill was referred to committee).
444. Compare H.R. 271, 113th Cong. (1st Sess. 2013) (“To clarify that compliance with an emergency order under section 202(c) of the Federal Power Act may not be considered a violation of any Federal, State, or local environmental law or regulation.”), with H.R. 4273, 112th Cong. (2012) (clarifying that “compliance with an emergency order under section 202(c) of the Federal Power Act may not be considered a violation of any Federal, State, or local environmental law or regulation”).
446. See Smith, supra note 141 (discussing the 2005 shutdown of the Potomac Station).
restart. In October 2012, Potomac Station was retired. Environmental activism, it seems, had achieved its ultimate objective. The power plant’s retirement, moreover, raised no electric reliability concerns.

Between August 2005 and October 2012, PJM, which is responsible for electric reliability in Washington, D.C. and in the Mid-Atlantic region in general, implemented local and regional measures, some years in the making, to ensure electric reliability for Washington, D.C. Indeed, environmental activism did not force the shutdown of Potomac Station. Instead, careful and farsighted transmission expansion planning permitted the retirement of the power plant.

Testifying before a House subcommittee in 2012, Regina A. McCarthy, who in July 2013 became EPA Administrator, was correct. “The lights have not gone out in the past, due to Clean Air Act regulations, and . . . [EPA] rules won’t cause them to go out in the future.” But not because the EPA itself will ensure that the lights will not go out, rather, PJM and other transmission planning organizations and entities with ultimate responsibility for electric reliability will provide that assurance. Environmental activists opposed to aging coal-fired power plants should support the efforts of these organizations.

447. See DOE Order No. 202-05-3, supra note 21, at 6–10 (outlining the need for reliable electricity in our nation’s capital as one of the many reasons for restarting Potomac Station).
448. See Sullivan, supra note 382 (describing the 2012 retirement of the Potomac Station).
449. See id. (explaining that environmentalists primarily wanted the Potomac Station retired).
450. See Kormos, supra note 3700, at 1-2315 (noting that Potomac Station’s retirement would not raise any electric reliability concerns).
451. See id. (discussing additions that would need to be made to transmission lines to ensure that Washington D.C.’s electricity needs are met).
452. See Sullivan, supra note 3822 (noting that the decision to close Potomac Station was not made because of environmental concerns).
453. See Kormos, supra note 370, at 1-2315 (explaining that the Potomac Station retirement would not have been possible unless TrAIL could be expanded).
454. The American Energy Initiative, Part 19, supra note 1, at 50.
455. See Kormos, supra note 3700, at 1-2315 (noting that transmission expansion was required in order to create electric reliability).
A Napoleonic Approach to Climate Change: The Geoengineering Branch

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Abstract

Climate change is an inevitable consequence of human greenhouse gas emissions. Without substantial changes in anthropogenic causes of climate change, there will be severe negative impacts on our planet. Complete abolition of greenhouse gas emissions, however, is not possible, nor will it necessarily stop the negative impacts of climate change. Therefore, substantial research must be done in geoengineering to understand better how we can positively act to avert significant climate change. Given the practical difficulties and potential effects, there must be comprehensive oversight. Currently, differing national laws makes this difficult. Additionally the United States laws do not properly cover climate engineering. Therefore, the United States should enact a comprehensive legal and regulatory program to develop and grow research in climate engineering. This comprehensive regime should be a model for the rest of the world to follow.

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I. Introduction

Absent substantial reductions in greenhouse gas (GHG) emissions, significant climate change will be unavoidable.\(^1\) Carbon remains in the atmosphere for centuries, and even if carbon emissions were stopped immediately, the planet would continue to warm.\(^2\) Although mitigation of GHG emissions remains the preferred approach, recent estimates predict that it will no longer suffice to avert significant planetary warming.\(^3\) While we should continue to mitigate, we need to develop alternative approaches should mitigation not occur quickly enough or to the degree required to avoid catastrophic climate change.\(^4\)

To minimize the worst effects of climate change, we may need to utilize climate engineering.\(^5\) Climate engineering could help avoid the worst

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2. See id. (discussing the climatic changes that would continue even after cessation of carbon emissions).

3. See Susan Solomon et al., Irreversible Climate Change Due to Carbon Dioxide Emissions 106 PROCEED. NAT’L ACAD. SCI. 1704, 1709 (2009), available at http://www.pnas.org/content/early/2009/01/28/0812721106.full.pdf (“Irreversible climate changes due to carbon dioxide emissions have already taken place, and future carbon dioxide emissions would imply further irreversible effects on the planet, with attendant long legacies for choices made by contemporary society.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

4. See David Bello, Has the Time Come to Try Geoengineering?, SCIENTIFIC AMERICAN (Aug. 15, 2012), http://blogs.scientificamerican.com/observations/2012/08/15/has-the-time-come-to-try-geoengineering/ (“If the world collectively fails to restrain pollution, then we might need to deploy geoengineering techniques in a hurry to prevent catastrophic climate change.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

5. In recognition of the common usage of “geoengineering,” this paper uses the terms “climate engineering” and “geoengineering” interchangeably to mean “the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change.” THE ROYAL SOCIETY, GEOENGINEERING THE CLIMATE: SCIENCE, GOVERNANCE, AND UNCERTAINTY 1 (2009) [hereinafter ROYAL SOCIETY], available at http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2009/8693.pdf (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). For further discussion of these terms, see BART GORDON, ENGINEERING THE CLIMATE: RESEARCH NEEDS AND STRATEGIES FOR INTERNATIONAL COOPERATION 39 (2010), available at http://www.washingtonpost.com/wp-srv/nation/pdfs/Geengineeringreport.pdf (arguing that although numerous terms besides “climate engineering” have been used to refer to these activities, including “climate remediation,” “climate intervention,” and “geoengineering,” the Chair of the House Committee on Science and Technology finds that
consequences of planetary warming and reduce atmospheric carbon. The United States should establish a comprehensive scheme to encourage research and regulation of geoengineering, because current environmental laws, targeted to pollution, do not address it. The United States should prohibit the implementation of geoengineering until absolutely necessary, if ever.

Part II of this Article explores the factors that make continued climate change inevitable. It next discusses climate engineering technologies and their anticipated benefits and risks. Part III reviews the domestic and international laws that might control climate engineering research and testing in the United States. Finally, Part IV presents considerations for a regulatory scheme that would foster the research and testing of climate engineering and may serve as a model for an international program.

II. Mitigation Alone Will Not Avert Significant Climate Change

Human-sourced emissions of greenhouse gases are causing significant climate change. We can now anticipate that we will take longer and be less successful in reducing these emissions than will be necessary to avoid significant alteration of the climate. As a result, we will inevitably need to expand the set of tools to which we can turn to combat climate change.
change and its consequences. One of the tools that we need to consider more seriously is climate engineering.

A. The Climate Is Changing

The Earth is warming. Figure 1 illustrates the rise in annual mean temperatures since the late nineteenth century:

Figure 1

Global Land–Ocean Temperature Index

11. See id. at ix (“Unless future efforts to reduce greenhouse gas emissions are much more successful than they have been so far, additional action may be required should it become necessary to cool the Earth this century.”).

12. See id. at 4 (“Concerns regarding the slow progress on achieving emissions reductions, and uncertainties about climate sensitivity and climate tipping points have led some members of the scientific and political communities to suggest that geoengineering may offer an alternative solution to climate change mitigation.”).


14. Id.
The change between any individual year and another, however, may be unclear or misleading, because individual years are subject to the variability of the El Niño-La Niña cycle, volcanic eruptions, or other events. The warming trend over years, particularly recent years, however, is especially meaningful because it shows that the hottest years on record have all occurred recently. Indeed, all twelve years in the twenty-first century rank among the fourteen warmest in the 133-year period of record.

Numerous Earth systems are manifesting the indirect consequences of this warming, such as extreme weather events, increasing ocean...
temperatures, changes in precipitation patterns, and rising sea levels. For example, the global mean sea level showed little change between 1 A.D. and 1900, but it has risen since that time, and its rise is accelerating. Scientists recognize two major causes of this rise: thermal expansion of the oceans and melting of land-based ice, such as glaciers. Recession of glaciers is a strong indicator of climate change. Available data, collected since the 1800s, reveals a considerable reduction in glacier size from 1850 until the 1970s, when glacier thickness stabilized. The rate of loss has accelerated since the 1990s.

B. The Rise in the Planet’s Temperature Will Continue and Accelerate

Even if we eliminate the anthropogenic sources of global warming immediately and completely, the global temperature will continue

20. See National Climatic Data Center, supra note 13 (“The warming trend [is] . . . confirmed by other independent observations, such as the melting of mountain glaciers on every continent, reductions in the extent of snow cover, earlier blooming of plants in spring, a shorter ice season on lakes and rivers, ocean heat content, reduced arctic sea ice, and rising sea levels.”).

21. See id. (“Global mean sea level has been rising at an average rate of approximately 1.7 mm/year over the past 100 years . . . which is significantly larger than the rate averaged over the last several thousand years.”); see also IPCC, supra note 17, at 409 (tracking global sea level changes starting from the end of the last ice age and offering projections of future sea level changes).

22. See IPCC, supra note 17, at 409 (explaining past and future increases in global sea level).

23. See id. (“The two major causes of global sea level rise are thermal expansion of the oceans (water expands as it warms) and the loss of land-based ice due to increased melting.”).


25. See IPCC, supra note 17, at 357 (following glacier changes starting in the 1800s).


27. See J. Lastovicka et al., Global Change in the Upper Atmosphere, 314 SCIENCE 1253, 1254 (2006) (naming the increase in carbon emissions since the start of the Industrial Revolution as the primary instigator of climate change and noting that the upper atmosphere is cooling while the lower atmosphere is warming because carbon in the lower atmosphere creates the “greenhouse effect”); see also IPCC, supra note 17, at 139 (explaining that carbon emissions from burning fossil fuels include more 12C isotopes than 13C isotopes at a rate that would not otherwise occur in nature, and that the ratio of 12C isotopes to 13C isotopes in the atmosphere has increased at a rate consistent with that of CO2 emissions from fossil origin); Gerald A. Meehl et al., Combinations of Natural and Anthropogenic Forcings in Twentieth-Century Climate, 17 J. CLIMATE 3721, 3723–24 (2004) (stating that the rate and
to rise for decades before it stabilizes. Se 28 Several factors will cause this continued rise. First, carbon dioxide (CO\textsubscript{2}), which remains in the atmosphere for centuries, will continue to trap heat. Second, the thermal inertia of the Earth’s oceans means that they absorb heat and radiate it gradually, for hundreds of years. Second, feedbacks increase the rate of global warming.

First, although natural processes, such as photosynthesis and absorption by ocean waters, remove some of the anthropogenic CO\textsubscript{2} that is released into the atmosphere, these processes cannot remove all such CO\textsubscript{2}, meaning that CO\textsubscript{2} will continue to accumulate in the atmosphere. Moreover, natural processes become less successful at removing CO\textsubscript{2} as the extremity of climate change cannot be explained without accounting for anthropogenic influences, as simulations of global temperatures including only natural influences project global temperatures that remain largely flat and only simulations that include human sources track the actual warming that has occurred since the 1970s. This evidence has allowed climate scientists to conclude that climate change is anthropogenic.

28. See Solomon et al., supra note 3, at 1704 (explaining that even if all emissions ceased, atmospheric temperatures would not drop significantly for at least one-thousand years).


30. See generally James Hansen, et al., Target Atmospheric CO\textsubscript{2}: Where Should Humanity Aim?, 2 OPEN ATMOSPHERIC SCI. J. 217 (discussing the role of the ocean’s thermal inertia in earth temperatures as it relates to reductions in GHGs).

31. See Daniel A. Lashof, Benjamin J. DeAngelo, Scott R. Saleska & John Harte, Terrestrial Ecosystem Feedbacks to Global Climate Change, 22 ANN. REV. ENERGY ENV’T 75, 78–81 (1997) (defining the feedback process as that whereby change in one variable (such as CO\textsubscript{2} concentration) causes change in temperature, which causes change in a third variable (such as water vapor), which in turn causes further change in temperature). Feedbacks can either increase (positive feedback) or reduce (negative feedback) the system’s response to outside variables. Id. at 1. An example of a negative feedback is the increase in low clouds caused by increased evaporation, which reflect sunlight, mitigating global warming. Id.

32. See Climate Change 2007, supra note 29, at 36–38 (“Warming reduces terrestrial and ocean uptake of atmospheric CO\textsubscript{2}, increasing the fraction of anthropogenic emissions remaining in the atmosphere. This positive carbon cycle feedback leads to larger atmospheric CO\textsubscript{2} increases and greater climate change for a given emissions scenario.”); see also IPCC, supra note 17, at 512 (“Natural processes such as photosynthesis, respiration, decay and sea surface gas exchange lead to . . . a small net uptake of CO\textsubscript{2} . . . , partially offsetting the human-caused emissions.”).
emissions increase, and climate change itself suppresses carbon absorption by both land and ocean processes.

Second, because of the thermal inertia of the Earth’s oceans, the global temperature will continue to rise, even if carbon emissions were to cease. Thus, the warming currently experienced is only about sixty percent of the warming that would be expected at the atmosphere’s current level of CO\(_2\) concentration. For this reason, were society to stop emitting all carbon today, the planet’s temperature would not immediately return to pre-industrial levels or even stabilize. Actually, the temperature would continue to increase for a few decades, and only then remain at that new level for at least one thousand years.

Third, not only will global warming continue for several decades, but the rate of warming will increase due to carbon-cycle feedback cycles that accelerate warming. Indeed, models suggest that feedbacks will more
than double the direct effect of increasing CO\textsubscript{2} levels without feedbacks.\textsuperscript{42} For example, feedbacks are accelerating the rate at which the Arctic ice cap melts.\textsuperscript{43} As the global temperature has warmed, less snow has fallen on the Arctic ice cap.\textsuperscript{44} Because snow reflects approximately eighty-five percent of the sunlight that it receives,\textsuperscript{45} snow acts as sunscreen for ice. The decline in snowfall has exposed ice to sunlight, which increases melting.\textsuperscript{46} As the melting increases, the planetary surface albedo\textsuperscript{47} decreases, thus prompting greater melting.\textsuperscript{48} Ocean waters absorb almost ten times more solar radiation than does sea ice,\textsuperscript{49} thereby increasing temperatures.\textsuperscript{50}

Additional feedbacks will accelerate the rate at which the atmosphere warms.\textsuperscript{51} Such feedbacks include, among others, the increase of

\begin{itemize}
  \item \textsuperscript{42} See Nat’l Research Council, Understanding Climate Change Feedbacks 16 (2003) (“Climate models suggest that the temperature change enhancement associated with feedback processes is greater than the temperature change resulting from the direct effect of the carbon dioxide doubling without feedbacks.”).
  \item \textsuperscript{43} See Archer & Brovkin, supra note 37, at 291 (“There are reasons to believe that real ice sheets might be able to collapse more quickly than our models are able to account for . . . .”).
  \item \textsuperscript{44} See U. of Melbourne, More Rain, Less Snow Leads to Faster Arctic Ice Melt, Melbourne Newsroom (July 2, 2011), http://newsroom.melbourne.edu/news/n-572 (last visited Sept. 8, 2013) (”\[D\]ue to warming temperatures, on more days of the year and in more parts of the polar region, temperatures are becoming too warm for protective snow to form.”) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).
  \item \textsuperscript{45} See id. (“Snow is highly reflective and bounces up to 85 percent of the incoming sunlight back into space.”) (internal quotations omitted)).
  \item \textsuperscript{46} See id. (discussing snow protection of Arctic ice and the increased exposure and melt resulting from decreased snowfall).
  \item \textsuperscript{47} See IPCC, supra note 17, at 941 (defining albedo as “the fraction of solar radiation reflected by a surface or object” and noting that snow has a high albedo, while oceans and vegetation-covered surfaces have low albedos).
  \item \textsuperscript{48} See M. Tedesco, et al., The Role of Albedo and Accumulation in the 2010 Melting Record in Greenland, 6 Env’t Res. Letters 1, 2 (2011) (linking decreases in surface albedo to increases in ice melt).
  \item \textsuperscript{49} See Alicia Newton, The Big Melt, 1 Nature Reports: Climate Change 93, 93 (2007), available at http://www.nature.com/climate/2007/0712/pdf/ngeo.2007.31.pdf (“Open ocean waters absorb almost ten times more solar radiation than sea ice—a phenomenon known as the ice-albedo feedback.”); see also James A. Screen & Ian Simmonds, Declining Summer Snowfall in the Arctic: Causes, Impacts and Feedbacks, 38 Climate Dynamics 1, 1 (2011), available at http://www.springerlink.com/content/84078356qupn28g6 (comparing the relationship between the decline of snowfall and the decline of sea ice-cover).
  \item \textsuperscript{50} See id. (“\[T\]he Arctic is expected to warm particularly strongly, because of the albedo feedback from melting the Arctic ice cap.”).
water vapor,\textsuperscript{52} the weakening of carbon sinks,\textsuperscript{53} and the impairment of terrestrial hydrology and its impact on vegetation.\textsuperscript{54}

\textbf{C. Mitigation Alone Is Unlikely to Avert Significant Climate Change}

For several reasons, mitigation alone is unlikely to be sufficient to prevent significant climate change. First, international agreements to reduce emissions have had limited success, and are unlikely to be successful in the future.\textsuperscript{55} Second, implementation of alternative energy technologies is unlikely to take effect soon enough to avert significant temperature increases.\textsuperscript{56} Finally, scientists now believe that initial targets for acceptable warming were too lenient, necessitating a stronger response to climate change than previously anticipated.\textsuperscript{57}

To avoid catastrophic climate change, international agreements have set goals to reduce greenhouse gas emissions.\textsuperscript{58} The United Nations

\begin{footnotesize}
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\item\textsuperscript{52} See Nat’l Research Council, supra note 42, at 2 (“Water vapor feedback is the most important positive feedback in climate models. It is important in itself, and also because it amplifies the effect of every other feedback and uncertainty in the climate system.”).
\item\textsuperscript{53} See H. Damon Matthews & David W. Keith, Carbon-Cycle Feedbacks Increase the Likelihood of a Warmer Future, Geophysical Res. Letters, May 4, 2007, at 1 (“Climate changes will likely weaken carbon sinks, leading to positive carbon-cycle feedbacks . . . .”).
\item\textsuperscript{54} See Nat’l Research Council, supra note 42, at 60 (reporting on terrestrial hydrology’s role in climate change feedbacks).
\item\textsuperscript{56} See Solomon et al., supra note 3, at 1704 (explaining that climate changes caused by carbon presently in the atmosphere are irreversible).
\item\textsuperscript{57} See Bill McKibben, Global Warming’s Terrifying New Math, Rolling Stone (July 19, 2012), http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719 (discussing the agreed two degree-Celsius limit on global warming as too lenient, as smaller temperature increases have already caused a great deal of damage) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).
\end{itemize}
\end{footnotesize}
Framework Convention on Climate Change (UNFCCC) set an overall framework for intergovernmental efforts to address climate change. In 1997, the parties to the UNFCCC developed the Kyoto Protocol, which committed industrialized nations to achieve reductions in greenhouse gas emissions by 2012. These countries committed themselves to collective reductions averaging more than five percent from 1990 emissions levels. Unfortunately, emissions have continued their upward trajectory. As of 2007, their collective emissions had dropped only 1.4% below their 1990 emissions. At the same time, emissions from the non-industrialized countries had increased by 100.6% over 1990 levels, so that combined


60. See generally Background on the UNFCCC: The International Response to Climate Change, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/essential_background/items/6031.php (last visited Sept. 9, 2013) (“In 1992, countries joined . . . [the UNFCCC] to cooperatively consider what they could do to limit average global temperature increases and the resulting climate change, and to cope with whatever impacts were, by then, inevitable.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


62. See Kyoto Protocol, supra note 61, at art. III, ¶ 1 (stating that the parties shall reduce their “aggregate anthropogenic carbon dioxide equivalent emissions” of greenhouse gases, with a “view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012”).


global emissions had increased by 34.7% since 1990. As discussed below in Part IV, similar efforts are likely to be unsuccessful in the future.

Second, even if nations decide to reduce CO\textsubscript{2} emissions, structural aspects of the energy industry, which generates one-quarter of global greenhouse gases, will require decades to convert a significant portion of the industry to clean technologies. Although society adopts certain technologies with lightning rapidity, conversion to new energy technologies occurs much more slowly. Indeed, two “laws” of energy-technology development dictate that the energy industry requires several decades to adopt and implement new technologies. On average, energy
technologies have required thirty years to advance from being technically available to reaching materiality. This pattern was consistent across all technologies, including nuclear power, natural gas, biofuels, wind, and solar photovoltaic.

Figure 2 below illustrates that several energy technologies grew during the last century in accordance with these “laws”:

Adoption of new technologies in the energy field requires significant time because of several inherent characteristics of the power industry. First, historical patterns show that the industry needs almost a full decade to build and test new technologies: three years to build a demonstration plant, one year to commence operations, and two to five breakthrough to commercial introduction that may take decades) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

72. See Kramer & Haigh, supra note 71, at 568 (“In the twentieth century, it took 30 years for energy technologies that were available in principle to grow exponentially and become widely available.”).

73. See id. (stating that the pattern of slow commercial availability of energy technologies was remarkably consistent across all technologies); id. at 569 (“The challenge in the decades ahead is to match, perhaps even outperform, the historic ‘laws’ by designing energy policies directed at decarbonizing the energy industry.”); see also Peter Lund, Market Penetration Rates of New Energy Technologies, 34 ENERGY POL’Y 3317, 3321–22 (2006) (providing a separate analysis projecting that the time for solar photovoltaic and wind energy sources to grow from providing one percent of their total energy potential to fifty percent will be nearly thirty years).

74. Kramer & Haigh, supra note 71, at 569.
years to identify problems and reach satisfactory operability. Second, massive amounts of capital must be invested to alter significantly the mix of energy sources, amounts that dwarf the scale of the industry.

Third, once a technology reaches materiality, growth rates flatten (see Figure 3). This growth trend results in part from the nature of energy infrastructure. Power plants have average lives of twenty-five to fifty years, though some have operational lives of up to 100 years. Consequently, only two to four percent of existing sources require replacement in a given year. Besides replacing power plants, conversion to renewable energy systems will often require other developments, such as land acquisitions, different transmission methods, enabling technologies, market systems, and other changes, which may not yet be foreseeable.

Royal Dutch Shell projected that renewable sources of energy could reach materiality by 2030, sooner than others have forecast. Royal Dutch Shell further projected that by 2050 total energy demand would be

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75. See id. at 568 (explaining that energy technology relies on conversion processes and that the wind power required decades to develop, produce, purchase, and deploy the new turbines at the scale required to generate one percent of the country’s energy).

76. See id. (stating that it takes a few hundred billion dollars to bring a new technology to materiality).

77. See id. (“You cannot just spend $1 trillion overnight in a $30-billion industry.”).

78. See id. (“After reaching materiality, growth curves have historically leveled off.”).

79. See id. (“Unlike consumer goods that may become obsolete in a few years, the capital goods of the energy system have a lifetime of 25–50 years.”).

80. See id. (“[T]he capital goods of the energy system have a lifetime of 25–50 years. That means only 2–4% of existing technology needs replacing in a given year.”); Bryan K. Mignone, Robert H. Socolow, Jorge L. Sarmiento & Michael Oppenheimer, Atmosphere Stabilization and the Timing of Carbon Mitigation, 88 CLIMATIC CHANGE 252, 255 (2008) (explaining that development of new technology provides another incentive to plant owners to defer early retirement and subsequent construction of new plants; technological advancements discourage plant owners from committing themselves to current technologies and running the risk of locking themselves into expensive, yet soon-to-be-outdated, methods); see also id. at 252 n.3 (describing how the tendency toward economic postponement are somewhat mitigated by how quickly expensive technology is advancing).


one-third lower than a business-as-usual scenario.\textsuperscript{83} Even if these projections are correct, CO\textsubscript{2} concentrations would not stabilize until they reached 550 ppm.\textsuperscript{84}

Not only are we unlikely to meet current emissions targets, but scientists now believe that even these targets are not stringent enough.\textsuperscript{85} Despite mitigation efforts during the past three decades, atmospheric CO\textsubscript{2} concentrations have risen steadily.\textsuperscript{86} Figure 3\textsuperscript{87} presents the atmospheric concentration of CO\textsubscript{2} since 1980:

\begin{itemize}
  \item \textsuperscript{83} See Kramer & Haigh, supra note 71, at 569 (hypothesizing that by 2050 total energy demand will be a third lower than business-as-usual projections, mostly because of enhanced efficiency and electric vehicles).
  \item \textsuperscript{84} See id. (“We believe that the Blueprints scenario is the best we can reasonably hope to achieve for new energy deployment, yet in it, by 2050 two-thirds of the world energy supply still comes from fossil fuels and CO\textsubscript{2} concentrations stabilize at around 550 p.m.”); see also Ailun Yang & Yiyun Cui, Global Coal Risk Assessment: Data Analysis and Market Research 5, tbl. Li (World Resources Inst. Working Paper, Nov. 2012) (explaining that increased emissions are foreseeable in part because nearly 1,200 coal-fired power plants (including 360 in China and 450 in India) have been proposed to be built) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
  \item \textsuperscript{85} See Marco Steinacher, Fortunat Joos & Thomas F. Stocker, Allowable Carbon Emissions Lowered by Multiple Climate Targets, 499 NATURE 197, 197 (2013) (stating that the climate targets are unable to limit the risks from anthropogenic emissions sufficiently).
  \item \textsuperscript{87} See ESRL Data, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ftp://ftp.cmdl.noaa.gov/ccg/co2/trends/co2_annmean_mlo.txt (last visited Dec. 30, 2013) [hereinafter ESRL Data] (compiling measurements of CO\textsubscript{2} expressed as a mole fraction in dry air for the period 1959–2012) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).\end{itemize}
During this period, atmospheric CO\textsubscript{2} increased from 338.7 ppm to 393.8 ppm, a rise of 16.3%.\textsuperscript{88} Atmospheric CO\textsubscript{2} increased every year.\textsuperscript{89} Furthermore, the annual increase in CO\textsubscript{2} is actually rising.\textsuperscript{90} Since 2002, annual CO\textsubscript{2} concentrations have increased on average by 2 ppm per year.\textsuperscript{91}

Thus, not only are targets in international agreements too difficult to achieve,\textsuperscript{92} they may also be too lenient.\textsuperscript{93} The following example


\textsuperscript{89} ESRL Data, supra note 87.

\textsuperscript{90} See Lee R. Kump, The Last Great Global Warming, SCIENTIFIC AMERICAN, July 2011, at 57, 60, available at http://physics.ucf.edu/~britt/Climate/Reading[Last%20great%20warming].pdf (explaining that scientists calculate this rate of atmospheric carbon dioxide increase as possibly ten times faster than carbon dioxide rose leading up to the Paleocene-Eocene Thermal Maximum, the last major planetary warming, when temperatures rose by five degrees Celsius).

\textsuperscript{91} See Annual Data: Atmospheric CO\textsubscript{2}, CO\textsubscript{2} NOW, http://co2now.org/current-co2/co2-now/annual-co2.html (last visited Sept. 9, 2013) (“For the past decade (2003–2012) the average annual increase is 2.1 ppm per year.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{92} See SHELL INT’L, supra note 82, at 66 (discussing the probable difficulty in nations with such varied background and goals agreeing on a plan to control climate change).
illustrates the obstacles that prevent abatement of atmospheric levels of CO₂. At the 2010 UN Climate Change Summit in Cancun, the delegates agreed to limit warming to a global mean temperature increase of two degrees Celsius, which requires an atmospheric content of 450 ppm of CO₂. To achieve this target, global emissions immediately need to begin declining by more than one percent per year, in contrast to the annual global increase. Small delays in emissions cuts, moreover, necessitate much larger reductions in future emissions. Delay causes the atmospheric CO₂ to peak higher and later, thus necessitating much sharper cuts to attain the same level. For this reason, stabilization at 450 ppm appears to be “virtually impossible even if aggressive mitigation were to begin today.”

Thus, not only are targets in international agreements too difficult to achieve, these targets may also be too lenient. Scientists have set a rise of two degrees Celsius as a target to avert catastrophic consequences.

93. See id. (arguing that the Copenhagen Accord failed to set effective targets).
95. See IPCC, supra note 17, at 826 (explaining that the best calculation for atmospheric content of 450 ppm would be a temperature increase of no more than two degrees).
96. See Mignone et al., supra note 80, at 251 (projecting that a decline in emissions by one percent would achieve a 475 ppm CO₂ level).
97. See UNEP, supra note 67, at 3 (indicating that global emissions must peak before 2020 to have a “likely” chance of staying within the two degrees Celsius target and describing the two degrees Celsius target as “highly unrealistic’’); see also Current Rates of Decarbonisation Pointing to 6°C of Warming, PricewaterhouseCoopers (Nov. 5, 2012) http://press.pwc.com/GLOBAL/News-releases/current-rates-of-decarbonisation-pointing-to-6oc-of-warming/s/47302a6d-efb5-478f-b0e4-19d8801da855 (stating that current rates of decarbonization point to six degrees Celsius of warming) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
98. See Mignone et al., supra note 80, at 253 (“We find that the marginal rate of substitution between future and present mitigation . . . becomes quite large when the decline rate increases beyond 1 or 2% per year, meaning that small increases in delay necessitate very large increases in the intensity of future mitigation.”).
99. See id. at 256 (“[T]he peak atmospheric concentration would increase by 6.6 ppm if mitigation were delayed 1 year.”).
100. Id.; see also Shell Int’l, NEW Lens Scenarios: A SHIFT IN PERSPECTIVE FOR A WORLD IN TRANSITION (2013) (finding that Shell’s most recent estimate projects that we will “overshoot” the 2° C goal) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
101. See Shell Int’l, supra note 82, at 66 (discussing the probable difficulty in nations with such varied background and goals agreeing on a plan to control climate change).
102. See id. (arguing that the Copenhagen Accord failed to set effective targets).
103. See IPCC, supra note 17, at 826 (discussing the benefits of staying within a two degree global temperature increase).
Recent analyses, however, suggest that this rise would be too high.\textsuperscript{104} Comparison to prehistoric records indicate that the current level of CO\textsubscript{2} (approximately 394 ppm) is already too high to maintain current planetary conditions.\textsuperscript{105} Indeed, current analyses suggest that 2\textdegree C warming may cause significant sea-level rises, storms, floods, droughts, and heat waves.\textsuperscript{106} Maintaining climate conditions comparable to those of the Holocene Era, during which civilization developed, requires reducing the atmospheric CO\textsubscript{2} level to 350 ppm.\textsuperscript{107}

Thus, the solution required must not merely cut emissions, but also reduce atmospheric carbon.

\textit{D. Climate Engineering: What It Is, and How It Can Help}

The realities of climate change highlight two key considerations. First, significant climate disruption is foreseeable, regardless of future emission levels.\textsuperscript{108} Second, mitigation alone cannot return the climate to its preindustrial state.\textsuperscript{109} To avoid severe climate disruption, we need to explore a broad range of alternatives.\textsuperscript{110} These alternatives should include climate engineering.

Climate engineering refers to efforts to intervene in the Earth’s climate system to reduce temperature and to stabilize it at a lower level than would be obtained without intervention; it requires deliberate efforts and has global impacts.\textsuperscript{111} Thus, it involves both deliberate efforts and global impacts to be effective.

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\textsuperscript{104.} See Hansen et al., supra note 31, at 217 (arguing that a limitation of one degree Celsius, as opposed to the two degree goal, could prevent irreparable species and ice sheet loss) (on file with the \textit{Washington and Lee Journal of Energy, Climate, and the Environment}).

\textsuperscript{105.} See \textit{id.} at 218 (calculating that even at the current level of atmospheric CO\textsubscript{2}, additional warming is already “in the pipeline” because of planetary feedbacks, and estimating that the planet is committed to an additional 1.4\textdegree C of warming, a total increase of 2\textdegree C from preindustrial levels).

\textsuperscript{106.} See \textit{id.} at 225 (stating that even a small change in surface temperature could spur extreme environmental responses).

\textsuperscript{107.} See \textit{id.} at 229 (suggesting an initial goal of 350 ppm to return planetary balance).

\textsuperscript{108.} See \textit{Royal Society, supra} note 5, at ix (stating that emissions changes alone have not been successful in providing a solution to the global warming issue).

\textsuperscript{109.} See \textit{id.} (arguing that mitigation efforts will not be implemented quickly enough to make necessary changes needed to stunt global warming).

\textsuperscript{110.} See \textit{id.} (“Unless future efforts to reduce greenhouse gas emissions are much more successful then they have been so far, additional action may be required should it become necessary to cool the Earth this century.”).

\textsuperscript{111.} See \textit{id.} (defining geoengineering as the “deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming”).
Climate engineering techniques fall into two broad categories. The first, solar radiation management (SRM), would reduce the amount of solar radiation available to heat the planet. The second, carbon dioxide removal (CDR), would remove CO$_2$ from the atmosphere. Within these two categories, climate engineering techniques may be further classified. First, they may be grouped according to the length of their life cycles: the effects of some would be short-lived and could be “shut off” almost immediately; whereas the effects of other techniques might last for decades or even centuries. Second, techniques vary by their means of intervention. Some methods require small-scale changes (painting roofs to reflect more sunlight, for example), whereas others involve the manipulation or enhancement of biological processes. Finally, methods may be grouped according to the amount of time required before they take effect; certain types can begin to cool the planet within months, whereas others require decades.

SRM techniques reflect the sun’s inbound light and heat back into space. They include a broad range of methods and costs; some SRM techniques are simplistic while others are technologically complex and

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112. See id. at 1 (“[SRM] methods: which reduce the net incoming . . . solar radiation received, by deflecting sunlight, or by increasing the reflectivity (albedo) of the atmosphere, clouds or the Earth’s surface.”).

113. See id. (“[CDR] methods: which reduce the levels of carbon dioxide (CO2) in the atmosphere, allowing outgoing long-wave (thermal infra-red) heat radiation to escape more easily.”).

114. See generally id. (evaluating various geoengineering methods for “timeliness,” which includes “the state of readiness for implementation . . . and the speed with which the intended effect (on climate change) would occur”).

115. See Mark Williams, Cooling the Planet, M.I.T. TECH. REV. (Feb. 13, 2007), http://www.technologyreview.com/news/407306/cooling-the-planet/ (stating that the cost of climate engineering techniques would vary dramatically, with some, such as stratospheric aerosols, costing a few billion dollars, and others, such as space-based mirrors, requiring trillions of dollars) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Virgoe, infra note, 146, at 108 (arguing that methods will also vary in their need for ongoing maintenance, some lasting a long time (painted roofs), and others requiring repetition (aerosols) or maintenance (space mirrors) on a regular basis).

116. See ROYAL SOCIETY, supra note 5, at 47 (stating that some improvements will be more simplistic in nature, while others will require industrial-scale developments).

117. See Peter Davidson, Chris Burgoyne, Hugh Hunt & Matt Causier, Lifting Options for Stratospheric Aerosol Engineering: Advantages of Tethered Balloon Systems, 370 PHIL. TRANS. R. SOC. A 4263, 4264 (2012) (stating the importance of analysis of anticipated timetables for different methods because some methods, such as CDR, might require up to fifty years to have an impact, whereas others, such as SRM techniques, could take effect within a few years).

118. See ROYAL SOCIETY, supra note 5, at 1 (explaining that SRM techniques work by deflecting sunlight or making the atmosphere more reflective).
prohibitively expensive. They also vary as to the part of the environment which they affect—the earth’s surface, its atmosphere, or outer space. Surface-based techniques include painting roofs white, planting more reflective crops, or covering desert or ocean surfaces with reflective materials. Atmospheric methods increase the reflectivity of clouds or mimic the temporary, global cooling that results from the ejection of sulfur particles from volcanic eruptions by injecting aerosol particles into the atmosphere.

A major advantage of some SRM techniques is that they may be the only means to reduce the global temperature almost immediately, should that become necessary, because they could take effect within a matter of months. SRM, however, does not remove CO$_2$ from the atmosphere; it merely compensates for the increased levels of CO$_2$. As a result, scientists anticipate SRM could have unintended consequences. Scientists also believe that, once started, some SRM methods must be used

119. See Roger Angel, Feasibility of Cooling the Earth with a Cloud of Small Spacecraft near the Inner Lagrange Point (L1), 103 PROC. NATL. ACAD. SCI. 17184, 17188 (2006) (explaining that some space-based reflective mirrors, for instance, could require several decades and trillions of dollars to put into place).
121. See id. at 2 (summarizing crop, desert, and urban albedo geoengineering techniques).
122. See Angel, supra note 119, at 17185 (detailing the addition of particles of various materials, such as sea salt, to whiten clouds).
123. See id. at 17188 (“One way known to reduce heat input, observed after volcanic eruptions, is to increase aerosol scattering in the stratosphere.”).
124. See David W. Keith, Edward Parson & M. Granger Morgan, Research on Global Sun Block Needed Now, 463 NATURE 426, 426 (2010), available at http://www.nature.com/nature/journal/v463/n7280/full/463426a.html (“SRM could alter the global climate within months—as suggested by the 1991 eruption of Mount Pinatubo, which cooled the globe about 0.5° C in less than a year by injecting sulphur dioxide into the stratosphere.”).
125. See ROYAL SOCIETY, supra note 5, at 47 (“SRM methods are the only way in which global temperatures could be reduced at short notice, should this become necessary.”).
127. See id. (“Geoengineering is a stopgap measure, a ‘quick fix,’ a ‘Band-Aid.’”).
128. See ROYAL SOCIETY, supra note 5, at 50 (explaining the varied responses of different aspects of climate; precipitation is sensitive to specific aspects of climate, while other natural systems are likely to have unforeseen reactions to decreased temperatures in high-CO$_2$ conditions).
continuously, or warming will return immediately and at a rate too fast for humans and animals to adapt.\textsuperscript{129} In contrast to SRM, CDR can reverse warming, since it reduces the atmosphere’s CO\textsubscript{2} content.\textsuperscript{130} However, reversal requires the reduction of a significant fraction of CO\textsubscript{2} before it alters the atmospheric balance.\textsuperscript{131} Thus, in contrast to SRM, CDR may require several decades before it can have a discernible effect on the environment.\textsuperscript{132} On the other hand, its ability to lower the CO\textsubscript{2} content of the atmosphere may become critical if significant mitigation efforts come too late to avoid dangerous warming.\textsuperscript{133} Furthermore, CDR involves fewer environmental risks.\textsuperscript{134} This contrasts with SRM, which, besides several possible adverse consequences, would only create an artificial and approximate balance between increased atmospheric gas concentrations and sunlight levels.\textsuperscript{135}

CDR techniques involve the storage of CO\textsubscript{2} in the ocean or in the ground.\textsuperscript{136} Ocean-based methods include ocean fertilization (promoting the
growth of carbon-consuming phytoplankton) and enhanced upwelling/downwelling (altering ocean circulation to increase the availability of nutrients to enhance phytoplankton growth (upwelling) while accelerating the return of CO$_2$-concentrated surface water to the deep sea (downwelling)).

Land-based techniques include direct air capture and sequestration, use of biomass and sequestration, and afforestation. Whether SRM or CDR, several aspects of climate engineering make it a compelling option: climate engineering is easier than mitigation to implement; it produces benefits sooner than other approaches, it is more politically viable, and it can reduce, rather than just stabilize, CO$_2$ levels. For these reasons we should anticipate that one or more nations—or even private parties—will seriously consider implementing climate engineering methods.

A key advantage of climate engineering over mitigation is that climate engineering would be much easier to institute effectively. Mitigation requires billions of consumers to change energy-consumption habits, as well as unprecedented international cooperation. Climate engineering, on the other hand, could be implemented by a single state, or even by a single—albeit well-financed—individual. For instance, at least two methods, stratospheric aerosols and cloud whitening, could cost less than $10 billion per year, each. When compared to the trillions of dollars physical processes to remove the greenhouse gas, and biologically based methods . . . to simulate or enhance natural carbon storage processes.”).

137. See GAO, supra note 7, at 7 (“Enhanced upwelling/downwelling—altering ocean circulation patterns to bring deep, nutrient-rich water to the ocean’s surface (upwelling), to promote phytoplankton growth—which removes CO$_2$ from the atmosphere, as described below—and accelerating the transfer of CO$_2$-rich water from the surface of the ocean to the deep-sea (downwelling).”).

138. See ROYAL SOCIETY, supra note 5, at 10 (describing land-based CDR methods).

139. See Scott Barrett, The Incredible Economics of Geoengineering, 39 ENVTL. & RES. ECON. 45, 45 (2008) (discussing how geoengineering is both politically and economically more feasible and could possibly reduce, rather than just prevent, climate change).

140. See ROYAL SOCIETY, supra note 5, at 42–43 (describing the involvement of private parties in the implementation of geoengineering techniques).

141. See Barrett, supra note 139, at 50 (“Theory points to the difficulty in achieving substantial and wide scale cooperation for this problem, and the record to date sadly supports this prediction.”); id. at 49 (explaining that stabilization of CO$_2$ levels would require cutting emissions by sixty to eighty percent, yet emissions have risen approximately twenty percent since the adoption of the Framework Convention on Climate Change).

142. See William C.G. Burns, Climate Geoengineering: Solar Radiation Management and Its Implications for Intergenerational Equity, 4 STANFORD J. LAW, SCI. & POL’Y 46, 46 n.50 (2011) (arguing that the cost of many geoengineering options might be “well within the budget of almost all nations,” as well as a handful of wealthy individuals, potentially allowing a rogue nation or individual to engage in climate engineering unilaterally).

143. See Barrett, supra note 139, at 49 (establishing that geoengineering techniques are relatively low-cost when compared with the costs of mitigation, as seen in the Panel on
that mitigation is anticipated to cost annually, such an alternative is essentially “costless.”

Besides its lower financial costs, geoengineering will likely require less political capital. As mentioned, mitigation requires consumers to conserve, change habits, or both. Businesses must modify their products or, in some cases, face extinction. Thus, mitigation requires the cooperation of billions. Because of the inconvenience and disruption associated with mitigation, most governments have been unwilling to require the reductions necessary to curtail the use of fossil fuels significantly. Most climate engineering proposals, on the other hand, require no such sacrifices. Although geoengineering may have its own negative consequences, in many instances it will not require the unpopular changes in lifestyle or

Policy Implications of Greenhouse Warming calculation that adding aerosol dust to the stratosphere would cost just pennies per ton of CO$_2$ mitigated; see also James Temple, Cloud Brightening: Theory to Prototype, SAN FRANCISCO CHRON. (Jan. 5, 2013), available at http://www.sfgate.com/science/article/Cloud-brightening-theory-to-prototype-4170478.php (noting that cloud brightening using seawater was projected to cost as little as $2.5 billion annually) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); Barrett, supra note 139, at 49 (stating even persons skeptical of such calculations have acknowledged that the costs of such systems would be “trivial” compared to mitigation approaches).


145. See Barrett, supra note 139, at 49 (estimating SRM would have a marginal cost of approximately 1/10,000th of the cost of mitigation); see also Alan Carlin, Why a Different Approach Is Required If Global Climate Change Is to Be Controlled Efficiently or Even at All, 32 WM & MARY ENVTL. L & POL’Y REV. 685, 739 (2008) (“SRM is estimated to have a marginal cost about 1/10,000th as expensive as ERD [exclusive regulatory de-carbonization, the mitigation strategy of exclusively reducing carbon output] per equivalent ton of carbon reduced to limit global temperature increases to 2°C above pre-industrial levels using current assumptions concerning climate sensitivity.”).

146. See John Virgoe, International Governance of a Possible Geoengineering Intervention to Combat Climate Change, 95 CLIMATIC CHANGE 103, 107 (2009) (explaining the differences in terms of participation geoengineering requires as opposed to mitigation or other CO$_2$ reduction methods).

147. See Carlin, supra note 145, at 721 (“It is difficult to see . . . why many constituents would not pursue every available loophole rather than reduce their welfare and freedom of choice.”).

148. See id. at 720–21 (“[P]oliticians would be required to maintain unusually strong resolve as the population learns what would be the real effects of the [mitigation] measures. . . . It is difficult to see why politicians would be willing to force their constituents to adopt unpopular and expensive constraints on their activities . . . .”); ROYAL SOCIETY, supra note 5, at 4 (arguing that because of the many unknown factors, political communities may lean away from mitigation toward an alternative, such as geoengineering).
business models necessitated by mitigation.\footnote{149} When combined with its lower costs, climate engineering may be less disruptive and thus more palatable.\footnote{150}

Absent utilization of geoengineering, global warming will not reverse until atmospheric CO\textsubscript{2} declines through natural processes.\footnote{151} Thus, to produce a rapid reduction in the amount of atmospheric carbon and its consequences, climate engineering is the only choice.\footnote{152}

\textit{E. Climate Engineering: Objections and Responses}

Despite the advantages of climate engineering, critics raise many legitimate concerns regarding the moral hazard presented by climate engineering, the risk of unforeseen or uneven consequences, and the potential for misuse or irresponsible implementation.\footnote{153}

The primary objection to pursuing climate engineering is that it will give rise to a moral hazard and will remove the incentive to reduce fossil fuel use.\footnote{154} Essentially, if society can avert the worst consequences of climate change through geoengineering, then it will not undertake the

\begin{footnotesize}
149. See Virgoe, \textit{supra} note 146, at 106–07 (describing the socio-political characteristics of geoengineering).
150. See Carlin, \textit{supra} note 145, at 721 (“Global warming has all the psychological characteristics—a long time horizon, uncertainty, and few readily apparent effects to remind people that there is a problem in their everyday lives—needed to keep it at a modest level of priority.”).
151. See Samuel Thernstrom, \textit{What Role for Geoengineering?}, \textit{American} (Mar. 2, 2010), \textit{available at} http://www.american.com/archive/2010/march/what-role-for-geoengineering (“[B]y the time the atmospheric concentration of carbon dioxide peaks, whatever amount of warming it will cause will be locked in, and it will take centuries for the amount of CO\textsubscript{2} in the atmosphere to decline significantly through natural processes.”) (on file with the \textit{Washington and Lee Journal of Energy, Climate, and the Environment}).
152. See Barrett, \textit{supra} note 139, at 47–49 (explaining climate engineering’s usefulness as a short-term solution).
153. See generally Royal Society, \textit{supra} note 5 (discussing various concerns associated with geoengineering).
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societal and lifestyle changes required for effective mitigation. Thus, society will continue with business as usual (either maintaining or increasing levels of fossil fuel use), relying upon climate engineering to avoid the worst effects of climate change.

There are several responses to the moral hazard objection to geoengineering. Although the pursuit of climate engineering may create a moral hazard, any moral hazard may be an acceptable risk or may be offset by greater concerns, such as an anticipated global catastrophe. Second, geoengineering may actually encourage mitigation. According to this theory, the radical nature of climate engineering and its potential risks may inspire society to pursue mitigation more seriously.

Critics make a second objection to climate engineering—they argue that the dangers of climate engineering could outweigh its benefits. For example, spraying sulfate particles into the atmosphere could trigger acid rain and deplete the ozone layer; albedo modification may impair...
ecosystem productivity by reduced photosynthesis; ocean fertilization may undermine biological productivity in non-fertilized areas, cause widespread eutrophication and anoxia, and stimulate toxic algal blooms; sequestered carbon could escape and reenter the atmosphere. Without further study of climate engineering and its effects, analyses of climate engineering’s benefits and costs are too uncertain to be valuable.

Alternatively, critics object that the dangers imposed by geoengineering could disproportionately affect certain regions or populations. Lower precipitation may particularly impact East and Southeast Asia, Africa, and the Amazon and Congo valleys. This may undermine the food security of two billion people. Thus, climate engineering will create its own winners and losers, as will climate change. While most nations may benefit from reduced global temperatures, others will suffer from changed atmospheric conditions.

162. See Davis, supra note 154, at 924 (“Albedo modification schemes pose a variety of frightening side effects, such as impaired ecosystem productivity from reduced photosynthesis.”).

163. See Burns, supra note 142, at 40–41 (“Several studies have also indicated that ocean iron fertilization, a CDR approach, could undermine biological productivity in non-fertilized regions, cause widespread eutrophication and anoxia, and stimulate toxic algal blooms.”).

164. See Bob van der Zwaan & Koen Smekens, CO\textsubscript{2} Capture and Storage with Leakage in an Energy-Climate Model, 14 ENVTL. MODEL. & ASSESS. 135, 135 (2009) (“The leakage time frame that characterises [carbon sequestration], and the compatibility of that time frame with climate change policy and targets as well as features of the carbon cycle, is determinant for [sequestration]’s suitability to mitigate, postpone, or preclude climate change.”).


166. See Burns, supra note 142, at 40 (“Stratospheric sulfate aerosol injection . . . could lead to a substantial reduction in precipitation in monsoon regions in East and South-East Asia and Africa . . . Diebacks of tropics forests could also be triggered by substantial precipitation declines in the Amazon and Congo valleys.”).

167. See id. (“The severe reduction in monsoonal intensity that will result from the reduction in precipitation could potentially undermine the food security of 2 billion people in the region.”).

168. See Davis, supra note 154, at 929 (stating that the impact of climate change will not be uniformly negative as higher latitude countries, particularly Canada and Russia, may benefit from warmer global temperatures, but that there would be disparities in regional meteorological effects of geoengineering as well).

169. See id. (“In general, industrialized countries may benefit relative to less industrialized countries due to their comparatively greater ability to adapt to the consequences of climate change.”).
Critics also voice concerns about the possibility of geoengineering’s misuse. A rogue nation or entity could decide unilaterally to implement geoengineering over the objection of the world community. Second, governments may use climate engineering technologies either for their own benefit or as a weapon against enemies. Third, private interests may promote geoengineering for their own profit.

The reality is that a single nation, corporation, or individual is capable of undertaking climate engineering. This fact may actually support responsible research and testing of geoengineering. First, an open research program will reduce the perceived need by a rogue country or group to develop its own program. Second, a thorough knowledge of these methods will better enable the world community to recognize the


171. See Barrett, supra note 139, at 46 (discussing the likelihood that countries may unilaterally develop and deploy geoengineering because “incentives for countries to reduce emissions on a substantial scale are too weak, and incentives for them to develop geoengineering are too strong” for a commitment to abstain from experimenting with geoengineering to be a realistic prospect).


175. See Royal Society, supra note 5, at 37 (stating that in order to deal with irresponsible parties dangerously experimenting with geoengineering, “many commentators have suggested forming an international consortium to explore the safest and more effective options, while also building a community of responsible geoengineering researchers”).

effects of a rogue entity that attempts to geoengineer. Finally, since private entities might emerge as interest groups advocating for the deployment of one or more methods, an open research program will reduce their influence and ensure that the results and analyses are unbiased by any outside circumstances. An open research program would also minimize the risks that testing is rushed or that it or its results are skewed to reach particular results.

Another concern is that the related research could foster “technological momentum” in support of geoengineering. This refers to the tendency of research programs to create a body of researchers vested in the development of the technology they are researching. This tendency has arisen in a number of contexts, notably medical technology and weapons systems. In part because of the disparity in expertise, policymakers are reluctant to oppose the recommendations of these groups for further development and deployment of new technologies.

While the risk of such technological momentum is real, several checks should work to minimize this concern. Ideally, any decision to utilize climate engineering should be made at a global level, thereby

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177. See Mark G. Lawrence, The Geoengineering Dilemma: To Speak or Not to Speak, 77 CLIMATIC CHANGE 245, 246 (2006) (“[W]ithout a good overview of potential geoengineering efforts which might eventually be undertaken, it would be difficult to monitor for the possibility of ‘covert’ geoengineering.”).

178. See Victor et al., supra note 176 (“[S]ome geoengineering options are cheap enough to be deployed by wealthy and capable individuals or corporations.”).

179. See id. (stating that a cooperative, international research agenda is necessary in order to establish rules that govern the use of geoengineering technology for the good of the entire planet).

180. See id. (discussing the risk that geoengineering might be undertaken by a state without appropriate concern for harms elsewhere).

181. See Davis, supra note 154, at 948 (“Another potential objection to a geoengineering research program is that it would generate ‘technological momentum,’ so that if it was determined that geoengineering was possible, even if likely to generate side effects, the result would be development and eventual deployment.”); see also U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-11-71, CLIMATE ENGINEERING: TECHNICAL STATUS, FUTURE DIRECTIONS, AND POTENTIAL RESPONSES, i (2011), available at http://www.gao.gov/new.items/d1171.pdf (stating that advocates of geoengineering research caution against the misuse the research could bring) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

182. See Davis, supra note 154, at 948 (indicating “technological momentum” occurs when “research programs create a community of researchers that functions as an interest group promoting the development of the technology that they are investigating”).

183. See id. at 949 (providing the fields of medical technology and weapons systems as two examples of areas in which “technological momentum” has been observed).

184. See id. (“Given [researchers’] comparative level of expertise, policymakers may have a difficult time resisting calls for development and deployment of geoengineering technologies.”).
minimizing the influence of interest groups.\textsuperscript{185} Second, any research program should be open and transparent.\textsuperscript{186} Besides reducing the likelihood that a rogue entity would be able to implement a method undetected, an open research program would also provide accurate and unbiased data, thereby reducing the risk that a vested interest could unduly influence research.\textsuperscript{187}

The risks cited by critics are serious, but the true extent of these risks is still unknown,\textsuperscript{188} and we are uncertain that we can predict all of the possible risks.\textsuperscript{189} That is part of the point of this paper. Because of the potential benefits and possible need for climate engineering, we should create a legal regime that facilitates research into geoengineering and its consequences, rather than one that prohibits or discourages investigation into these methods \textit{ab initio}.\textsuperscript{190} Early exploration of these technologies has another critical advantage: it makes it more likely that we will know of benefits and risks before a climate emergency actually arises.\textsuperscript{191}

\textsuperscript{185} See infra Part IV.D (discussing the importance of a moratorium on deployment in order to ensure that research programs are primarily used for research and not implementation).

\textsuperscript{186} See infra Part IV.C (arguing for the benefits of transparency in a domestic research program).

\textsuperscript{187} See Davis, supra note 154, at 934 (stating that a transparent research program will lessen the likelihood that a state or “rogue billionaire” will unilaterally implement a geoengineering program).

\textsuperscript{188} See Douglas G. MacMartin, David W. Keith, Ben Kravitz & Ken Caldeira, Management of Trade-Offs in Geoengineering Through Optimal Choice of Non-Uniform Radiative Forcing, 3 NATURE CLIMATE CHANGE LETTERS 365, 365 (2013) (stating that recent analysis suggests desired climate moderation may be achieved with thirty percent less solar insulation than previously anticipated, thus reducing the potential side effects of SRM, demonstrating the uncertainty that these risks will be as great as projected).

\textsuperscript{189} See Alan Robock, 20 Reasons Why Geoengineering May Be a Bad Idea, BULL. ATOMIC SCIENTISTS, May/June 2008, at 14, 17 (discussing the uncertainty in predicting the outcome of geoengineering efforts) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{190} See generally infra Part IV.E (arguing that the United States should use NEPA and financial incentives to conduct geoengineering research and testing).

\textsuperscript{191} See Gareth Davies, Framing the Social, Political, and Environmental Risks and Benefits of Geoengineering, 46 TULSA L. REV. 261, 270 (2010) (explaining that the “moral hazard” argument against geoengineering presents a real danger if global warming reaches a point where geoengineering is clearly desirable, because the political and research base will not be there).
F. Climate Engineering: The Need to Accelerate Research Now

Little research has been conducted on any method of climate engineering; only the United Kingdom and a project jointly supported by France, Germany, and Norway have begun concerted research efforts regarding climate engineering. Years of research and testing must be conducted before such technologies can be utilized responsibly. After completion of initial research, extensive modeling would be conducted of various approaches and their consequences. After these laboratory analyses were completed, scientists would perform limited field testing. Some experts project that, combined, these steps might require a decade or longer. Accordingly, a research program focused on geoengineering technologies should commence as soon as possible, so that the risks are understood before the onset of catastrophic climate change.

192. See The Principles, OXFORD GEOENGINEERING PROGRAMME, available at http://www.geoengineering.ox.ac.uk/oxford-principles/principles/ (last visited Sept. 8, 2013) [hereinafter The Principles] (“Research into geoengineering is at a very early stage . . . .”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also ROYAL SOCIETY, supra note 5, at 52 (“Little research has actually so far been undertaken on most of the methods considered, despite a great deal of interest in recent years from the scientific and engineering community, from concerned citizens . . . and the media.”).


194. See ROYAL SOCIETY, supra note 5, at 52 (“Much more research on the feasibility, effectiveness, cost, environmental impact and potential unintended consequences of most methods would be required before they can be properly evaluated.”).

195. See id. at xii (“The principal research and development requirements in the short term are for much improved modeling studies and small/medium scale experiments (e.g. laboratory experiments and field trials).”).

196. See id. at 41 (cautioning that although there is a need for field trials to further geoengineering research, there is also a clear need for governance of large-scale field testing of some geoengineering techniques).

197. See Rob Swart & Natasha Marinova, Policy Options in a Worst Case Climate Change World, 15 MITIG. ADAPT. STRATEG. GLOB. CHANGE 531, 542 (2010) (predicting that SRM methods will likely require at least two decades from the commencement of research until they can achieve the desired effect).

198. See Davidson, supra note 117, at 4294–95 (stating that despite arguments against geoengineering, developing emergency mechanisms now is important to ensure they can be tested before they are actually needed).
Finally, a clarification: while this paper supports the immediate and extensive research and testing of climate engineering methodologies, this paper does not intend to suggest that geoengineering can, or should be, the sole solution to society’s climate change problems. We must mitigate. Nevertheless, barring an immediate commitment to a reduction in carbon emissions to nearly zero, we will not avoid a significant increase in global temperatures. Thus, at the very least, we should fully understand the implications of climate engineering should we need to reduce global temperatures immediately to avert a catastrophe.

III. International and Domestic Laws Do Not Provide a Uniform and Concerted Policy for the Regulation of Climate Engineering

Neither domestic nor international law comprehensively governs climate engineering. Because existing environmental laws were drafted in a very different context in response to very different problems, at best they haphazardly address aspects of some climate engineering methods. Moreover, several geoengineering methods fall completely outside of the contemplation of any of these provisions. Ultimately, this inconsistent coverage will complicate both the pursuit and regulation of climate engineering research.

A. Domestic Environmental Laws

In the United States, Congress passed environmental laws to address particular problems, such as polluted air and water, the cleanup of...
toxic chemicals, and the treatment of hazardous waste. These laws, passed in the 1970s and 1980s, predate most consideration of climate change, and, thus, precede any contemplation of climate engineering as a response. In some instances, these laws regulate aspects of particular climate engineering methods, but they do not provide a comprehensive scheme for the regulation of geoengineering research, testing, or deployment. Thus, most research and testing of geoengineering can proceed unregulated in the United States. However, a comprehensive scheme should be developed to promote their research and to regulate these efforts.

The following discussion reviews the federal laws that might regulate climate engineering research and development.

1. Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) ensures the quality of the nation’s drinking water by authorizing the EPA to set drinking water quality standards and to oversee local authorities that implement those standards. Pursuant to its authority to protect underground water sources under the SDWA, the EPA regulates the geological sequestration of CO₂. The SDWA authorizes the EPA to establish minimum standards for state underground injection control programs. In December 2010, the

206. See Bracmort & Lattanzio, supra note 165, at 25 (discussing federal agencies’ minimal efforts and funding with respect to the development and implementation of national geoengineering policies).
208. See id. § 300g-2 (explaining the roles of the EPA and state regulators).
209. See id. § 300h-2 (authorizing the EPA to enforce regulations that protect underground sources of water).
211. See id. at 77,235 (“Part C of the SDWA requires EPA to establish minimum requirements for state UIC programs that regulate the subsurface injection on fluids onshore
EPA promulgated rules under the Underground Injection Control Program (UIC) of the SDWA. The 2010 rules provide for the development of a new class of wells, Class VI. This class builds upon existing UIC requirements with standards tailored to CO\textsubscript{2} injection for long-term storage. Operators of Class VI wells must prepare assessments of the appropriateness of the location for CO\textsubscript{2} sequestration, must follow certain well construction and operating requirements, must comply with testing and monitoring obligations to ensure the effectiveness of sequestration, must follow post-injection closure procedures, and must provide financial assurance for closing and remediating activities. Carbon dioxide itself is not a drinking water contaminant, but its presence in water and offshore under submerged land within the territorial jurisdiction of the state.

212. See id. at 77,230 (stating that the regulation would become effective on January 10, 2011, one month after the EPA issued the regulation, on December 10, 2010).

213. See id. at 77,240 (discussing the proposal for a new class of injection wells, Class VI, as well as the technical criteria for permitting Class VI wells).

214. See Geologic Sequestration of Carbon Dioxide, ENVTL. PROT. AGENCY, http://water.epa.gov/type/groundwater/uic/wells_sequestration.cfm (last visited Oct. 15, 2013) (“The Class VI rule builds on existing UIC Program requirements, with extensive tailored requirements that address carbon dioxide injection for long-term storage to ensure that wells used for geologic sequestration are appropriately sited, constructed, tested, monitored, funded, and closed.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

215. See Class VI Rule, supra note 210, at 77,247 (“Today’s final action requires owners or operators of Class VI wells to perform a detailed assessment of the geologic, hydrogeologic, geochemical, and geomechanical properties of the proposed GS [Geologic Sequestration] site to ensure that GS wells are sited in appropriate locations and inject into suitable formations.”).

216. See id. at 77,250 (“Today’s final approach is based on existing construction requirements . . . for Class I hazardous waste injection wells, with modifications to address the unique physical characteristics of CO\textsubscript{2}.”).

217. See id. at 77,257 (“The requirements for operation of Class VI injection wells are based on the existing requirements for Class I wells, with enhancements to account for the unique conditions that will occur during GS including buoyancy, corrosivity, and higher sustained pressures over a longer period of operation.”).

218. See id. at 77,259 (“Today’s final rule . . . requires owners or operators of Class VI wells to develop and implement a comprehensive testing and monitoring plan . . . that includes injectate monitoring, corrosion monitoring of the well’s tubular, mechanical, and cement components, pressure fall-off testing, ground water quality monitoring . . . .”).

219. See id. at 77,266 (discussing the care required during the post-injection site period, in which the owner or operator of the Class VI well must continue monitoring to ensure the protection of underground sources of drinking water).

220. See id. at 77,268 (noting that owners or operators of Class VI wells must “demonstrate and maintain financial responsibility as approved by the Director for performing corrective action on wells . . . injection well plugging, PISC and site closure, and emergency and remedial response.”).
forms carbonic acid, which can cause metals or other contaminants to leach into ground water as a result of sequestration. The EPA deemed regulation appropriate also because of the large volumes of CO$_2$ that may be injected, the mobility of CO$_2$ within geologic formations, and potential impurities in the CO$_2$ stream.

2. Clean Air Act

Under the Clean Air Act (CAA), the EPA establishes primary and secondary standards for ambient air quality. The EPA sets the primary ambient air quality standards at a level to protect the public health; it sets the secondary standards to protect the public welfare. Pursuant to this authority, the EPA identifies pollutants that can be reasonably expected to harm public health or welfare, and prescribes regulations to limit such pollutants accordingly. Through this authority, the CAA might affect climate engineering because the EPA has identified sulfur oxides as one such pollutant. As described previously, sulfur particles are the material of choice for SRM methods that propose to eject

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221. See id. ("While CO$_2$ itself is not a drinking water contaminant, CO$_2$ in the presence of water forms a weak acid, known as carbonic acid, that, in some instances, could cause leaching and mobilization of naturally-occurring metals or other contaminants from geologic formations into ground water.").

222. See id. at 77,233 ("Due to the large CO$_2$ injection volumes anticipated at GS projects, the relative buoyancy of CO$_2$, its mobility within subsurface geologic formations, its corrosivity in the presence of water, and the potential presence of impurities in the captured CO$_2$ stream, the Agency has determined that tailored requirements, modeled on the existing UIC regulatory framework, are necessary to manage the unique nature of CO$_2$ injection for GS.").


224. See id. § 7409(a)(1) (authorizing the EPA to establish a national primary ambient air quality standard and a national secondary ambient air quality standard).

225. See id. § 7409(b)(1) ("National primary ambient air quality standards . . . shall be ambient air quality standards the attainment and maintenance of which . . . are requisite to protect the public health.").

226. See id. § 7409(b)(2) ("Any national secondary ambient air quality standard . . . shall specify a level of air quality the attainment and maintenance of which . . . is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air.").

227. See id. § 7408(a) (directing the EPA to identify pollutants which "may reasonably be anticipated to endanger public health or welfare" and to issue air quality criteria accordingly).

228. See Keith, Parson & Morgan, supra note 124, at 427 ("At one extreme, a state might decide that avoiding the effects of climate change on its people takes precedence over the environmental concerns of SRM and begin injecting sulphur into the stratosphere, with no prior risk assessment or international consultation.").
these sulfur particles into the atmosphere because they mimic volcanic emissions of sulfur. Some analysts suggest, however, that particles other than those made of sulfur, such as titanium dioxide, may provide similar or better results. If titanium dioxide were used, this method would probably not trigger protections under the CAA, because the EPA has not identified titanium dioxide as a pollutant that threatens public health or welfare.

Carbon sequestration also implicates protections of the CAA: pursuant to its authority under the CAA, the EPA has promulgated reporting requirements concerning the release of CO₂ from underground injection facilities established under the SDWA. The EPA promulgated these rules to enable it to monitor the growth and efficacy of geologic sequestration and to evaluate policy options. Pursuant to these regulations, facilities must prepare reports on the amounts of CO₂ received, injected, and sequestered, and whether any CO₂ has escaped through leakage. The EPA also requires that facilities develop and submit for its approval a monitoring, reporting, and verification plan.

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229. See id. (discussing the use of sulfur particles in SRM).
230. See Davidson et al., supra note 117, at 4265 ("The choice of particle is receiving close attention; hitherto, it had been assumed that aerosols would be sulphuric acid mists similar to those produced by volcanoes.").
231. See id. at 4266 ("If other particles are to be designed and manufactured . . . , they will need particular properties to be attractive alternatives to the use of a sulphuric acid aerosol . . . . Various high refractive index particle systems could be considered but titanium dioxide (TiO₂) is a promising candidate.").
233. See generally 40 C.F.R. §§ 98.440–98.449 (establishing reporting requirements); see also Mandatory Reporting of Greenhouse Gases: Injection and Geologic Sequestration of Carbon Dioxide, 75 Fed. Reg. 75,060, 75,062 (Dec. 1, 2010) ("CAA section 114 provides EPA with the authority to require the information mandated by this rule because such data will inform and are relevant to EPA’s implementation of a wide variety of CAA provisions.").
234. See Mandatory Reporting of Greenhouse Gases: Injection and Geologic Sequestration of Carbon Dioxide, 75 Fed. Reg. 75,060, 75,062 (Dec. 1, 2010) (noting that the data collected “will, among other things, inform Agency decisions under the CAA related to the use of carbon dioxide capture and geologic sequestration (CCS) for mitigating GHG emissions.").
235. See generally 40 C.F.R. § 98.442 (2013) ("You must report: (a) Mass of CO₂ received[,] . . . injected into the subsurface[,] . . . produced[,] . . . [m]ass of CO₂ emitted by surface leakage[,] . . . equipment leaks[,] and vented emissions of CO₂ from surface equipment located between the injection flow meter and the injection wellhead . . . [and] between the production flow meter and the production wellhead.").
236. See 40 C.F.R. § 98.448 (2013) (mandating the submission and enumerating the requirements of a monitoring, reporting, and verification plan).
3. Comprehensive Environmental Response, Compensation, and Liability Act

Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)\textsuperscript{237} to provide broad federal authority to compel the cleanup of hazardous substances that may endanger human health or the environment\textsuperscript{238} and to ensure that responsible parties bear the costs.\textsuperscript{239} CERCLA defines “hazardous substance” to include any substance designated as such by the EPA, not only under CERCLA, but also under other environmental legislation.\textsuperscript{240}

In theory, CERCLA could apply to climate engineering through regulation of carbon sequestration.\textsuperscript{241} In practice, however, CERCLA is unlikely to have a direct effect on carbon sequestration.\textsuperscript{242} Even though CO\textsubscript{2} is not identified as a hazardous substance under CERCLA,\textsuperscript{243} the statute’s protections may be triggered if a CO\textsubscript{2} stream contains a hazardous substance or reacts with ground water to produce a hazardous substance.\textsuperscript{244}

\footnotesize{\textsuperscript{237} Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601–9675 (2012).\textsuperscript{238} See H.R. Rep. No. 1016(I), at 6119 (1980), reprinted in 1980 U.S.C.C.A.N. 6119, 6119 (“The bill would . . . provide for a national inventory of inactive hazardous waste sites and . . . [would] establish a program for appropriate environmental response action to protect public health and the environment from the dangers posed by such sites.”).\textsuperscript{239} See id. at 6120 (“[CERCLA] would also establish a federal cause of action in strict liability to enable the Administrator to pursue rapid recovery . . . from persons liable therefor and to induce such persons voluntarily to pursue appropriate environmental response actions with respect to inactive hazardous waste sites.”).\textsuperscript{240} See 42 U.S.C. § 9601(14) (defining the term “hazardous substance” as it is defined by the EPA under CERCLA and other acts, such as the Federal Water Pollution Control Act, the Toxic Substances Control Act, among others).\textsuperscript{241} See Alexandra B. Klass & Elizabeth J. Wilson, Climate Change and Carbon Sequestration: Assessing a Liability Regime for Long-Term Storage of Carbon Dioxide, 58 EMORY L.J. 103, 128–32 (2008) (discussing CERCLA’s potential application to carbon sequestration).\textsuperscript{242} See id. at 130 (“Because CO\textsubscript{2} is nontoxic at low concentrations and is not a listed waste, CERCLA likely does not apply to current CO\textsubscript{2} injection activities unless recognized hazardous substances are present.”).\textsuperscript{243} See 42 U.S.C. § 9601(14) (defining hazardous substance); see also Federal Requirements Under the Underground Injection Control Program for Carbon Dioxide Geologic Sequestration Wells, 75 Fed. Reg. 77,230, 77,260 (Dec. 1, 2010) (“CO\textsubscript{2} itself is not listed as a hazardous substance under CERCLA.”).\textsuperscript{244} See Federal Requirements Under the Underground Injection Control Program, supra note 244 (stating that CO\textsubscript{2} could contain a hazardous substance or react with ground water and produce a hazardous substance).}
4. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) provides “a comprehensive ‘cradle to grave’ regulatory system for identifying, listing, and tracking hazardous wastes; setting standards for the generation, handling, storage, and disposal of hazardous wastes . . . .” RCRA applies only to “solid wastes” that are also “hazardous wastes,” when considered in light of certain qualifying criteria. A solid waste is a hazardous waste if it exhibits one of these characteristics: ignitability, corrosivity, reactivity, and toxicity.

RCRA’s application to carbon sequestration would depend upon the presence of hazardous materials in CO₂ streams, because CO₂ is not a hazardous waste under RCRA. In most instances, however, the captured CO₂ would contain some impurities. Although concentrations of these impurities would likely be very low, there would be a risk of contaminating underground sources of drinking water given the volume of CO₂. Furthermore, the types and concentrations of impurities would vary by characteristics of the original source of the captured CO₂, such as the nature of the facility, composition of the underlying material (coal, for example), plant operating conditions, and pollution removal technologies. Thus, operators would need to determine whether the CO₂ contains a hazardous material, and, if it did, they would need to inject the

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246. Klass & Wilson, supra note 241, at 125.
248. See id. § 261.11 (listing the criteria used to classify solid waste as hazardous).
249. See id. §§ 261.20–24 (describing the characteristics of ignitability, corrosivity, reactivity, and toxicity).
250. See Klass & Wilson, supra note 241, at 127 (“CO₂ is not a listed hazardous waste, and it seems unlikely that CO₂ alone would be considered a hazardous waste, although co-injection with other waste stream constituents (e.g., hydrogen sulfide (H₂S)) could cause it to be defined so.”).
251. See id. (stating that CO₂ is not listed as a hazardous material).
253. See id. (anticipating that any impurities would only be present in small amounts).
254. See id. (“Because of the volume of CO₂ that could be injected, there may be a risk that co-contaminants in the CO₂ stream could endanger [drinking water] . . . .”).
255. See id. at 43,503 (“[T]he types of impurities and their concentrations in the CO₂ stream are likely to vary by facility, coal composition, plant operating conditions, and pollution removal technologies . . . .”).
stream into Class I wells, as RCRA prohibits the injection of CO\textsubscript{2} streams containing hazardous wastes into Class VI wells.

5. Marine Protection, Research, and Sanctuaries Act

The Marine Protection, Research, and Sanctuaries Act (MPRSA)\textsuperscript{258} implements the obligations of the United States under the 1972 London Convention.\textsuperscript{259} The MPRSA prohibits the transportation of any material for the purpose of dumping it into ocean waters “in the territorial sea or the contiguous zone of the United States.”\textsuperscript{261} The Act defines “material” to include solid, industrial, and other waste.\textsuperscript{262} Even then, a party may receive a permit from the EPA to dispose of materials other than dredged matter, radiological, chemical and biological warfare agents, or high-level radioactive or medical waste.\textsuperscript{263} The MPRSA applies to vessels carrying materials out of the United States, as well as vessels entering the territorial sea or the contiguous zone of the United States.\textsuperscript{264}

Besides regulating ocean dumping, the MPRSA also establishes a research program.\textsuperscript{265} Specifically, it establishes a monitoring and research program concerning the long-range effects of ocean dumping, pollution, and man-induced changes of ocean ecosystems.\textsuperscript{266} The MPRSA may

\textsuperscript{256} See 40 C.F.R. § 262.11 (stating that an operator must determine if its solid waste is hazardous, and prescribing the process for making this determination); see generally 40 C.F.R. § 146.5 (describing the purposes and uses of the different classes of wells).

\textsuperscript{257} See Federal Requirements Under the Underground Injection Control Program, supra note 244, at 43,503 (July 25, 2008) (indicating that the rule would preclude injecting hazardous waste into class VI wells).


\textsuperscript{260} See 33 U.S.C. § 1411(a) (prohibiting vessels and aircraft from transporting material to dump it in ocean water).

\textsuperscript{261} Id. § 1401(c).

\textsuperscript{262} See id. § 1402(c) (“‘Material’ means . . . solid waste . . . industrial . . . and other waste.”).

\textsuperscript{263} See id. § 1412(a) (stating that no permit will be issued for “dredged material . . . radiological, chemical, and biological warfare agents, high-level radioactive, and medical waste”).

\textsuperscript{264} See id. § 1401(c) (stating that the act regulates both dumping materials taken out of the United States and materials brought into “the territorial sea or the contiguous zone of the United States”).

\textsuperscript{265} See id. § 1441 (stating that the Secretary of Commerce will establish a research program).

\textsuperscript{266} See id. §§ 1441–42 (stating that the Secretary of Commerce will create a research program to monitor “long-range effects of pollution, overfishing, and man-induced changes of ocean ecosystems”).
regulate climate engineering because fertilization of the ocean with iron could fall within its jurisdiction.\textsuperscript{267} A 2007 case regarding a company, Planktos, that planned to conduct an iron fertilization experiment, is illustrative.\textsuperscript{268} The EPA wrote to Planktos, informing it that if Planktos used a vessel flying an American flag, then the EPA might require a permit under the MPRSA for ocean dumping.\textsuperscript{269} Ocean fertilization techniques require adding only a very small amount of iron to the ocean.\textsuperscript{270} The statute prohibits the act of “dumping . . . into ocean waters.”\textsuperscript{271} The parties did not definitively resolve this issue, however, because Planktos decided to use another vessel, thereby removing its experiment from the jurisdiction of the MPRSA.\textsuperscript{272}

During the dispute, the United States submitted an agenda item to the parties of the London Convention and the Protocol Secretariat regarding Planktos and the extension of the Convention to fertilization efforts.\textsuperscript{273} In November 2007, the parties to the Convention concluded that it covers ocean fertilization.\textsuperscript{274} The Contracting Parties also “urged states to use the

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\item \textsuperscript{267} See Kelly Hearn, Plan to Dump Iron in Ocean as Climate Fix Attracts Debate, NAT’L GEOGRAPHIC NEWS (July 25, 2007), news.nationalgeographic.com/news/pf/59308315.html (indicating that the EPA believes dumping iron into the ocean might require a permit under the MPRSA) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item \textsuperscript{268} See ELI KINTISCH, HACK THE PLANET 129 (2010) (describing Planktos’s plan to sprinkle iron in the ocean); see id (stating that iron increases plankton growth and the plankton convert CO\textsubscript{2} into carbon stored in the plant tissue).
\item \textsuperscript{269} See Hearn, supra note 267 (stating that the EPA informed Planktos it may need a permit even though it was unsure if fertilization would be subject to the act).
\item \textsuperscript{270} See KINTISCH, supra note 268, at 129 (stating “minute” levels of iron will be added to the ocean under Planktoss’s plan); Steven Mufson, Iron to Plankton to Carbon Credits, WASH. POST (July 20, 2007), http://www.washingtonpost.com/wp-dyn/content/article/2007/07/19/AR2007071902553_pf.html (describing the process of fertilization and stating that the ratio of iron dust inserted into ocean water is comparable to a teaspoon of iron added to the water in an Olympic-size pool) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item \textsuperscript{271} 33 U.S.C. § 1411(a) (2012); see also 33 U.S.C. § 1410(f) (defining “dumping” somewhat vaguely as “a disposition of material,” which should contemplate the fertilization of the sea with iron nutrients).
\item \textsuperscript{272} See KINTISCH, supra note 268, at 137 (explaining that Planktos chose not to use a United States vessel in order to avoid EPA regulations).
\item \textsuperscript{274} See Press Release: Large-Scale Fertilization Operations Not Currently Justified, Say Parties to International Treaties, International Maritime Organization (Nov. 16, 2007),
utmost caution when considering proposals for large-scale fertilization operations . . .

In 2008, the parties adopted a resolution to expand the London Convention and the London Protocol to allow ocean fertilization for research purposes. Because of its focus on ocean dumping, rather than subseabed burial, of “wastes,” the MPRSA appears to have little applicability to carbon sequestration efforts. First, the targeting of ocean dumping should render it inapplicable to efforts to sequester carbon since that involves injecting the fluid under the seabed. Second, for the MPRSA to extend to subseabed injections, it would need to regulate the particular material, CO₂, being injected. This is doubtful. As previously noted, the MPRSA regulates the dumping of waste. While the MPRSA does not define “waste” generally, it defines “industrial waste” as any “solid, semisolid, or liquid waste generated by a manufacturing or processing plant.” Since CO₂ captured for sequestration is captured as a gas and not as a solid or a liquid, it likely does not fall within this definition.

available at http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx (“Parties . . . say that planned operations for large-scale fertilization of the oceans using micro-nutrients—for example, iron—to sequester carbon dioxide (CO₂), are currently not justified.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); Davis, supra note 154, at 934 (stating that the London Convention covered and competently addressed ocean fertilization).

275. Davis, supra note 154, at 934.
276. See infra at Part III.B.1 (discussing the London Convention).
278. See id. at 352 (stating the MPRSA does not cover subseabed activity); see also Ann Brewster Weeks, Subseabed Carbon Dioxide Sequestration as a Climate Mitigation Option for the Eastern United States: A Preliminary Assessment of Technology and Law, 12 OCEAN & COASTAL L.J. 245, 264 (2007) (noting that the MPRSA’s only reference to the subseabed excludes it from the definition of “dumping,” the act which triggers coverage by the act). But see Sumit Som, Creating Safe and Effective Carbon Sequestration, 17 N.Y.U. ENV’T L.J. 961, 976–77 (2008) (arguing that the leaking of sequestered CO₂ could harm the marine environment, thus justifying application of the MPRSA to subseabed sequestration).
279. See Brugato, supra note 277, at 352 (noting that courts have not ruled on the question and that the London Convention leaves the question uncertain).
280. See 33 U.S.C. § 1411(a) (prohibiting vessels and aircraft from transporting material in order to dump it in the ocean water).
6. Endangered Species Act

Congress passed the Endangered Species Act (ESA) to protect endangered and threatened species of plants and animals, as well as the ecosystems upon which those species rely. The ESA has two major provisions which may be pertinent to the regulation of geoengineering. First, Section VII prohibits a federal agency from taking actions that might jeopardize a listed species. To this end it requires an agency to consult with the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS) to determine whether the contemplated agency action might jeopardize a protected species. Section VII extends to all activities authorized, funded, or carried out by a federal agency. Second, Section IX prohibits any person from “taking” any protected species. The ESA defines “take” to mean, inter alia, harass, harm, wound, kill, or collect; the regulations define “harm” to include significant habitat modification.

The ESA is likely to have limited and uneven application to climate engineering efforts. Because “taking” a listed species is necessary to trigger
the statute’s protections, the ESA may restrict climate engineering only where such species are harassed, harmed, wounded, or killed. For instance, one geoengineering proposal involves placing reflective materials over desert landscapes to reflect solar radiation. This method may not be acceptable where a listed species lives, if it results in injury to listed species. Of course, other technologies with generalized effects may be barred. For example, if sulfate aerosols, wherever emitted, were determined to threaten a particular listed species of bird, then this would support a complete ban on the method.

If a certain method does, in fact, affect a listed species, an additional ground for ESA application may arise. Section 1536(a)(2) requires that a federal agency consult with the appropriate authority any time the agency is considering an action that may jeopardize a listed species. Thus, if climate engineering involves agency action—whether it is participation in an experiment, provision of funding, or licensing and permitting—the agency must first consult with FWS or NMFS about the implications for listed species. In the future, §1536(a)(2) may be implicated by most climate engineering efforts. Consequently, this suggests one means by which the federal government might play a larger role in the future.

7. National Environmental Policy Act

The National Environmental Policy Act (NEPA) mandates the preparation of a detailed environmental impact statement (EIS) whenever a federal agency proposes “legislation and other major Federal actions significantly affecting the quality of the human environment.” Such “major Federal action” includes partial or complete financing of both

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293. See generally 16 U.S.C. §§ 1538, 1540 (describing prohibited actions “with respect to any endangered species of fish or wildlife listed pursuant to section 1533” that may result in a civil penalty).
294. See id. § 1532(19).
295. See Irvine et al., supra note 120, at 2 (describing desert albedo geoengineering).
297. See Hester, supra note 259, at 888 (discussing protection of birds and possible limitations on atmospheric methods under the Migratory Bird Treaty Act).
298. See 16 U.S.C. § 1536(a)(2) (“Each Federal agency shall . . . insure that any action . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species . . . .”).
299. See 50 C.F.R. § 402.01(b) (giving the Fish and Wildlife Service and National Marine Fisheries Service power to administer the act).
301. Id. § 4332(C).
An EIS is a detailed written statement that addresses the environmental impact of the proposed action, alternatives to the action, and any irretrievable commitments of resources. Moreover, NEPA mandates that the agency preparing the EIS shall seek comments from any federal agency with jurisdiction regarding the environmental impact of the action as well as comments from the public.

NEPA, however, is merely a procedural statute. It “does not mandate particular results.” Instead, it requires only “that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts.” As a result, NEPA can be a powerful yet impotent force in regulating climate engineering efforts. NEPA can be powerful because it forces federal agencies to evaluate potential alternatives and to provide public notice of all government-sponsored projects that affect the quality of the human environment. On the other hand, NEPA provides no means to prevent implementation of these proposals. Indeed, courts long have recognized that the remedy for a violation of NEPA is merely compliance with the procedural requirements of the statute. A party cannot use a failure to comply with NEPA as a means to stop a proposed action permanently.

302. See 40 C.F.R. § 1508.18(a) (“Actions include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies . . . .”).
303. See 42 U.S.C. § 4332(c) (listing environmental impact, adverse effects of implementation, alternatives, and irretrievable commitment of resources as required elements of a statement).
304. See 40 CFR § 1503.1(a) (requiring comment on the draft environmental impact statement from the public and the federal agency with jurisdiction before submitting a final environmental impact statement).
307. Id. at 349.
308. See 42 U.S.C. § 4332(c) (requiring an agency to describe alternatives to the proposed action).
309. See 40 CFR § 1506.6(b) (“Agencies shall: . . . [p]rovide public notice of NEPA-required hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or affected.”).
310. See Winter, 555 U.S. at 23 (discussing NEPA as a procedural statute that merely requires agencies to contemplate consequences of their action before the action is implemented).
311. See Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519, 558 (1978) (“NEPA does set forth significant substantive goals for the Nation, but its mandate to the agencies is essentially procedural. . . . Administrative decisions should be set aside . . . only for substantial procedural or substantive reasons as mandated by statute.”).
312. See Winter, 555 U.S. at 23 (concluding that NEPA ensures “that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts” (internal quotations omitted)).
Moreover, NEPA requirements take effect only when the proposed action implicates a federal agency. Absent such involvement, NEPA cannot compel any action.

8. Clean Water Act

The Clean Water Act (CWA) seeks to restore the integrity of the nation’s waters by eliminating the discharge of pollutants into them. The CWA seeks to achieve this goal primarily by requiring a permit for the discharge of any pollutant by point sources.

The CWA is unlikely to impede climate engineering for several reasons. Iron fertilization involves the growth of plankton in water and oceans, not lakes or rivers, provide the best waters for such efforts, but CWA jurisdiction does not extend to these waters. On the other hand, the CWA is consistent with geoengineering. Wetlands serve as efficient sources of carbon sequestration. The CWA protects wetlands by requiring permits for activities that would harm wetlands. Climate engineering efforts would favor the protection and increase of wetlands. Therefore, the

313. See 40 C.F.R. § 1508.18 (requiring control by a federal agency as part of the definition of an action).
314. See Winter, 555 U.S. at 15–16 (stating that NEPA applies when federal agencies take a “major Federal actio[n] significantly affecting the quality of the human environment” (internal quotations omitted)).
316. See id. § 1251(a) (“The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”).
317. See id. § 1251(a)(1) (“[I]t is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985 . . . .”).
318. See id. § 1342(a)(1) (stating the procedure and conditions for obtaining a permit to discharge pollutants); see also id. § 1313 (amending the CWA to require states to implement water quality standards).
320. See id. at 559 (“[O]cean iron fertilization activities generally take place on the high seas.”).
321. See 33 U.S.C. § 1362(7)–(8) (defining “navigable waters” of the United States to include the “territorial seas” that extend seaward a distance of only three miles).
323. See 33 U.S.C. § 1344(a) (authorizing the Secretary to issue permits).
CWA is consistent with these objectives, and such geoengineering efforts would not conflict with the CWA.

B. International Environmental Laws

Like domestic law, most international treaties are targeted to the control of pollution. Even those international laws that regulate some aspect of climate engineering research and deployment will have limited impact on efforts conducted in the United States. Although the United States has signed some of these agreements, it has not ratified most of them, and consequently, is not bound by their terms.


As noted previously, the United States implements its obligations under the London Convention through the MPRSA. The London Convention requires parties “to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter.” In its definition of “dumping,” however, the London Convention excludes the

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324. See id. § 1251(a) (“The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”).

325. See Davis, supra note 154, at 930–31 (stating that it is a principle of international law to prevent pollution).

326. See Brugato, supra note 277, at 347–52 (discussing the lack of international treaties on domestic efforts at sequestration).

327. See Medellin v. Texas, 552 U.S. 491, 505 (2008) (“While treaties ‘may comprise international commitments . . . they are not domestic law unless Congress has either enacted implementing statutes or the treaty itself conveys an intention that it be “self-executing” and is ratified on these terms.’” (quoting Iguartua-De La Rosa v. United States, 417 F.3d 145, 150 (1st Cir. 2005) (en banc) (Boudin, C.J.))).


329. See Brugato, supra note 277, at 349 (“The London Convention was opened for signature in 1972 and entered into force in 1975.”).

330. See id. (stating the United States is one of eighty-five parties to the Convention).

331. See Hester, supra note 259 and accompanying text.

332. London Convention, supra note 328, art. I.
“placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of this Convention.”333

In 1996, the parties to the London Convention adopted the Protocol to the Convention on the Prevention of Marine Pollution (London Protocol) to update and supersede the London Convention.334 The London Protocol permits subseabed sequestration of carbon.335 As of May 2012, forty-two countries have joined as parties to the Protocol; the United States is not yet a party to the agreement.336

In 2008, the contracting parties to the London Convention and London Protocol adopted nonbinding Resolution LC-LP.1 (2008) on the Regulation of Ocean Fertilization (Resolution).337 The Resolution expands the London Convention and the London Protocol to include ocean fertilization.338 It further provides that “ocean fertilization activities other than legitimate scientific research should not be allowed.”339 The Resolution considers non-research activities to be contrary to the London Convention and Protocol and not exempt from the definition of dumping.340 Research projects should be assessed case-by-case in conjunction with an

333. Id. at art. III, ¶ 1(b)(ii).
335. See Brugato, supra note 277, at 351 (describing how the parties of the London Protocol effectively allowed for subseabed sequestration by adopting an amendment to Annex I in 2006).
338. See id. ¶ 1 (stating that “the scope of the London Convention and Protocol includes ocean fertilization activities”); see also Till Markus & Harald Ginzky, Regulating Climate Engineering: Paradigmatic Aspects of the Regulation of Ocean Fertilization, 5 CARBON & CLIMATE L. REV. 477, 480 (2011) (describing why the contracting parties came to adopt the nonbinding LC-LP.1 resolution).
339. LC-LP.1, supra note 337, ¶ 1.
340. See id. ¶ 8 (stating that activities other than scientific research “should be considered as contrary to the aims of the Convention and Protocol”).
Assessment Framework.\textsuperscript{341} This Framework requires a “scientific quality check and environmental impact assessment.”\textsuperscript{342}

Therefore, these agreements bind the United States to restrict ocean fertilization activities to scientific research but allow carbon sequestration under the sea.

2. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques

The Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD)\textsuperscript{343} is a binding treaty targeted to weather manipulation.\textsuperscript{344} ENMOD arose in part as a response to efforts by the United States during the Vietnam War to use cloud seeding to gain military advantage.\textsuperscript{345} Although only seventy-four nations are parties to the convention, these parties include most of the world’s major economies.\textsuperscript{346} The United States ratified the treaty in 1979.\textsuperscript{347}

Under ENMOD, each party “undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party.”\textsuperscript{348} Several relevant points become apparent from this statement. First, the drafters targeted ENMOD to address militaristic or hostile efforts.\textsuperscript{349} Second, ENMOD pertains to environmental modification that serves as the “means of destruction,

\begin{itemize}
\item \textsuperscript{341} See Markus & Ginzky, supra note 341, at 480 (listing a summary of the requirements of LC-LP.1).
\item \textsuperscript{342} Id. at 481.
\item \textsuperscript{343} Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, opened for signature May 18, 1977, 31 U.S.T. 333 [hereinafter ENMOD].
\item \textsuperscript{344} See id. at 335 (“Desiring to prohibit effectively military or any other hostile use of environmental modification techniques.”).
\item \textsuperscript{345} See Davis, supra note 154, at 935–36 (describing how the United States “injected silver iodide flares into clouds” over the Ho Chi Minh Trail to increase rainfall and reduce the ability of the North Vietnamese to transport troops and material, and stating that ENMOD was enacted “in response to these ‘weather warfare’ efforts”).
\item \textsuperscript{346} See Catherine Redgwell, Geoengineering the Climate: Technological Solutions to Mitigation—Failure or Continuing Carbon Addiction?, 2 CARBON & CLIMATE L. REV. 178, 183 (2011) (“The treaty enjoys only limited participation, with 74 State Parties, though it should be observed that this includes most major economies . . . .”).
\item \textsuperscript{347} See ENMOD, 343 note 342, at 333 (“The President of the United States of America ratified the Convention on December 13, 1979, in pursuance of the advice and consent of the Senate.”).
\item \textsuperscript{348} Id. at 336.
\item \textsuperscript{349} See id. (stating that parties to the treaty cannot use military or hostile “environmental modification techniques”).
\end{itemize}
damage or injury. While some climate engineering technologies may create disparate effects across the globe, the motivation for their use is benevolent rather than hostile. Moreover, ENMOD recognizes that “environmental modification techniques for peaceful purposes could ... contribute to the preservation and improvement of the environment for the benefit of present and future generations.” Thus, ENMOD appears inapplicable to geoengineering for the purpose of improving the environment. Finally, even if it were applicable, at least one major gap exists in its coverage: ENMOD addresses state action. However, as discussed previously, some climate engineering methods are sufficiently inexpensive that one or more private individuals could fully finance them.

3. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies

In 1967 the United Nations’ Committee on the Peaceful Uses of Outer Space developed the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and

350. Id.
351. See Michael C. MacCracken, Geoengineering: Worthy of Cautious Evaluation?, 77 CLIMATIC CHANGE 235, 238–39 (2006) (noting that “climate” is actually a “mathematical construct created by averaging weather,” and ENMOD might prohibit geoengineering for climate change because a plan implemented by a few countries may affect several others, creating hostility). But see Rob Gurto, What’s the Difference Between Weather and Climate?, NASA (Feb. 1, 2005), http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html (recognizing that climate and weather pertain to different periods of time, which may weaken MacCracken’s argument that relies on the similarities between weather and climate) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
352. See ROYAL SOCIETY, supra note 5, at 1 (explaining that geoengineering projects are focused on mitigating the effects of, and adaptation to, climate change).
353. ENMOD, supra note 343, at 336.
354. See id. at 335 (“[E]nvironmental modification techniques for peaceful purposes could ... contribute to the preservation and improvement of the environment for the benefit of present and future generations.”).
355. See id. (including only “State Parties” in the provisions and requirements of the convention).
356. See Burns, supra note 142 (claiming that even a single state or private individual could finance climate engineering projects).
Other Celestial Bodies (Outer Space Treaty). The United States Senate ratified the Outer Space Treaty shortly after it was opened for signature.

The Outer Space Treaty arose in response to the Cold War and the resulting “Space Race.” Because of the concerns of the day, the Outer Space Treaty sought mainly to prevent the use of outer space as a base for military operations and to avoid military conflict regarding space. For these reasons, the Outer Space Treaty is especially focused on the peaceful and beneficial use of space. Thus, the Outer Space Treaty’s preamble notes that the parties desire outer space to be used for peaceful purposes, and Article I notes that space exploration should be carried out for the benefit of all countries.

While the Outer Space Treaty primarily seeks to ensure the peaceful exploration and use of space, which would be consistent with space-based climate engineering proposals, it also addresses liability for

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358. See id. at 2410 (listing the dates when the treaty was formed (Jan. 27, 1967) and ratified by the United States (Oct. 10, 1967)).


361. See Lyndon B. Johnson, Remarks at the Signing of the Treaty on Outer Space (Jan. 27, 1967), available at http://www.lbjlib.utexas.edu/johnson/archives.hom/speeches.hom/670127.asp (“This treaty means that the moon and our sister planets will serve only the purposes of peace and not war.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

362. See Outer Space Treaty, supra note 357, at 2411 (“Recognizing the common interest of mankind in the exploration and use of outer space for peaceful purposes . . . .”).

363. See id. at 2412 (“The exploration of outer space . . . shall be carried out for the interests of all countries . . . .”).

364. See id. at 2411, 2413, 2418 (noting that the treaty encourages peaceful use and exploration of outer space).

365. See ROYAL SOCIETY, supra note 5, at 40 (explaining that the Outer Space Treaty would require use of climate engineering technologies that would not interfere with “peaceful exploration and use of outer space”).
space-based activities. Specifically, Article VII provides for liability for damage by an object launched into space. The Outer Space Treaty extends liability to damage occurring in the atmosphere or outer space. While not necessarily a limit on geoengineering, it may be argued that the intent of the drafters was to address direct physical damage, such as a collision in space or the atmosphere, caused by launched objects. Although the Outer Space Treaty extends liability to damage caused in Earth’s atmosphere, it appears not to cover the emission of sulfur or other particles. The Outer Space Treaty is targeted to objects that are launched with the intent of entering outer space. SRM methods, however, propose to emit particles into the stratosphere, rather than outer space.

366. See Outer Space Treaty, supra note 357, at 2415 (including the obligations of State Parties in article VI and liabilities of these parties in article VII).
367. See id. (“Each State Party to the Treaty that launches or procures the launching of an object into outer space . . . is internationally liable for damage to another State Party to the Treaty . . . .”).
368. See id. (describing liability for damage as extending to damage “in air space or in outer space”).
370. See Eilene Galloway, The United States and the 1967 Treaty on Outer Space, in PROCEEDINGS OF THE FORTIETH COLLOQUIUM ON THE LAW OF OUTER SPACE 18, 26 (1998) (stating that United States Ambassador Arthur Goldberg testified before the Senate about the treaty and how article VII only covers “damage caused by an impact of a space vehicle or object”).
371. See Outer Space Treaty, supra note 357, at 2415 (providing that states will be liable for damages to other states if they launch an object which causes damage to property of other states, whether in the air or in space).
4. Long-Range Transboundary Air Pollution Treaty for Europe and North America

The Long-Range Transboundary Air Pollution Treaty for Europe and North America (LRTAP)\textsuperscript{374} was developed in 1979 in response to acid rain.\textsuperscript{375} The LRTAP addresses the international implications of acid rain.\textsuperscript{376} Three Protocols to the Treaty regulate sulfur emissions.\textsuperscript{377}

As its title indicates, the LRTAP is targeted to the reduction and prevention of air pollution.\textsuperscript{378} Nevertheless, its definition of “air pollution” may be broad enough to extend to some aerosol particle methods: “the introduction . . . of substances . . . into the air resulting in deleterious effects of such a nature as to endanger human health, [and] harm living resources and ecosystems . . . .”\textsuperscript{379} Although climate engineers would argue that their actions are not intended to endanger humans or ecosystems,\textsuperscript{380} without further research into potential damage, the LRTAP appears to restrict sulfate aerosols.\textsuperscript{381}

5. Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention for the Protection of the Ozone Layer (Vienna Convention)\textsuperscript{382} arose in response to concerns that humans produced

\footnotesize{\textsuperscript{374} Convention on Long-Range Transboundary Air Pollution, opened for signature Nov. 13, 1979, 34 U.S.T. 3044 [hereinafter LRTAP].
\textsuperscript{375} See Amy A. Fraenkel, Comment, The Convention on Long-Range Transboundary Air Pollution: Meeting the Challenge of International Cooperation, 30 HARV. INT’L L.J. 447, 449 (1989) (explaining that acid rain was the impetus for LRTAP).
\textsuperscript{376} See id. at 95 (“The problem required an international response and led eventually to the Convention on Long-Range Transboundary Air Pollution.”).
\textsuperscript{377} See Redgwell, supra note 346, at 185 (explaining that LRTAP has several protocols, two of which regulate sulfur emissions).
\textsuperscript{378} See LRTAP, supra note 346, at 3046 (“The Contracting Parties . . . are determined to . . . gradually reduce and prevent air pollution including long-range transboundary air pollution.”).
\textsuperscript{379} Id. at 3046.
\textsuperscript{380} See Royal Society, supra note 5, at 1 (discussing the goals of geoengineering proposals to reduce the effects of climate change).
\textsuperscript{382} Vienna Convention for the Protection of the Ozone Layer, opened for signature Mar. 22, 1985, T.I.A.S. No. 11097, 1 [hereinafter Vienna Convention].}
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chemicals that would reduce the planet’s ozone layer.\footnote{383} The Vienna Convention opened for signature in 1985.\footnote{384} Two years later the Montreal Protocol on Substances that Deplete Ozone Layer (Montreal Protocol) opened for signature.\footnote{385} Parties to the Vienna Convention agree to reduce activities that would adversely impact the ozone layer.\footnote{386} The Montreal Protocol requires reductions in the production and consumption of certain controlled substances.\footnote{387}

The Vienna Convention and Montreal Protocol target their regulations to materials that harm the ozone layer.\footnote{388} Thus, they likely would apply to aerosol injection methods that would adversely impact the ozone layer.\footnote{389} Sulfur, the most prominent ingredient for atmospheric injections, reacts with chlorine in cold temperatures to form molecules that destroy ozone.\footnote{390} Scientists have calculated that injecting sulfur into the atmosphere to the extent required to engineer the climate would seriously impact the ozone levels at the poles.\footnote{391} Thus, the use of sulfur particles likely would violate the Vienna Convention and Montreal Protocol.


\footnote{384} See id. (“The Convention . . . was opened for signature at Vienna on 22 March 1985.”).


\footnote{386} See Vienna Convention supra note 382, at art. 2 ¶ 2(b) (stating that parties will work to “control, limit, reduce, or prevent” activities that harm the ozone layer).

\footnote{387} See Montreal Protocol, supra note 385, at 31–33 (listing requirements related to certain controlled substances, and the limits for use and production).

\footnote{388} See Vienna Convention, supra note 382, at pmbl. (stating that parties to the convention are “[d]etermined to protect human health and the environment against adverse effects resulting from modifications of the ozone layer”); Montreal Protocol, supra note 385, pmbl. (stating that parties to the convention are “[d]etermined to protect the ozone layer by taking precautionary measures to control . . . global emissions of substances that deplete it”).


\footnote{390} See id. at 1201 (“The combination of very low temperatures and increasing sunlight after the polar night results in a strong transformation of chlorine from reservoir forms to reactive radicals, leading to the rapid destruction of polar ozone.”).

\footnote{391} See Tilmes et al., supra note 161, at 20 (“The injection of a constant amount of sulfur in the stratosphere, as considered here, results in a constant offset of temperatures in the tropics at different altitudes after an adjustment time in the troposphere of approximately 5 years.”).
substitutes that do not deplete the ozone layer should not fall within the restrictions of these treaties.

6. Convention on Biological Diversity

The Convention on Biological Diversity (CBD)\textsuperscript{392} seeks to conserve biodiversity and promote sustainable uses of its components.\textsuperscript{393} The overarching principle that guides the agreement is that nations have “the sovereign right to exploit their own resources” but the “responsibility to ensure” that activities within their own borders “do not cause damage beyond the limits of [their] national jurisdiction.”\textsuperscript{394}

In 2008, the parties to the CBD considered adopting a moratorium on all ocean fertilization efforts.\textsuperscript{395} Instead, they adopted an approach similar to the approach taken by the London Convention, requiring an adequate scientific basis and a global regulatory mechanism.\textsuperscript{396} In 2010, the parties adopted COP 10 Decision X/33, which expands the CBD to address all climate engineering activities.\textsuperscript{397} Decision X/33 provides that parties ensure that “no climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities . . . with the exception of small scale scientific research studies . . . .”\textsuperscript{398} Thus, even though the CBD restricts the implementation of climate engineering, the parties nevertheless recognize

\textsuperscript{392} Convention on Biological Diversity, opened for signature June 5, 1992, 1760 U.N.T.S. 142 [hereinafter CBD].

\textsuperscript{393} See id. at 146 (stating that objectives include the “conservation of biological diversity, [and] the sustainable use of its components”).

\textsuperscript{394} Id. at 147.

\textsuperscript{395} See Subsidiary Body on Scientific, Technical and Technological Advice [SBSTTA], Biodiversity and Climate Change: Options for Mutually Supportive Actions Addressing Climate Change Within the Three Rio Conventions, § A, ¶ 21, SBSTTA 13 (Feb. 18–22, 2008), available at http://www.cbd.int/recommendation/sbstta/default.shtml?id=11619 (urging parties to adopt a moratorium on all ocean fertilization activities because of questions about its effectiveness and its potential adverse impacts on marine biodiversity) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{396} See Redgwell, supra note 346, at 187 (explaining the approach to ocean fertilization activities that the CBD adopted).


\textsuperscript{398} See id. ¶ 8(w) n.3 (explaining that geoengineering activities are defined as “any technologies that deliberately reduce solar insulation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity”).
the need to allow small-scale research.\textsuperscript{399} Regardless, these provisions do not apply to the United States, since it is not a party to the CBD.\textsuperscript{400}

7. United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC)\textsuperscript{401} commits parties to gather information regarding greenhouse gas (GHG) emissions, and to prepare for the effects of climate change.\textsuperscript{402} The United States became a party to the UNFCCC in 1992.\textsuperscript{403} The subsequent Kyoto Protocol requires nations to commit to legally binding reductions in GHGs.\textsuperscript{404} The United States has signed the Kyoto Protocol, but the Senate has not ratified it.\textsuperscript{405}

Because of their focus on mitigation and adaptation, neither the UNFCCC nor any of the related agreements, such as the Kyoto Protocol, address climate engineering directly.\textsuperscript{406} Parties to the UNFCCC commit to conserve and enhance carbon sinks, however, including forests and oceans.\textsuperscript{407} Given these sinks’ ability to remove carbon from the atmosphere, this commitment is consistent with the aims of geoengineering, particularly

\textsuperscript{399} See id. ¶ 8(w) (stating that climate engineering technologies that influence biodiversity cannot take place unless they are small-scale research projects).

\textsuperscript{400} See CBD, supra note 392, at n.1 (listing the parties to the convention and their date of ratification, and the United States is not included).


\textsuperscript{402} See id. (introducing the requirements of the convention).

\textsuperscript{403} See id. at 166 n.1 (indicating that the United States ratified the UNFCCC on Oct. 15, 1992).

\textsuperscript{404} See Background on the UNFCCC: The International Response to Climate Change, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/essential_background/items/6031.php (last visited October 24, 2013) (explaining how the Kyoto Protocol adds on to UNFCCC) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


\textsuperscript{406} See generally UNFCCC Treaty, supra note 401 (focusing entirely on mitigation of climate change, and not addressing geoengineering).

\textsuperscript{407} See id. at art. 4, ¶ 1(d) (stating that one of the UNFCCC Treaty’s purposes is to “promote sustainable management, and promote and cooperate in the conservation and enhancement . . . . of sinks and . . . forests”).
As this paper will discuss later, the UNFCCC also requires nations to cooperate in the “full, open, and prompt exchange” of scientific and technological information concerning the climate system.

8. Regulation of Transboundary Pollution

Transboundary pollution consists of “pollution whose physical origin is situated wholly or in part within the area under the jurisdiction of one [state] and which has adverse effects, other than effects of a global nature, in the area under the jurisdiction of [another state].” Customary international law requires states to ensure that activities under their jurisdiction do not cause such harm. The Trail Smelter Arbitration between the United States and Canada applied this principle.

Subsequently, the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) was formed to regulate transboundary harms. The Espoo Convention requires parties to assess the environmental impact of activities at an early stage and to notify and consult each other on all major projects likely to have a

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408. See ROYAL SOCIETY, supra note 5, at 1 (stating that geoengineering aims to offset the effects of climate change, and the commitments under the UNFCCC also have this goal).


411. See RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW of the U. S. § 601 (2013) (describing state responsibility for environmental injury to other jurisdictions as a result of the state’s actions).

412. See Jon M. Van Dyke, Liability and Compensation for Harm Caused by Nuclear Activities, 35 DENVER J. INT’L L. & POL’Y 13, 13 (2006) (stating that the Trail Smelter Arbitration applied the “no-harm rule”); see also Noah D. Hall, Transboundary Pollution: Harmonizing International and Domestic Law, 40 U. Mich. J. L. Reform 681, 696 (2007) (describing the facts of the case and how the Trail Smelter Arbitration is unique because it remains the only international decision that specifically involves transfrontier pollution); id. at 696–98 (describing how the tribunal held that no state may permit its territory to be used in a manner to cause injury by fumes in the territory of another state).


414. See id. at pmbl. (stating that one of the purposes of the Espoo Convention is to “enhance international co-operation in assessing environmental impact in particular in a transboundary context”).
significant, adverse environmental impact across boundaries. Although a signatory to the Espoo Convention, the United States has not ratified it. Separately, though, the United States and Canada entered into an agreement to address acid rain caused by transboundary pollution. This agreement would implicate sulfur aerosols. Other aerosol methods, however, are unlikely to fall under this agreement or related precedent.

C. A Summary—Regulatory Coverage of Climate Engineering by the United States.

Because both domestic and international environmental laws developed to address pollution, there are only a series of patchwork amendments provide sporadic coverage of climate engineering research and testing. A comprehensive regulatory regime has been developed for only one method, a subcategory of carbon sequestration. Other methods, including ocean fertilization and stratospheric aerosol injections, may be

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415. See id. at art. III (describing requirements for notifying nearby states of activities likely to have a transboundary impact).


417. See Agreement on Air Quality, U.S.-Can., Mar. 13, 1991, 1852 U.N.T.S. 80 (noting that a broader North American Agreement on Transboundary Environmental Impact Assessment between Canada, Mexico, and the United States has been drafted, but final negotiations have stalled over the application of the agreement to state and local governments); see also Charles M. Kersten, Rethinking Transboundary Environmental Impact Assessment, 34 Yale J. Int’l Law 173, 178 (2009) (describing the value of international environmental impact statements).

418. See Agreement on Air Quality, supra note 417, at annex (enumerating objectives concerning the reduction of sulfur dioxide); id. at art. I (defining “air pollution” as “the introduction by man, directly or indirectly, of substances into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystems”).

419. See Davidson et al., supra note 117, at 4266 (describing the properties of alternatives to sulfur aerosols).

420. See Bracmort & Lattanzio, supra note 165, at 24 (“While no federal law has been enacted with the express purpose of covering geoengineering activities, some legal instruments may currently apply to domestic geoengineering practices and their impacts, depending on the type, location, and sponsor of the activity.”).

421. See id. (“In July 2008, the [EPA] relied on its authority under the Safe Water Drinking Act to issue a draft rule that would regulate CO₂ injection for the purposes of geological sequestration.”).
affected by existing federal law.\textsuperscript{422} Meanwhile, other methods of climate engineering remain almost wholly unregulated.\textsuperscript{423}

The following table identifies the primary climate engineering methods currently identified by scientists and the United States laws and binding international treaties that regulate their research and testing:

Table 1

<table>
<thead>
<tr>
<th>Method</th>
<th>Regulating Laws</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean fertilization</td>
<td>MPRSA, London Convention</td>
</tr>
<tr>
<td>Ground-based reflectors</td>
<td>ESA (indirect)</td>
</tr>
<tr>
<td>Sequestration—underground</td>
<td>Safe Drinking Water Act</td>
</tr>
<tr>
<td>Sequestration - subseabed</td>
<td>(None)</td>
</tr>
<tr>
<td>Aerosols - sulfur</td>
<td>CAA, Montreal Protocol, LRTAP, Canada-U.S. Agreement</td>
</tr>
<tr>
<td>Aerosols - non-sulfur</td>
<td>(None)</td>
</tr>
<tr>
<td>Space-based mirrors</td>
<td>(None)</td>
</tr>
<tr>
<td>Enhanced up/downwelling</td>
<td>(None)</td>
</tr>
<tr>
<td>Cloud whitening</td>
<td>(None)</td>
</tr>
</tbody>
</table>

Table 1 highlights several aspects of the patchwork nature of the United States’ regulation of climate engineering activities. First, only three methods are regulated directly: carbon dioxide sequestration, ocean fertilization, and sulfur aerosol injection.\textsuperscript{424} The parties to the London

\textsuperscript{422} See \textit{id} at 24–25 (discussing geoengineering methods and the federal laws that may regulate them).

\textsuperscript{423} See \textit{id} at 26 (noting the lack of unified federal regulatory authority over geoengineering techniques); \textit{id} at 25 (“Moreover, in the absence of federal lawmaking, some states have begun developing their own policies to address particular geoengineering activities.”).

\textsuperscript{424} See \textit{id} at 23–25 (noting the EPA’s jurisdiction pursuant to the Clean Air Act and Clean Water Act to regulate carbon dioxide sequestration, ocean fertilization, and stratospheric aerosol injection).
Convention and the London Protocol, after the disputes arising from the Planktos incident, amended those agreements to incorporate ocean fertilization. The EPA recently approved regulations pursuant to the Safe Drinking Water Act to control carbon sequestration. Finally, sulfur aerosols fall within both domestic (Clean Air Act) and international (the LRTAP, Montreal Protocol, and the Canada-U.S. Agreement) regulations.

To the extent that United States law or binding international law regulates other methods, it does so indirectly, occasionally, or loosely. For example, the ESA does not directly regulate the placement of reflectors, but it may be implicated if their placement harmed a threatened or endangered species. NEPA also does not apply to any particular method, but its requirements may be implicated by any geoengineering efforts that require major federal action. The Outer Space Treaty extends to injuries caused by space objects, but it addresses militaristic uses of space. Similarly, ENMOD, which prohibits weather manipulation, is directed to military efforts.

Table 1 also demonstrates that no uniform body of regulations governs the development and deployment of climate engineering. Sections of different statutes or treaties address different aspects of geoengineering, but they were approved at different times in response to different circumstances. Moreover, these laws were approved at different times in response to different circumstances. No comprehensive regulatory

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425. See supra Part III.B.1 (discussing the development of the London Convention).
426. See generally Class VI Rule, supra note 210 (implementing requirements for carbon sequestration).
427. See generally supra Part III.A and B (discussing domestic and international laws that may govern aerosol injection).
429. See id. § 1538(a)(1)(B) (“[I]t is unlawful for any person subject to the jurisdiction of the United States to . . . take any [endangered] species within the United States . . . .”).
431. See id. § 4332(c) (requiring detailed environmental impact statement for major federal action affecting the quality of the human environment).
432. See Outer Space Treaty, supra note 357 (noting the application of the treaty to injuries from outer space activities).
433. See id. (discussing that the context of the treaty relates to military action).
434. See ENMOD, supra note 343 (observing that the application of this agreement affects military action).
435. See Bracmort & Lattanzio, supra note 165, at 24–28 (describing the piecemeal nature of government oversight of geoengineering activities).
436. See id. at 24 (describing how the Clean Air Act Amendments of 1990 might apply to aerosol injection).
scheme has been developed for climate engineering, nor does any single body regulate these efforts.\footnote{\textit{See id.} (discussing how in the absence of a federal program, “some legal instruments may currently apply to domestic geoengineering efforts and their impacts”).}

Finally, no federal law expressly prohibits any type of climate engineering.\footnote{\textit{See id.} (“[N]o federal law has been enacted with the express purpose of covering geoengineering activities . . . .”).}

\textbf{IV. The United States Should Enact a Comprehensive Legal Scheme to Regulate and Encourage Climate Engineering Research and Testing}

Nothing short of drastic measures can avert significant climate change.\footnote{\textit{See ROYAL SOCIETY, supra note 5, at ix (“It is likely that global warming will exceed 2° C this century unless global greenhouse gas emissions are cut by at least 50% of 1990 levels by 2050, and by more thereafter.”)).} Thus, society must explore alternatives to mitigation and adaptation to minimize the consequences of this change.\footnote{\textit{See id.} (“Unless future efforts to reduce greenhouse gas emissions are much more successful than they have been so far, additional action may be required should it become necessary to cool the Earth this century.”)).} The United States should take a leadership role in this effort. To do so, it must develop a comprehensive scheme of regulation, establish a regulatory body to oversee these efforts, and facilitate this research. Furthermore, by instituting a domestic program addressing climate engineering research, this program may become a model for a future international agreement.

\textit{A. The United States Should Promptly Commence a Geoengineering Research Program}

For several reasons, the United States should not wait for an international agreement to be reached; it should commence its own research on geoengineering.\footnote{\textit{See Davis, supra note 154, at 907–08 (suggesting the United States should not wait to complete such arrangements before commencing its program).}} Several reasons support this conclusion. First, the realities of climate change and the time to develop responsive technologies necessitate that research commence forthwith.\footnote{\textit{See BRACMORT & LATTANZIO, supra note 165, at 3 (“Little research has been done on most geoengineering methods, and no major directed research programs are in place . . . [but] more research would be required to test the feasibility, effectiveness, cost, social and environmental impacts, and the possible unintended consequences of geoengineering before deployment.”)).} As discussed previously, the planet is already warming, and numerous feedbacks in the climate
system may accelerate this warming, which will continue regardless of the success of mitigation efforts. Structural characteristics of our energy system will perpetuate significant carbon emissions for decades. Moreover, research, modeling, and testing climate engineering proposals will require many years.

Second, a meaningful international agreement is not likely to be adopted soon. Particularly when novel issues are involved, the process of reaching international agreement can be time-intensive. Further complicating the process will be the conflicting interests of nations. Some countries, for instance, may seemingly benefit from climate change (especially northern countries such as Russia and Canada); fossil fuel producers and developing countries stand to benefit from business as usual, while smaller nations may be concerned that larger or richer countries will determine their fates. Because of the nature of climate engineering, the only international consensus on the issue might be to impose a moratorium on research and deployment. Unfortunately, the parties most likely to abide by a moratorium are precisely those most likely to study, test, and

443. See supra Part II.B (noting, for example, that increasing global temperatures will melt permafrost and release methane, further exacerbating global warming).
444. See supra Part II.C (summarizing arguments that mitigation alone is inadequate to prevent global warming).
445. See supra Part II.C (discussing structural aspects of the energy market that impede adoption of clean technologies).
446. See ROYAL SOCIETY, supra note 5, at 52 (“A R&D programme on geoengineering methods . . . could reduce many of the uncertainties within 10 years.”).
447. See Carlin, supra note 145, at 725 (arguing that an international agreement “appears very unlikely given the history of voluntary international cooperation between nations”); David G. Victor, On the Regulation of Geoengineering, 24 OXFORD REV. ECON. POL’Y 322, 324 (2008) (“From today’s vantage point, a treaty negotiation would yield inconclusive outcomes . . . .”).
448. See ROYAL SOCIETY, supra note 5, at xi (discussing current and potential international governance problems).
449. See id. (“The acceptability of geoengineering will be determined as much by social, legal and political issues as by scientific and technical factors.”);
451. See Victor., supra note 447, at 324 (“Economic growth tends to trump vague and elusive global aspirations.”).
452. See BRACMORT & LATTANZIO, supra note 165, at 22–23 (noting that at the 2012 climate talks in Doha, the U.N. Climate Change Secretariat dismissed suggestions that the time had arrived to explore geoengineering); see also Alister Doyle, Geo-Engineering Wins Scant Enthusiasm at U.N. Climate Talks, REUTERS (Dec. 2, 2012), http://www.reuters.com/article/2012/12/02/us-climate-talks-geoengineering-idUSBRE8B103Y20121202 (discussing the uncertainty surrounding geoengineering and potential responses) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
assess these technologies responsibly. A moratorium would thus “leave less responsible governments and individuals—those most prone to ignore or avoid inconvenient international norms—to control the technology’s fate.”

Another aspect of international treaties, their inherent conservatism, will further reduce the value of an agreement. Nations typically water down the terms of treaties to levels that ensure that compliance is readily achievable. When compliance is not easily achievable, nations simply do not join. In the context of climate engineering, this tendency might limit the methods that are open for consideration or minimize the amount of research and testing that is conducted. Nations lacking the technical ability might seek to limit research and testing. If a treaty’s conditions were too restrictive, nations with the ability to pursue climate engineering might simply decline to join the treaty. We already see examples of this process in the recent amendments to the London Protocol and in the Convention on Biological Diversity.

Finally, the United States should commence its own program now to ensure that domestic geoengineering activities are appropriately overseen. Theoretical understanding of climate engineering is increasing, so that scientists and entrepreneurs are beginning to commence their own

453. See Victor, supra note 447, at 326 (“A taboo is likely to be most constraining on the countries (and their subjects) who are likely to do the most responsible testing, assessment, and (if needed) deployment of geoengineering systems.”).
454. Id. at 327.
455. See id. at 331 (describing how opposing interests water down the treaty-making process).
456. See id. (“[C]ountries adjust their commitments to the point where they are sure that compliance is feasible and because they do not join when commitments are too demanding.”).
457. See id. at 333 (pointing to the Kyoto Protocol as an example of these tendencies of international agreements).
458. See id. (noting that the participation of more nations would lead to more research).
459. See id. (“Most nations would probably favor a ban on geoengineering because only a few countries actually have the capability to geoengineer on their own.”).
460. See id. (“[T]he few nations with unilateral geoengineering capabilities would seek favorable (i.e. vague) language [in the treaty]; if unsuccessful, those countries could simply refuse to join.”).
461. See supra Part III.B.7 (describing how European nations inserted restrictive language on genetically-engineered crops and the United States, the leader in this field, then refused to join the treaty; see also Victor, supra note 447, at 331 (stating that the development of the CBD followed this pattern).
462. See BRACMORT & LATTANZIO, supra note 165, at 21 (discussing concerns in an oversight regime for geoengineering); Andy Ridgwell, Chris Freeman & Richard Lampitt, Geoengineering: Taking Control of Our Planet’s Climate?, 370 PHIL. TRANSACTIONS ROYAL SOC’Y A 4163, 4163–65 (2012) (examining the level of technological innovation as compared to governance development).
field experiments. In light of the paucity of applicable domestic and international laws, few limitations restrict these activities.

B. The United States Needs to Establish a Single Oversight Body for Climate Engineering Research

The federal government should oversee climate engineering research through a multi-disciplinary body. Federal oversight is important to ensure that uniform regulations and guidelines control these efforts. Indeed, states have already begun to step into the vacuum created by federal inaction. The oversight body should be multidisciplinary to confront managerial, legal, and scientific issues that could arise. The oversight body should also be able to address the historical, ethical and social implications of geoengineering.

Not only should the oversight body incorporate multiple perspectives, it should also be a single, self-contained agency. Creating a

463. See Henry Fountain, A Rogue Climate Experiment Outrages Scientists, N.Y. TIMES Oct. 18, 2012, at A1 (examining the ability of individuals to conduct their own climate engineering tests).

464. See BRACMORT & LATTANZIO, supra note 165, at 24 (“The federal government could expand these existing laws to specifically address geoengineering activities or develop new laws. In addition, administrative agencies could interpret their statutory authority to authorize new rules explicitly addressing particular geoengineering activities.”).

465. See GAO, supra note 7, at 23 (“However, without the guidance of an operational definition for what constitutes geoengineering or a strategy to capitalize on existing research efforts, federal agencies may not recognize or be able to report the full extent of potentially relevant research activities.”).

466. See, e.g., CAL. PUB. UTIL. CODE § 8341(d)(5) (West 2013); see also TEX. NAT. RES. CODE ANN. § 91.802(c) (West 2013) (ensuring that both California and Texas incorporate consideration of carbon sequestration into their codes.); see also CAL. PUB. RES. CODE § 35650(b)(2)(J)(i) (West 2013) (providing state funding for research into carbon sequestration in the ocean).

467. See Alan Carlin, Implementation & Utilization of Geoengineering for Global Climate Change Control, 7 SUSTAINABLE DEV. L. & POL. 56, 56–57 (2007) (explaining that any organization charged with implementing climate change should strive to establish a high level of scientific review, limited legal liability, and cost-efficiency).

468. See American Meteorological Society, Policy Statement on Geoengineering the Climate System 1 (Mar. 7, 2009) (draft statement), available at http://www.ametsoc.org/policy/draftstatements/geoengineering_draftstatement.pdf (“As with inadvertent human-induced climate change, the consequences of such actions would almost certainly not be the same for all nations and individuals, thus raising legal, ethical, diplomatic, and even national security concerns.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

single entity will yield the obvious benefits of efficiency, avoidance of regulatory gaps or overlap, consistent oversight, and coordination of efforts. Indeed, while federal agencies have funded some modest climate engineering research efforts, these efforts have been disjointed. At least five agencies have funded geoengineering research. Despite this breadth of effort, the federal government has yet to form a position or strategy concerning climate engineering. While the diversity of geoengineering technologies lends itself to specialization within different federal agencies, those familiar with current federally-funded research efforts urge the creation of a single, interagency, coordinating body.

One benefit of a single oversight body is that it can clearly identify those projects which the federal government would consider to fall within the umbrella of climate engineering. The current lack of such guidance stems from the absence of an operational definition of what geoengineering incorporates. This lack of a clear definition creates several problems. First, climate engineering research is difficult to identify, since projects are
not consistently recognized as falling within it.\textsuperscript{478} Second, this lack of clarity hampers efforts to coordinate geoengineering research.\textsuperscript{479} Third, it risks some activities being brought under the umbrella of climate engineering that most scientists would not label as such.\textsuperscript{480} Not only is a functional definition of climate engineering necessary, the oversight body also needs to be flexible in its application to take into account technological advancements that may suggest new methods to engineer the climate.\textsuperscript{481}

C. The United States’ Program Should be Fully Transparent

The United States’ program should follow certain guidelines. First, it should be transparent, research plans and results should be readily available.\textsuperscript{482} Transparency will serve several purposes. First, it will assure that others conducting similar research will remain informed of the most recent developments.\textsuperscript{483} Second, transparency will assure other nations and the general public of the integrity and objectives of the program.\textsuperscript{484} Absent such assurances, the development of a research and testing program may

\begin{itemize}
\item \textsuperscript{478} See GAO, supra note 7, at 38 (discussing the lack of consensus about what activities constitute geoengineering).
\item \textsuperscript{479} See id. (“Variations in agencies’ interpretation of our data request, as well as the comments noted above, support our recommendation that additional clarity and guidance regarding the federal approach to geoengineering is needed, and that further discussion of what types of activities should be included in a federal operational definition of geoengineering may be warranted.”); see also Gordon, supra note 5, at 38–39 (noting that government actions need to be clear before going forward with geoengineering).
\item \textsuperscript{480} See GORDON, supra note 5, at 38 (stating that many low-risk activities undertaken for centuries, such as reforestation, could technically fall within this category).
\item \textsuperscript{481} See Memorandum from the The Royal Society ¶ 18 (Dec. 2009), available at http://www.publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/10011319.htm (explaining that commentators have called for flexibility in the definition of nanotechnology to allow regulations to adapt as the science develops and new information comes to light) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Diana Bowman, Joel D’Silva & Geert van Calster, Defining Nanomaterials for the Purpose of Regulation within the European Union, 1 EUROPEAN J. RISK REG. 115, 121 (2010) (noting the difficulty policymakers have had in defining nanomaterials given advances in technology).
\item \textsuperscript{482} See GAO, supra note 7, at 37 (“[A]ny framework governing research should include several elements, such as transparency . . . .”).
\item \textsuperscript{483} See id. at 38 (“[L]ack of information may hinder policy decisions and governance at the domestic and international level.”).
\item \textsuperscript{484} See The Principles, supra note 192 (urging transparency to minimize the tendency for individual action to be perceived as potentially infringing on the sovereignty of other nations by crossing national boundaries); see also Memorandum from the Dep’t of Energy and Climate Change (Jan. 2010), available at http://www.publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/10011306.htm (examining the need for international regulation of geoengineering) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\end{itemize}
inspire an “arms race” in which other nations ramp up their own programs, possibly reducing interest in cooperation on other climate issues.\footnote{485} Furthermore, some segment of society is likely to remain skeptical of climate engineering.\footnote{486} Full disclosure of its strengths and weaknesses will help to keep this response to a minimum.\footnote{487}

Transparency can also help to discourage unilateral testing and implementation of climate engineering.\footnote{488} Already, private interests have attempted or begun field testing.\footnote{489} Keeping all nations equally informed of geoengineering findings can help to deter rogue entities from unilaterally implementing methods determined to have exceptional risks.\footnote{490} Transparency also will better enable nations to monitor for unsanctioned geoengineering implementation.\footnote{491} Dissemination of results will keep nations informed of methods, technologies, and their consequences, thereby better enabling nations to monitor for “covert” geoengineering.\footnote{492} Finally, it will foster an expectation of transparency around climate engineering, which will be critical should circumstances necessitate that implementation be given serious consideration.\footnote{493}


\footnote{486} See Jay Michaelson, Geoengineering and Climate Management: From Marginality to Inevitability, 46 Tulsa L. Rev. 221, 239 (2010) (discussing the changing values and approaches to climate change management).

\footnote{487} See id. at 227–29 (describing the probability of eventual acceptance of climate management actions).

\footnote{488} See Robert L. Olson, Geoengineering for Decision Makers 53 (2011), \textit{available at} http://www.wilsoncenter.org/sites/default/files/Geoengineering_for_Decision_Makers_0.pdf (explaining how an international governance system needs to be able to deter experimentation) (on file with the \textit{Washington and Lee Journal of Energy, Climate, and the Environment}).

\footnote{489} See, e.g., Fountain, \textit{supra} note 463 (describing the actions of a “California businessman” who experimented with ocean fertilization and “outraged scientists and government officials”).

\footnote{490} See Olson, \textit{supra} note 488, at 32 (“But if research indicates that deploying that technology could be expected to have dreadful side effects, it is less likely to be used by a rogue actor. We need to know what approaches to avoid even if we are desperate.”).

\footnote{491} See id. at 58 (discussing one of the major risks of geoengineering implementation without appropriate governance).

\footnote{492} See Lawrence, \textit{supra} note 177, at 246 (discussing problems with poorly-informed policymakers).

\footnote{493} See Olson, \textit{supra} note 488, at 39–40 (explaining how establishing legitimacy is crucial to any consensus on geoengineering).
D. The Program Should Prohibit Actual Implementation

The research program must be exactly that—a program for research and testing, and not the beginning of implementation. Thus, when it commences this program, the United States must place a moratorium on the use of climate engineering. This will serve two purposes. First, it will ameliorate concerns, especially from other nations, that the United States is preparing to commence geoengineering unilaterally. Second, it will encourage a clear demarcation between research and implementation. A clear division is important so that concerns regarding implementation will not affect decisions regarding research.

E. The United States Should Use NEPA and Financial Incentives to Conduct Geoengineering Research and Testing

The United States should combine a set of regulations and incentives as part of a climate engineering program. Computer modeling, which would be nearly impossible to police and engenders few risks, would not need to be regulated. All field testing would require federal approval, however. Prior to approval, which would be considered a major federal action, the agency would be required to complete the NEPA process. This would make advance consideration of testing’s impacts more likely. More importantly, it will ensure that the public is fully informed about the experiment.

494. See id. at 44 (arguing that unapproved implementation could hamper geoengineering governance).
495. See Davis, supra note 154, at 946 (“First, in order to head off a backlash by the international community against geoengineering, environmental research and testing should be implemented in conjunction with a unilateral moratorium against deployment.”).
496. See id. at 945–46 (arguing that the United States should both self-impose a moratorium and should “attempt to persuade other countries conducting active environmental research programs to adopt such a moratorium”).
497. See id. at 944–45 (“A self-imposed prohibition on deployment would clarify the distinction between research and deployment.”).
498. See id. at 946 (explaining the difference between a research and experimental program).
499. See Bracmort & Lattanzio, supra note 165, at 25–26 (discussing the current and potential uses of government entities to encourage and regulate geoengineering).
500. See Royal Society, supra note 5, at 17 (noting that computer modeling is already occurring).
501. See Davis, supra note 154, at 944 (noting how procedural requirements should accompany any action).
502. See GAO, supra note 7, at 30 (“[G]eoengineering activities undertaken, funded, or authorized by federal agencies would be subject to [NEPA].”)
503. See id. at 36 (“[T]he legal experts who spoke about domestic regulation generally agreed that the federal government should play a role in governing geoengineering...
This proposal thus parallels the approach taken by the CBD. Although the parties amended the CBD to place a moratorium on geoengineering implementation in 2010, it nevertheless allows small-scale scientific research studies. The CBD allows such efforts only where justified by the need to gather specific data and the studies have been subject to a thorough prior assessment of the potential impacts on the environment. Similarly, this proposal prohibits climate engineering implementation and allows limited field testing, but requires extensive pre-testing disclosure and consideration.

Second, to encourage private participation and to facilitate testing, the federal government should clarify the liability of parties conducting field tests. It should impose strict liability because of the potentially ultra-hazardous nature of these activities. On the other hand, the federal government should minimize the costs of liability to encourage participation in the program. For instance, the federal government could require the maintenance of sufficient liability insurance as a precondition to approval, but the government could subsidize the premiums or indemnify the party for any liability found in excess of the required coverage. Currently, the federal government requires nuclear power plant operators to maintain insurance, but it covers claims exceeding the mandated amount. Of course, to receive protection from liability, private parties would need to satisfy all NEPA and related disclosure requirements and any other mandates. Furthermore, the federal government should issue appropriate research—either by developing research norms and guidelines or applying existing regulations and guidelines.”.

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504. See id. (“[O]ne expert cautioned that discussing deployment could raise the level of controversy surrounding the subject.”).

505. Supra notes 392–94 and accompanying text.

506. Supra note 399 and accompanying text.


508. See Davis, supra note 154, at 945 (discussing the need for a balance between real life testing and avoiding negative side effects).

509. See GAO, supra note 7, at 37–38 (stressing the importance of defining liability and restitution for damage caused by geoengineering activities).

510. See RESTATEMENT (FIRST) OF TORTS § 519 (stating that until climate engineering technologies are tested, they should be categorized as ultra-hazardous activities because they “necessarily involve a risk of serious harm . . . , and [are] not [matters] of common usage”).


512. See GAO, supra note 7, at 30 (discussing the role of NEPA).
regulations governing the procedures for testing to ensure, among other aspects, safety, data collection, and publication of results.\footnote{See Davis, supra note 154, at 905 (arguing that an appropriate level of regulation is beneficial).}

\textbf{F. A United States Program Can Serve as a Model for an International Agreement}

An additional benefit of the United States taking the lead in supporting and regulating climate engineering research is that its efforts can provide a model for, if not a prod to, a future international regime.\footnote{See id. at 940 (“[Defense Advanced Research Projects Agency]’s organizing elements . . . ; cooperation between governments, corporations, and academic institutions; and use of networked, collaborative teams organized around specific technological challenges have contributed to its success in fostering technological advances. . . . [T]his collaborative and performance-oriented approach should be applied internationally.”
\end{quote}}\footnote{See supra Part II.B.1 (discussing the existing state of international environmental regulation on geoengineering).} As noted previously, only France, Germany, Norway, and the United Kingdom have commenced any efforts concerning geoengineering.\footnote{See supra note 197, at 541 (noting that techniques such as solar radiation management may take two decades to study and implement).} Nevertheless, the likelihood of significant warming is increasing, and mitigation is not likely by itself to keep the planet from warming at least 2°C.\footnote{See Victor, supra note 447, at 331 (arguing that research efforts by individual nations or academic institutions “would help nations craft the norms that should govern the testing and possible deployment of newly developed technologies”).} Given the decades required to study, test, and assess the results from climate engineering,\footnote{See id. (“[C]onnected national efforts would link together in a transnational partnership of expert regulators, as has happened in many other areas where regulation rests on experts and benefits from international coordination.”
\end{quote}} such efforts must commence shortly.

\end{quote}}
environmental arena, the United States sulfur emissions trading system has served as a model for the European Union Emissions Trading System,\textsuperscript{521} which serves as a “fundamental component of the international framework”\textsuperscript{522} for greenhouse gas emissions trading.

A domestic program can also provide information critical to the development of a future international agreement.\textsuperscript{523} Specifically, it can provide a base of experience from which to develop regulatory norms for a subsequent international agreement.\textsuperscript{524}

Many of these proposals find support from those scientists likely to be integral in researching and developing climate engineering.\textsuperscript{525} In 2010, the Asilomar International Conference on Climate Intervention Technologies convened over 165 experts to consider the conditions and precautions appropriate to undertake climate engineering research.\textsuperscript{526} Their recommendations included the creation of new governance and oversight
mechanisms, coordination of research efforts, transparency, and no-fault liability.

IV. Conclusion

Society needs to increase its mitigation and adaptation efforts. Nevertheless, we have reason to expect that these actions alone will not prevent significant climate change and its consequences. Accordingly, we need to consider additional approaches, such as climate engineering. Because of the long lead time necessary to study, test, and prepare geoengineering methods should it become necessary, such efforts should commence immediately. Since an international agreement may be both inadequate and long in coming, the United States should take the lead and initiate its own program.

527. See id. at 9 (“Governments must clarify responsibilities, and, when necessary, create new mechanisms, for the governance and oversight of large-scale climate engineering research activities that have the potential or intent to significantly modify the environment or affect society.”).
528. See id. at 20 (“Climate engineering research should be conducted openly and cooperatively, preferably within a framework that has broad international support.”).
529. See id. (“[G]overnance mechanisms will need to include provisions for . . . promoting transparency and disclosure.”).
530. See id. at 24 (“Liability and compensation processes based on ‘no-fault’ principles over some range of potential impacts defined in advance of particular experiments may be needed as part of the approval process.”).
“Turn on the Lights”\textsuperscript{1}—Sustainable Energy Investment and Regulatory Policy: Charting the Hydrokinetic Path for Pakistan

Nadia B. Ahmad\textsuperscript{*}

Abstract

Hydrokinetic energy is an under-recognized, low-cost renewable technology that can be deployed in Pakistan through a robust national energy strategy and international investment schemes to tackle the country’s acute energy crisis. This article will show how national and local laws can be amended to favor progress in the sustainable energy sector and achieve hydrokinetic energy production in Pakistan, which if actualized, would be nothing short of a game changer—strategically and environmentally. Despite current legal regimes that disfavor small scale hydroelectric power production, Pakistan and other less developed countries can adapt and deploy hydrokinetic technology through revamped investment laws, regulatory rules, and renewable energy tax reform.

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\textsuperscript{1} \textit{FUTURE, TURN ON THE LIGHTS} (Epic Records 2012).

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I. Introduction

The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition; we must lead it.²

In his second inaugural address, President Barack Obama ratcheted up the call for sustainable energy development.³ Looking beyond America’s own borders, it is important to consider energy projects in less developed countries (LDCs).⁴ Among such prospects, Pakistan is arguably the most

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³ See generally id. (calling for America to lead the transition toward sustainable energy).
vital country for advancing U.S. security interests. Pakistan’s energy crisis is of concern not only to itself but also worldwide. Having pledged over $30 billion in aid to Pakistan since 1948, the United States has overlooked the feasibility of nascent energy technologies to relieve the country’s acute energy crisis. As a part of the civilian assistance program to Pakistan, the U.S. Department of State and USAID recognized the need for alleviating energy poverty and creating sustainable energy options in Pakistan. Until now, hydrokinetic energy was ignored as a solution to Pakistan’s energy crisis. The aim of this article is to furnish a preliminary framework for how this under-recognized, potentially low-cost renewable technology can be deployed in Pakistan through a robust national energy policy strategy and international investment schemes. Even though current legal regimes disfavor small-scale hydroelectric power production, Pakistan and other similarly situated LDCs can adapt and deploy hydrokinetic technology through revamped renewable energy laws, rules, and tax reform. This
Article analyzes governance, regulatory, investment, and environmental law and policy in Pakistan for the use of hydrokinetic energy, a low-carbon, high-output energy alternative, which, if actualized, would be nothing short of a game changer both strategically and environmentally. This article will show how national, regional, provincial, and local laws can be amended to support progress in the sustainable energy sector and achieve hydrokinetic energy production in Pakistan.

Hydropower has historically been Pakistan’s energy source of choice, accounting for one-third of the nation’s electricity generation. For that reason, the use of hydrokinetic energy would be an extension of the prevailing energy infrastructure and power grid system. Hydrokinetic energy harnesses the power from the natural flow of water in streams and waves for electrical generation by using small turbines placed directly in the water. While the engineering and design for hydrokinetic electricity generation are evolving, the potential is extraordinary in various LDCs by retooling energy, environmental, and investment laws. Hydrokinetic energy can be among this millennium’s major renewable energy sources with the right technological innovations and investment laws. Although the methodology proposed in this article is country-specific, it can be expanded to other LDCs and restructured based on different national requirements, because many of the legal recommendations for supporting the sustainable energy growth are universal.

remains marred in political controversy and disagreement amongst the provinces.”).


13. See id. at 85 (explaining how Pakistan’s preexisting hydropower infrastructure could make for a smooth transition to hydrokinetic energy).


15. See Marchetti, supra note 4 (explaining the potential for the development of hydrokinetic energy and the barriers that impede the process).

16. See U.S. DEP’T OF ENERGY, supra note 14, at 5 (“Although the marine and hydrokinetic (MHK) industry is at a relatively early stage of development compared to other renewable energy technologies (such as wind and solar power), the rivers, coasts, and oceans of the United States represent significant potential as a renewable energy resource.”).

THE HYDROKINETIC PATH FOR PAKISTAN

Moreover, the deployment of hydrokinetic energy complements the United Nations Sustainable Energy for All initiative, which focuses on the necessary connection between clean energy development and defeating poverty. This renewable energy development initiative is stimulated by fears of energy security and concerns that environmental degradation caused by conventional fossil fuels must be mitigated. Pakistan has a significant amount of renewable energy resources in the form of solar, wind, geothermal, biomass, and hydropower. These resources remain untapped. Energy sources derived from extractive industries such as coal, oil, and gas may provide Pakistan with enough energy to power its electrical grid, but these fossil fuel resources are unreliable and unsustainable. The current legal regime favors fossil fuels through government-backed subsidies and loan guarantees. Having legal mandates, including a national renewable energy portfolio and renewable energy targets (RETs) to promote the diversity of energy sources, lays the foundation for a reliable electrical system.


21. See id. (“Pakistan’s massive, unexploited renewable energy sources, particularly hydroelectric and solar, can help plug its widening energy deficit and improve livelihoods.”).

22. See Reeves, supra note 6 (explaining that the constant blackouts and outages in Pakistan are a result of the energy shortages throughout the country).


mechanisms to attract investment in alternative energy are necessary to make a next generation energy technology, like hydrokinetic energy, cost-competitive with existing renewables, and even conventional fossil fuels.\textsuperscript{25} This article will also look at how the legal issues associated with intercorporate debt, corruption, and the lack of investment regimes bolster an increasing overreliance on fossil fuels that sideswipe and undermine environmental law reform and sustainable energy growth.\textsuperscript{26}

This article consists of four parts. Part II of this article will discuss the shortage of energy in Pakistan and its root legal causes, the suitability of hydrokinetic energy for Pakistan, and what Islamabad policymakers can do by way of legal reform to promote hydrokinetic energy as a sustainable energy option. Parts III and IV turn toward legal impediments to implementation and specific policy measures for hydrokinetic energy investment regimes. Part V of this article will address law and policy measures for sustainable energy generation that have been successful internationally and how Pakistan can enhance its own laws to support international investment and sustainable development.

\textit{II. Status of Pakistan’s Power Industry}

Unreliable energy and power outages exacerbate Pakistan’s economic and educational woes.\textsuperscript{27} The energy crisis is sparked simultaneously by top-down issues at the federal government level and bottom-up factors such as the theft of electricity.\textsuperscript{28} This inability to have

\textsuperscript{25} See infra Part IV.B (discussing a variety of tax models that would promote investment in renewable alternative energy projects in Pakistan).

\textsuperscript{26} See infra Part III.A (addressing the problem of circular debt in Pakistan and the negative effects it has on the growth of reliable energy in Pakistan).

\textsuperscript{27} See Energy Crisis Worse than Terrorism: Shahbaz Sharif, NATION (June 18, 2012), http://www.nation.com.pk/pakistan-news-newspaper-daily-english-online/lahore/18-Jun-2012/energy-crisis-worse-than-terrorism-shahbaz-sharif (describing energy shortages that interfere with school and university schedules, as well as blackouts that impact factory production and hinder economic activity in other businesses) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT); see also Lakshman D. Guruswamy, \textit{Sustainable Energy: A Preliminary Framework}, 38 IND. L. REV. 671, 674 (2005) (“Because the demand for oil and gas far exceeds the supply within those countries that rely most heavily upon them, these countries are compelled to import oil and gas from politically volatile parts of the world.”).

\textsuperscript{28} See Reeves, supra note 6 (“Pakistan’s public sector distribution and energy producing companies are hugely inefficient and afflicted by corruption and theft. A lot of people don’t pay their electricity bills.”).
dependable electricity creates geopolitical instability.29 “Protesters in several towns in Punjab, Pakistan’s wealthiest province, have smashed windshields, blocked roads, shut down markets, and set fires to the offices of parliamentarians and an electric utility. [Protestors] have clashed with police, who brought out handcuffs and tear gas and fired live rounds in the air.”30 Any solution for energy reliability and efficiency will require a strategy that looks at the energy crisis from a top-down and bottom-up perspective.31 Employing a one-way energy strategy of top-down or bottom-up is not practical.32 It has not worked in the United States and would be bound to fail in Pakistan as well.33

In the intervening time, the clean energy movement is sweeping across Europe, China, India, and Canada.34 Renewable energy provides the hope of meeting energy consumption demand and increasing energy efficiency in South Asia, an area traditionally prone to blackouts, energy shortages, and aging energy infrastructure.35 The need for energy in Pakistan is widespread.36 The inability to turn on a light switch is of serious concern and typifies the condition of extreme poverty, class inequality, and

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29. See Pakistan’s Energy Crisis: Power Politics, THE ECONOMIST (May 21, 2012 7:05 PM), http://www.economist.com/blogs/banyan/2012/05/pakistan%E2%80%99s-energy-crisis (“Under the current government, the power sector has neared the top of a list of security, political and foreign-policy problems that includes some heavyweight contenders.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

30. Id.

31. See, e.g., Kevin L. Doran, Can the U.S. Achieve A Sustainable Energy Economy from the Bottom-Up? An Assessment of State Sustainable Energy Initiatives, 7 VT. J. ENVTL. L. 3, 3 (2006) (explaining that America has not “achieved the ideal of a sustainable energy economy” on the national level despite the efforts of individual states).

32. See id. at 4 (“[W]ithout a uniform national regulatory regime, there is a risk that actors will engage in a ‘race to the bottom’ by locating in states that have not enacted stringent or any regulatory restrictions.”).

33. See generally id. (discussing the failure of U.S. efforts to achieve sustainable energy because of a lack of both federal and state commitment to the project).

34. See discussion infra Part V.B (comparing hydrokinetic projects in the United Kingdom, Canada, India, Sri Lanka, Ghana, and China).


lack of education, infrastructure disrepair, and lost hopes. The reason Pakistan’s energy woes take center stage is because of Pakistan’s role in larger geopolitical conflicts. In other Asian nations and throughout Africa, reliable energy is a cause for concern, but in Pakistan the lack of energy contributes to heightened anxiety because of increased violence, a deteriorating education system, rapid escalation of crime, rising health problems, and economic instability. Having a dependable source of electricity would be a watershed moment for Pakistan and the surrounding region.

Pakistan’s energy industry is underdeveloped and highly inefficient. Only seventy-eight percent of its urban population and forty-six percent of rural people have access to electricity. This disparity in electricity supply between urban centers and rural places is typical in LDCs. Energy supply and access to energy is a concern to various sectors of the population. Access to clean and reliable energy is the key for the stability and prosperity of Pakistan; the shutting down of production units contributes to unemployment and, in turn, to street crime and violence. Since only sixty-two percent of the population has access to electricity, the sustained growth in consumption of electricity is also important. Low electricity access rates correlate with low levels of social equity.

37. See Pakistan’s Energy Crisis, supra note 29 (explaining the broader political and social ramifications and causes of mass riots in response to power outages).

38. See id. (identifying Pakistan’s government officials and their role in the energy crisis).

39. See id. (“Riots over power shortages in Pakistan are not new.”).

40. See Shaikh, supra note 20 (describing how Pakistan’s alternative energy sources await tapping).

41. See Denise Recheis, Current Energy Crisis in Pakistan, REEGLEBLOG (Dec. 1, 2011), http://blog.reegle.info/blog/current-energy-crisis-in-pakistan.htm (“Even though the country is blessed with energy resources, only seventy-eight percent of its urban population and forty-six percent of rural people have access to electricity.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

42. See, e.g., Marchetti, supra note 4 (“Kenya’s power grid does not reach the small farming village of Kiptusuri, making it difficult for local farmers to charge their cell phones.”).

43. See id. (explaining the hardships associated with power outages).

44. See Pakistan’s Energy Crisis, supra note 29 (“In the town of Vehari, rioters burned the offices of lawmakers belonging not only to a ruling coalition partner . . . but also the PML-N and the Pakistan Tehreek-e-Insaf, the party of Imran Khan, who positions himself as the country’s only hope for change.”).

45. World Energy Council, supra note 12, at 85.

46. See id. (explaining the relationship between energy access and societal factors in Pakistan).
Pakistan’s power crisis has led to unannounced power cuts lasting as long as twelve hours in many areas of the country. The energy crisis is expected to only worsen with demand projected to reach 50,000 megawatts (MW) by 2030, an amount which is three times higher than the supply presently available in the system. Pakistan’s energy problems have distinct causes, including the lack of integrated planning and forecasting, the absence of a central organization responsible for the energy sector, and an imbalanced energy mix. The country has the potential to satisfy seventy-five percent of its energy needs through domestic resources, including oil, gas, and hydroelectricity production.

Public discontent has grown at the perceived lack of tangible improvements in energy generation and distribution. Businesses are forced to shut down for part of the week as a result of the energy deficit, forcing many into bankruptcy. The power outages are a source of constant frustration. Demand for electricity peaks in the summer at around 18,000 MW, “but power companies only manage to supply 13,000 to 14,000 MW.” For example, in the sacred month of Ramadan when Muslims fast from dawn to dusk, the inability to use central air conditioning units, ceiling fans, and other electrically-generated cooling devices can prove to be excruciating when temperatures approach 122 degrees Fahrenheit.

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47. See Recheis, supra note 41 (“Pakistan’s power crisis has led to an acute electricity shortfall and unannounced power cuts of up to 12 hours in many areas of the country.”).
48. See, e.g., Navin Singh Khadka, South Asia’s Energy Crisis Demands Collective Action, BBC NEWS (Aug. 12, 2012), http://www.bbc.co.uk/news/business-19107372 (“Pakistan’s power crisis is going from bad to worse, with demand projected to reach 50,000 megawatts (MW) by 2030—three times more than the supply currently available in its system.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
49. Recheis, supra note 41.
50. See id. (describing Pakistan’s potential to sustain its energy needs domestically).
51. See id. (“Access to clean and reliable energy is the key for the stability and prosperity of Pakistan; the fact that production units keep on shutting contributes to unemployment and in turn to street crime and violence.”).
53. See Recheis, supra note 41 (describing the frustrations that lead to protests and riots in Pakistan).
55. See id. (detailing the inconveniences of living without power in Pakistan during the summer months).
Pakistan’s economic outlook has remained grim since 2008 because of its energy shortages.\textsuperscript{56} Even though India also suffers energy shortages, India has invested in instituting national, state, and municipal level policies to improve its energy crisis.\textsuperscript{57} Pakistan has recognized this predicament, but has not taken substantial affirmative steps to reduce foreign energy exports or expand its renewable energy sector.\textsuperscript{58} Energy sustainability extends beyond economic analysis because reliable energy is “essential to sustaining the economy, maintaining organized and productive markets, and protecting individual survival.”\textsuperscript{59}

A. Energy Portfolio

In spite of the internal political dynamics and grim economic outlook, Pakistan is still a prime country for the deployment of hydrokinetic energy.\textsuperscript{60} The country’s specific wind, current, and water conditions are ideal for the production of hydrokinetic energy.\textsuperscript{61} Those considerations along with the country’s short and long-term energy needs are why hydrokinetic energy is well-suited as a sustainable energy option in Pakistan. An examination of Pakistan’s energy portfolio shows how hydrokinetic energy can enter the mix and why the existing energy sources are inadequate.\textsuperscript{62} This subsection will first examine conventional energy sources and then turn to advances in the renewable energy sector.


\textsuperscript{58} See No End in Sight For Pakistan’s Energy Crisis, supra note 54 (“The government is keen to develop nuclear power as it tries to wean itself off expensive imported hydrocarbons—the country spends 7.5 percent of GDP on buying fuel, according to the Planning Commission.”).


\textsuperscript{60} See No End in Sight For Pakistan’s Energy Crisis, supra note 54 (“The rivers and valleys of the mountainous north may offer more than 50,000 MW of untapped hydroelectric potential.”).

\textsuperscript{61} See id. (discussing Pakistan’s energy potential).

\textsuperscript{62} See Shaikh, supra note 20 (explaining the inadequacies in Pakistan’s current energy resources).
Understanding the current state of the energy sector is necessary to understand the benefit that hydrokinetic energy provides to the energy portfolio. A diverse energy portfolio is fundamental for reliable and cost-effective energy.  

Power shortages are estimated to reduce three to four percent of Pakistan’s GDP. During 2008–09, the share of gas in the energy supply mix increased marginally to 48.3% from 47.5% in 2007–08, and stood at 30.2 million tons of oil equivalent (mtoe). The growth in the use of oil supplies over the last few years was fueled by an increase in the consumption of furnace oil by the power sector due to a shortage of gas, as well as an inadequate supply of water for hydroelectricity generation. In 2008–09 hydroelectricity declined slightly from 6.8 mtoe in 2007–08 to 6.6 mtoe. Enhancing fuel efficiency would not only increase the electricity output from the available fuel sources, but also reduce prices by lowering the cost of production.

Pakistan has been sought out for development projects in the past, but hydrokinetic energy is unique because it can be scaled to the circumstances of a given locality. For example, in Karachi, Pakistan’s largest city, hydrokinetic energy can be harnessed from the sea in large

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63. See id. (suggesting that Pakistan should be drawing energy from diverse sources rather than relying solely on fossil fuels and other non-renewable sources).
64. See Light’s Out, supra note 52 (noting that power shortages are adversely affecting Pakistani businesses, forcing them to shut down and potentially go bankrupt).
65. See Sumita Kumar, Pakistan’s Energy Security: Challenges and Options, 34 STRATEGIC ANALYSIS 912, 913 (2010) (describing the increase of gas as a share of the energy supply mix, and noting that “[t]he share of natural gas is the largest in Pakistan’s energy consumption”).
66. See id. at 913 (blaming increased furnace oil consumption and inadequate water supplies for Pakistan’s increased reliance on oil).
67. See id. (“Hydro-electricity registered a slight decline and stood at 6.6 mtoe in 2008–2009 as compared to 6.8 mtoe in 2007–2008.”)
69. See Burki, supra note 23, at 51 (“[T]he Indus River is longer than the Columbia, with a catchment area almost twice as large, but generates only half the amount of energy. The bulk of the 6,460 MW of electricity produced by the Indus system comes from two dams . . . on the Jhelum and . . . on the Indus.”).
quantities with the requisite equipment, whereas in Gilgit or Multan hydrokinetic energy can be secured through rivers and streams from smaller community-based systems.  

Looking at the existing energy portfolio of Pakistan will show why it is depressed and how Pakistan can benefit from hydrokinetic energy. Hydrokinetic energy will not constitute a sizeable portion of the national energy portfolio; however, it can bridge the gaps in energy supply during peak and off-peak times, especially in rural areas and high population density areas along the Arabian Sea.  

Breakthrough technologies impacting energy supply and demand will be necessary to address climate change, air quality, and energy security. Understanding the inadequacies of current energy sources will show why a new energy source is critical in a nation suffering from an acute energy crisis.

Natural gas is the number one energy source for Pakistan. Pakistan consumes all the natural gas produced domestically, which amounts to nearly 968 billion cubic feet annually. In 1952, natural gas was discovered in Baluchistan at the Sui field, a discovery that has since proved to be the country’s largest gas reservoir. Given the extent of onshore exploration activity within the country, it is highly unlikely that natural gas production is going to increase significantly in the foreseeable future. In all probability, the production of natural gas will decline over the next couple of decades, even as demand increases for cheaper alternative fuels like coal and hydropower.

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70. See id. (noting that different regions will require different systems to capture energy from different hydropower sources).

71. See id. (arguing that Pakistan government will need to develop the political will to harness its hydroelectric potential).


73. See generally id. (discussing the imperative of technological innovation in sustainable energy and the means to achieve it).

74. See Burki, supra note 23, at 40 (indicating in a chart that natural gas is and will likely remain Pakistan’s primary source of energy).

75. See Kumar, supra note 65, at 913 (“Pakistan consumes all the domestic natural gas that it produces . . . .”).


77. See Kumar, supra note 65, at 913 (noting that it is unlikely that natural gas production will increase).

78. See id. (“Statistics show that in the year 2007–2008, the power sector was the largest consumer of gas (33.5% share), followed by the industrial sector (23.8%), household (18.1%), fertilizer (15.6%), transport (5.4%) and cement (0.9%).”).
actively been pursuing the Iran-Pakistan Gas Pipeline Project and the Turkmenistan-Afghanistan-Pakistan-India Gas Pipeline Project to combat its energy shortages. Over the long-term, natural gas use remains unclear.

Because Pakistan’s limited oil reserves cannot sustain its increasing energy demands, it imports oil. The country, however, does have 944 million barrels of crude oil reserves that have been discovered, of which 680 million barrels have already been produced. It is estimated that Pakistan has oil reserves of 300 million barrels. Pakistan is dependent on West Asian countries for more than eighty percent of its oil and petroleum products. Pakistan recently shelved plans to import petroleum product from India until 2014 due to variations in fuel environmental quality. Moreover, the high carbon footprint of petroleum makes it an unattractive long-term energy strategy; however, it is essential for immediate energy demands.


80. See id. (“Demand for natural gas has outstripped supply in recent years, putting existing reserves under immense pressure.”).

81. See id. (explaining Pakistan’s dependence on oil imports).

82. PAKISTAN MINISTRY OF PETROLEUM AND NATURAL RESOURCES, FOSSIL FUELS OVERVIEW 2011, available at http://www.mpnr.gov.pk/gop/index.php?q=aHR0cDovLzE5Mi4xNjguNzAuMTM2L21wbnVvdXNlc3ZpGVZMS9maWxlL0ZPU1NJTCUyMEZVRUsTJTJw1ZFU1IZJRvMjAxM5wZGY%3D (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

83. See Kumar, supra note 65, at 914 (“While Pakistan’s oil production is estimated to be about 60,000 barrels per day, of which approximately ninety-seven percent is crude oil, it consumes about 350,000 barrels of oil and various petroleum products per day.”).

84. Id. Even though Pakistan witnessed vigorous oil exploration and development activity in the 1980s and 1990s, not many new oil fields became operational, therefore oil production has remained essentially flat. Id.


Following independence in 1947, coal comprised sixty percent of Pakistan’s commercial energy consumption, but this share decreased when natural gas was discovered in 1952.\textsuperscript{88} Discovery of large coal reserves in the Thar Desert in Sindh in the early 1990s, however, re-invigorated Pakistan’s coal production and reliance.\textsuperscript{89} The Thar reserves are estimated to contain 175 billion tons of coal.\textsuperscript{90} This discovery has increased the potential role that coal will play in Pakistan’s quest for energy self-reliance.\textsuperscript{91} The coal mining industry in Pakistan is impeded by constraints, including the quality and quantity of coal, mining difficulties, organization problems, and investment risks.\textsuperscript{92} Other issues, such as political instability, indecision, corruption, terrorism and security have also threatened coal exploration and production in the Thar Desert.\textsuperscript{93} These reasons suggest that coal as a long-term energy source is unsustainable. Nonetheless, the Thar reserves are relatively close to population centers of Hyderabad and Karachi.\textsuperscript{94} Experts have calculated that “135 to 175 billion tonnes of lignite of power from conventional power generation.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


\textsuperscript{88} See Kumar, supra note 65, at 914 (“[S]oon after independence coal contributed to about 60 per cent of overall energy consumption, but this decreased with the discovery of gas in 1952.”).


\textsuperscript{90} Id.

\textsuperscript{91} See id. (describing the impact of the Thar Desert discovery on Pakistan’s energy independence).


\textsuperscript{93} See id. (noting the social problems that hamper the development of the Thar coal deposit).

\textsuperscript{94} See PRIVATE POWER & INFRASTRUCTURE BOARD, supra note 89, at 2 (describing the geographic location of the Thar Desert in relation to major cities).
coal can potentially be obtained from the Thar deposit, which can produce thousands of megawatts of electricity for decades.\textsuperscript{95}

“Nuclear power provides about three percent of total electric power production in Pakistan.”\textsuperscript{96} The Pakistan Atomic Energy Commission operates two nuclear plants, Chashma-1 and Kanupp, which have an installed capacity of 300 MW and 125 MW respectively.\textsuperscript{97} A third nuclear power plant, Chashma-2, was completed with the help of the China National Nuclear Corporation in 2011 and has an installed capacity of 325 MW.\textsuperscript{98} The Pakistan Atomic Energy Commission hopes to increase the country’s nuclear power generation capacity to 8,800 MW by 2030.\textsuperscript{99} Nonetheless, concerns surrounding the safety and security of nuclear power plants may negatively impact the broad acceptance of nuclear energy.\textsuperscript{100}

\textbf{B. Renewable Energy Basket}

Fossil fuels can generate enough energy to power Pakistan’s electrical grid, but the permanency of these non-renewable fuel sources is speculative at best.\textsuperscript{101} The establishment of a diverse energy portfolio is therefore essential. Diversity of assets is quintessential to an investment portfolio: a country should derive its electricity and power needs from a variety of generation sources, including the sun, wind, water, and

\begin{itemize}
\item \textsuperscript{97} See Kumar, \textit{ supra} note 65, at 915 (“The two operational nuclear plants in Pakistan, Chashma-1 and Kanupp, have an installed capacity of 300 MW and 125 MW respectively, and are operated by the Pakistan Atomic Energy Commission.”).
\item \textsuperscript{98} See \textit{id.} (noting the assistance of the China National Nuclear Corporation).
\item \textsuperscript{99} See \textit{id.} (stating the government’s goal, and noting studies being conducted for the construction of additional nuclear plants).
\item \textsuperscript{101} See \textit{International News Network, supra} note 79 (questioning the feasibility of meeting the needs of Pakistan’s electricity grid with fossil fuels).
Pakistan hopes to increase the use of renewable energy in the future, and for this purpose has set up the Alternative Energy Development Board (AEDB), which is working toward increasing renewably-sourced electricity from solar and wind projects. In addition, Pakistan’s Ministry of Science and Technology established the Pakistan Council of Renewable Energy Technologies (PCRET) by merging the National Institute of Silicon Technology (NIST) and the Pakistan Council for Appropriate Technologies (PCAT) in 2001.

Pakistan’s renewable energy sources—solar, wind, geothermal, biomass, and hydropower—have enormous potential. Electricity generation from renewable sources constitutes 32.8% of total power production, primarily from hydroelectric power. The importance of alternative sources of energy like wind, solar, and biofuels has increased due to the massive rise in oil prices and ever-increasing energy demands. As a result of the urgent demand for larger scale energy resources, it is critical for Pakistan to move from the planning stage of renewable energy implementation into a new dawn of implementation. While some amount of planning must be deliberate and careful, a plan must be able to get off the ground. Pakistanis have the necessary expertise in terms of engineering, science, construction, and design to grow the production, development, and harvesting of renewable energy. Pakistan as a nation, however, lacks the regulatory planning, governance structures, and investment mechanisms to

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102. See generally Ahmed, supra note 36 (discussing different energy portfolio mixes for Pakistan and their potential impacts).

103. See Burki, supra note 23, at 70 (describing the goals of the Alternative Energy Development Board).


105. See Abbasi, supra note 68 (describing the percentage of power that renewable energy sources account for in Pakistan) There is debate as to whether large-scale hydroelectric power is considered a renewable energy source because of its environmental and social impacts. Id.

106. See Zamgochian, supra note 87 (describing the need for the development of renewable energy and the financial ramifications of dependency on nonrenewable resources).

107. See id. at 163 (discussing specific issues with Pakistan’s energy policy).

108. See generally id. (outlining the structure of Pakistan’s energy industry and resources).

109. See, e.g., PCRET, supra note 104 (offering technical expertise to harness alternative energy).
incorporate renewable energy into mainstream energy sources.\textsuperscript{110} Pakistan also lacks the ability to manage community expectations.\textsuperscript{111} Moreover, decades of bureaucratic authoritarianism have led the way for local communities to have low regard for any government initiatives.\textsuperscript{112} Because of this, any energy initiative is viewed with a raised eyebrow.

Pakistan will not only have to develop and implement sustainable technologies for accessing renewable energy, but it will also learn how to adopt new systems of energy governance and involve local and regional groups.\textsuperscript{113} With a new generation of Pakistanis who have an eye on globalization and moving their country forward, radical change is possible. The national government and provincial governments will have to work together to create the change that is needed to herald a new and more vibrant Pakistan.\textsuperscript{114}

In the interim, Pakistan has been developing a wind power energy project to address electricity supply problems since 2002.\textsuperscript{115} Pakistan’s geographic location with a coastline stretching over 1,046 kilometers provides the right conditions for the installation of wind turbines and the wind power potential of 50,000 MW.\textsuperscript{116} There are, however, still concerns about how to supply remote areas with these new energy sources.\textsuperscript{117} Working with the Chinese government, Pakistan established fourteen small wind power plants to generate electricity in the southern coastal region of Sindh and Balochistan, which previously had no access to electricity, because wind speeds are sufficient in hilly and coastal areas, which constitute a significant percentage of the terrain.\textsuperscript{118}

\begin{itemize}
\item \textsuperscript{110} See Burki, supra note 23, at 38 (describing the administrative and governmental flaws that prohibit alternative energy development).
\item \textsuperscript{111} See Reeves, supra note 6 (“Constant power outages are crippling Pakistan’s economy and, as NPR’s Philip Reeves reports, causing anger and frustration.”).
\item \textsuperscript{112} See id. (noting the public skepticism toward government energy projects).
\item \textsuperscript{113} See Burki, supra note 23, at 39–40 (predicting Pakistan’s progress in developing alternative energy).
\item \textsuperscript{114} See id. (explaining the need for cooperation from Pakistan’s government to achieve the goal of harnessing alternative energy).
\item \textsuperscript{115} Pakistan Looks to Wind Power, BBC News (Jan. 9, 2002), http://news.bbc.co.uk/2/hi/business/1750827.stm (“Pakistan is developing a wind power energy project, which could help solve some of the country’s electricity supply problems.”) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).
\item \textsuperscript{116} Energy Report Points at Faults in Pakistani Systems, supra note 68.
\item \textsuperscript{117} See BBC News, supra note 115 (“To supply electricity from the grid it is not even sometimes technically feasible, not to talk about economically feasible, to get back the revenues and for those areas definitely the renewable industry can play a part.”).
\item \textsuperscript{118} See id. (discussing the wind power program with the Chinese government).
\end{itemize}
Solar energy is the best and most suitable form of renewable energy for Pakistan.\textsuperscript{119} There is ample potential for generating solar power as two-thirds of Pakistan receives a good amount of sunlight—especially the central and southern parts of the country.\textsuperscript{120} Solar energy would be well suited for Pakistan’s sparsely populated regions: seventy percent of the population is divided among 50,000 villages far from the national grid.\textsuperscript{121} Moreover, over thirty percent of generated power is lost in transmission, more than seven times the loss rate for proper transmission networks.\textsuperscript{122} The lack of excess grid capacity limits the transmission of power from hydroelectric plants in the north to make up for demand shortfalls in the south.\textsuperscript{123} Because connecting these villages to the national grid would be very costly, solar panels would more easily allow for distributed generation, a cost efficient and empowering solution to rural energy problems.\textsuperscript{124}

Another viable renewable energy option is biofuels, which are a mixture of volatile, flammable hydrocarbons derived from plant material or animal waste that is used as fuel.\textsuperscript{125} Pakistan is exploring both the options of bioethanol (from sugar) and cellulose-based ethanol.\textsuperscript{126} Brazil is investing in Pakistan’s biofuels sector with the aim of helping Pakistan

\begin{itemize}
\item \textsuperscript{119} See Nisar Mahmood, Solar, Wind and Geothermal Power Seen as Solutions to Energy Crisis, \textit{The News} (Nov. 28, 2011), http://www.thenews.com.pk/TodaysPrintDetail.aspx?ID=79794&Cat=7 (noting that scholars believe that Pakistan has a potential of generating 2.9 million megawatts electricity from the sun) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).
\item \textsuperscript{120} See \textit{Energy Report Points at Faults in Pakistani Systems}, supra note 68 (noting that, despite this potential, Pakistan’s renewable generation capacity amounted to a paltry 180 MW between 2007 and 2008) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).
\item \textsuperscript{121} See Riaz Haq, Solar Energy for Sunny Pakistan, \textit{Haq’s Musings} (Feb. 27, 2009), http://www.riazhaq.com/2009/02/solar-energy-for-sunny-pakistan.html (stating that the Solar Energy Research Center produced a report indicating solar energy as the most suitable form of renewable energy) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).
\item \textsuperscript{122} See id. (explaining problems with Pakistan’s electric transmission infrastructure).
\item \textsuperscript{123} See id. (“[A] lack of spare high-voltage grid capacity limits the transmission of power from hydroelectric plants in the north to make up for shortfalls in the south.”).
\item \textsuperscript{124} See id. (discussing the potential for solar power to benefit rural populations both economically and socially).
\item \textsuperscript{125} See What are Biofuels?, \textit{Cornell University Green Choices}, http://www.greenchoices.cornell.edu/energy/biofuels/ (last visited Nov. 27, 2013) (defining biofuels) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).
\item \textsuperscript{126} See \textit{Energy Report Points at Faults in Pakistani Systems}, supra note 68 (stating that the existing sugar industry in Pakistan has the potential to produce more than 3,000 MW of electricity through co-generation).
\end{itemize}
through the current energy crisis. It is estimated that manure from livestock could be used to generate upwards of 16.3 million cubic meters of biomes per day.

In addition to the renewable energy sources discussed above, Pakistan also has an unrecognized potential for small-scale hydroelectric generation. Along with solar, wind, and biofuel projects, hydrokinetic energy has a future in Pakistan. Despite success in small communities in other countries, hydrokinetic projects have stalled because of problems connecting to the national grid and difficulties with the large-scale adoption of technology. Like hydrokinetic energy, Pakistan’s wind and solar potential is undetermined. Further empirical analysis will show the strong potential of renewable energy. At this time, however, there is not enough data to quantify the potential energy production from renewable resources. A unifying theme among renewable energy sources is that poor governance systems and legal incentives that facilitate fossil fuels are detrimental to renewable energy development.

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127. See Brazil Ready to Invest in Energy Sector of Pakistan, BUS. RECORDER (Mar. 9, 2011, 8:29 PM), http://www.brecorder.com/pakistan/business-a-economy/6352-brazil-ready-to-invest-in-energy-sector-of-pakistan.html ("Every possible help will be made to facilitate Pakistan to overcome the shortage of sugar... [The Brazilian ambassador to Pakistan Alfredo Leoni] said that Brazil is ready to invest in energy sector which is the need of the hour as Pakistan has hit energy crisis recently.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


129. See Nadia Ahmad, Shoring Up Power in Pakistan, DAWN (June 6, 2013), http://beta.dawn.com/news/1019094/shoring-up-power-in-pakistan ("The use of small scale hydropower, including hydrokinetic energy, which harness power from the movements of waves and tides through underwater turbine, would be one of many potential energy sources to exploit.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

130. See Pandey, supra note 86, at 167–68 ("Although a number of successful projects have been demonstrated in small communities and for connection to the national grid, large scale adoption of the technology has not taken place.").

131. See id. at 168 (stating that Pakistan installed fifty towers of varying heights in the coastal areas of Sindh and Balochistan and in the desert of Balochistan to measure wind velocity).

132. See id. ("The potential for solar energy, although not yet determined, is also thought to be very good throughout the country.").

133. See id. at 167–68 (noting that Pakistan’s hydro and wind power potential has not yet been fully measured).

134. See id. ("However, international experiences indicate that unless equal opportunities are made available to [renewable energy ] as are enjoyed by conventional
Traditional hydroelectricity as a renewable energy resource is problematic because of environmental and social impacts associated with large dams. The World Commission on Dams determined that “large-scale infrastructure projects such as dams can have devastating impacts on the lives and livelihoods of affected communities and ecosystems.” The “absence of adequate assessments and provisions being agreed to address these impacts” aggravate the harmful impacts of dams on communities and ecosystems. Based on past experiences with flooding, and by watching natural and man-made disasters occur in neighboring India and within their own borders, the Pakistanis are justifiably cautious when considering dam projects. Hydroelectric energy, though, is the second largest source of electricity in Pakistan and contributes 33.1% of total power generation in the country. While Pakistan’s hydroelectric generation potential is estimated to be 46,000 MW, only fourteen percent has been exploited. Various hydropower projects are under review as they are cost-effective and serve as a reliable energy option.

Historically dam projects in South Asia have been eyed with suspicion. For example, the construction of the Chandil Dam wreaked havoc in the Chaibbsasa District in the Indian province of Bihar in 1991. The trouble with dam projects in India, as in many LDCs, is that their designers and proponents are indifferent to the fate of the poor and tribal energy (primarily thermal power from oil or coal), the establishment of renewable energy will be very difficult . . . .\(^{135}\)


\(^{136}\) Id. at 199.

\(^{137}\) Id.

\(^{138}\) See id. at 112 (noting the impact of dams on grazing activities in pastoral communities in Pakistan).

\(^{139}\) See Kumar, supra note 65, at 914–21 (stating that the Water and Power Development Authority has control over the major hydroelectric plants, with the Tarbela plant being the largest with a 3,046 MW installed capacity, and that other operational plants include Mangla (1,000 MW), Warsak (240 MW), and Chashma (184 MW)).

\(^{140}\) Id.

\(^{141}\) See Abdul W. Bhatto, Aqeel A. Bazmi & Gholamreza Zahedi, Greener Energy: Issues and Challenges for Pakistan—Hydel Power Perspective, 16 RENEWABLE & SUSTAINABLE ENERGY REV. 2732, 2734 (2012) (“[N]umerous successful and mature projects have proved that, when carefully planned and executed, hydroelectric development can be reliable, cheap, economical and environment friendly . . . .”).

\(^{142}\) See Mukul Sharma, Project: One Night and Now What? in LANDSCAPES AND LIVES: ENVIRONMENTAL DISPATCHES ON RURAL INDIA, 98, 98–99 (2001) (discussing the dramatic cost overruns and villages displaced as a result of the project).
populations. Hydroelectricity is still seen as an attractive option because it provides water for irrigation and agriculture, storage capacity, flood control, and power generation. Pakistan is also endowed with considerable water flow in the northern region, which has a comparatively sparse population. Hydroelectric power is underutilized in Pakistan because of widespread public opposition to the construction of hydroelectric dams. This public opposition and the lack of political consensus have also deterred water distribution efforts.

The U.S. Congress allocated $280 million in new funding to support work on the Mangla Dam and Kurram Tangi Dam projects in Pakistan. The World Bank initially funded this construction project, which was designed and supervised by the London-based firm of Binnie & Partners, but built by the Mangla Dam Contractors, a consortium of U.S. construction management firms that employed Pakistanis, Americans, British, Canadians, Germans, and Irish. This project was a testament to international cooperation, but has since fallen by the wayside because of

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143. See id. at 99 (noting the disconnect between those who advocated for the dam and those who were harmed by it).
144. See Kumar, supra note 65, at 912–24 (noting the added benefits of hydroelectric dams).
145. See id. (noting the abundance of water in Pakistan’s sparsely populated north).
internal politicking, which is regrettably a trend for development projects in Pakistan.

Another significant hydroelectric project, which illustrates Islamabad’s former prowess in construction and design, is the artificial reservoir of Rawal Lake.\textsuperscript{150} The Rawal Dam helps fulfill the water needs for the cities of Rawalpindi and Islamabad, but the life of the dam expired in 2012.\textsuperscript{151} These dams should be decommissioned and the funds should instead be used to develop hydrokinetic energy. The expiring Rawal Dam shows that the days of large-scale dams are numbered.\textsuperscript{152} To continue funding large dam projects, which have been criticized by the World Commission on Dams, is reckless.\textsuperscript{153}

\textbf{III. Impediments to Implementation and Investment}

This Part explores the barriers to investment and deployment of sustainable energy sources, specifically with respect to hydrokinetic energy projects in Pakistan. The first hurdle to harnessing renewable energy in Pakistan is overcoming the mindset that it is not possible to advance technologically in the innovation and policy arenas. Unemployment, inflation, and business closures, invariably caused by energy shortages, lead to lawlessness and anarchy.\textsuperscript{154} A healthy dose of realism is essential to reset Pakistan’s priorities with respect to electricity demands.\textsuperscript{155} Businesses require a continuous supply of electricity to operate and complete orders

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150. \textit{See Kalbe Ali, Rawal Dam Life Expires This Year, DAWN} (Aug. 26, 2012), http://dawn.com/2012/08/26/rawal-dam-life-expires-this-year/ (noting that the dam’s artificial reservoir covers 8.8 square kilometers near Islamabad) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

151. \textit{See id. (“The proposed life of small dams is 50 years, which ends in 2012.”}).

152. \textit{See id. (noting the expiration of the Rawal Dam)}. 

153. \textit{See World Commission on Dams, in DAMS AND DEVELOPMENT: A NEW FRAMEWORK FOR DECISION-MAKING 35, 75 (2000) (“In the past, our unrestrained reliance upon large dam technology weighed down upon us . . . .”) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).


155. \textit{See id. (noting that the government’s willingness to give exemptions to “VIP entities” exacerbates the nation’s energy problems).
within an established timeframe.156 Energy shortages impede the Pakistani export industry from competing in international markets.157

A. Intercorporate Debt

A major deterrent of reliable energy generation and distribution in Pakistan is circular debt, otherwise known as intercorporate debt.158 Intercorporate debt in Pakistan is estimated at an astonishing $880 million.159 When public and private customers fail to pay their electricity bills, utilities cannot afford to pay fuel and operation costs, causing cascading defaults.160 To eliminate or reduce this debt, the government should encourage initiatives for consumers to pay their bills in a timely fashion.161 The government pays off a portion of this debt when power producers threaten to sue for loan defaults, but does not address problems that cause the debt.162 Government officials say the energy crisis could be overcome by ending circular debt.163 The Pakistan People’s Party (PPP)

156. See id. (“[T]he industry needs continuous supply of electricity to keep the units operational and to complete the export orders well within the given timeframe . . . .”).
157. See id. (“Pakistan had already lost a number of global markets and the new power cuts would further aggravate the situation . . . .”).
158. See Elizabeth Mills, Pakistan’s Energy Crisis 6 (2012), available at http://www.usip.org/sites/default/files/resources/PW79_Pakistans_Energy_Crisis.pdf (stating how circular debt is one of the largest issues facing Pakistan’s energy policy, and detailing the specific struggles energy companies have encountered as a result) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).
159. See Pakistan’s Energy Crisis, supra note 29 (“This so-called ‘circular debt,’ currently about $880m, is an ongoing problem.”).
160. See Chris Trimble, Nobuo Yoshida & Mohammad Saqib, Rethinking Electricity Tariffs and Subsidies in Pakistan, 3 (2011), available at http://www.indiaenvironmentportal.org.in/files/file/Rethinking%20Electricity%20Tariffs%20and%20Subsidies.pdf (finding that distribution companies cannot satisfy their power purchase cost obligations to power generation companies and that the power generation companies fail to pay fuel suppliers, who default on payments to refineries, gas producers, and international fuel suppliers).
162. See Pakistan’s Energy Crisis, supra note 29 (noting that poor recovery of dues, electricity theft, transmission losses, reliance on imported oil and politically sensitive subsidies perpetuate intercorporate debt and utility revenue shortfalls).
maintains that it gave 1.2 trillion rupees worth of subsidies to the power sector, supplemented the national grid by 3,500 MW, and initiated short-, medium-, and long-term strategic plans to resolve the energy crisis when they gained control of the government in March of 2008. Critics question these assertions noting that, nearly five years later, Pakistan continues to undergo unsustainable load shedding everywhere from rural areas to urban centers like Lahore.

B. Corruption

Corruption is another serious impediment to implementation of Pakistan’s renewable energy standards. Pakistan can overcome the technology gap with the appropriate funding and issues related to investment and regulation can be managed, but overcoming corruption is crucial. As opposition leaders accused the Pakistani government of indulging in corruption, Transparency International’s (TI) 2011 report on global corruption suggested that the Pakistani government may not be overly corrupt. Pakistan’s rank on the 2011 Index stood at 134, with forty-two countries ranking worse. In 2012, Pakistan’s rank slipped to
139, and government officials lambasted the methodology in the report and deemed the TI report baseless. A government spokesperson noted that at the parliamentary level, the Public Accounts Committee (PAC) was actively working to monitor government expenditures for the first time in the country’s history, and that it had recovered 180 billion rupees. At the federal level, the National Accountability Bureau and Federal Investigation Agency were coordinating efforts as the Anti-Corruption Departments were performing at the provincial levels, all of which recovered embezzled funds and took action against those responsible for embezzling government funds. Corruption in Pakistan poses a serious impediment to the successful development of sustainable energy projects.

C. Lack of Investment Regimes

Countries considering the shift to renewables often do not have adequate incentives. The majority of renewable energy technologies have yet to reach the point of market maturity and will require substantial continued innovation and research. Moreover, without government incentives, the switch to renewable energy appears daunting—a match of David versus the Goliath of fossil fuels. Ways to overcome investment regime hurdles through education will be discussed further in Part III.


171. See id. (“Kaira said at parliamentary level, Public Accounts Committee (PAC) was actively working for the first time in the country’s history. He said the PAC had recovered Rs180 billion . . . .”).

172. See id. (explaining the recent success of Public Accounts Committee).

173. See generally CORRUPTION IN SOUTH ASIA; INDIA, PAKISTAN AND SRI LANKA (K. M. de Silva et al. eds., 2002) (discussing corruption in Pakistan and other nations in South Asia).

174. See Hannah Wiseman, Expanding Regional Renewable Governance, 35 HARV. ENVT. L. REV. 477, 508–09 (2011) (citing the lack of accountability to individual regulators, conflicting solutions, and a preference for the status quo as reasons for the paucity of incentives).

175. See Felix Mormann, Requirements for a Renewables Revolution, 38 ECOLOGY L.Q. 903, 914–15 (2011) (“Most renewable energy technologies have not yet reached the stage of market maturity. The diversified portfolio of renewables favored by environmentalists and advocates of energy security will not be available without substantial research and innovation.”).

176. See id. at 921 (“Even where the same permit requirements apply to renewable energy plants and fossil fuel plants, the burden of multiple and often duplicative administrative procedures tends to weigh much heavier on renewable energy plants.”).
D. Overreliance on Fossil Fuels and Imported Energy

The Pakistani Sustainable Development Policy Institute concluded that the increased dependency on fossil fuel is the fundamental cause of the present energy crisis and the greatest hindrance towards financial sustainability. The most sustainable and best solution to the energy crisis is low cost and sustainable hydroelectricity. Because Pakistan is planning to import hydroelectricity from Tajikistan’s Rogun Dam, it should consider developing its own hydroelectric industry. The National Electricity Power Regulatory Authority (NEPRA) and water and power ministry never followed through with the plans to further develop Pakistani hydropower and transmit it to the Karachi Electricity Supply Company power system, which was envisioned during the construction phases of the Tarbela Dam in the 1960s.

E. Considerations for Marine Biodiversity and Environmental Issues

Industry manufacturers of hydrokinetic technology assert that there is a minimal impact on biological diversity from hydrokinetic energy because the turbine spins at the same speed or less than the natural water flow and in the same direction of the water flow. They claim to have determined that “little if any material adverse impact to marine life and expect zero impact on water quality as pertains to temperature, dissolved oxygen, or turbidity.” It is accepted, however, that definitive conclusions as to environmental impacts of these projects would require more detailed

177. See Mahmood, supra note 119 (discussing the Sustainable Development Policy Institute’s report).
178. See id. ("Solar and hydel power [are] also the cheapest sources of energy.").
179. See Khalid Mustafa, Import of Electricity to Weaken Pakistan’s Hydropower Potential, THE NEWS (July 16, 2013), http://www.thenews.com.pk/Todays-News-3-190061-Import-of-electricity-to-weaken-Pakistan’s-hydropower-potential (arguing that Pakistan ought to build two dams of its own instead of importing power from Tajikistan, which would weaken the country) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
180. See Energy Report Points at Faults in Pakistani Systems, supra note 68 (noting the original plan to transfer power to the Karachi Electricity Supply Company).
181. See Hydrokinetic Power Barges, ALTERNATIVE ENERGY (Aug. 18, 2009), http://www.alternative-energy-news.info/hydrokinetic-power-barges/ ("[T]hese power systems can be placed into sources of flowing water with minimal infrastructure or environmental impacts.") (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
182. Id.
Even though there have not been many environmental impact studies of hydrokinetic technology, the U.S. Department of Energy has recognized that the environmental impact of new technologies could be significant and that it requires further study. Hydrokinetic or ocean energy technologies extract energy from the water, which lowers wave height and current velocity; potentially altering sediment transport and the wave climate of nearby shorelines. The environmental impacts of small-scale hydropower projects are a concern, but the environmental impact would not be as severe as the known environmental impacts of large hydropower projects.

Hydrokinetic technologies derive electricity from a wave energy converter (WEC) device, a subsea pod, and subsea power transmission cables. In a WEC design, the enclosed metallic structure of the WEC device and subsea pod designs could potentially serve as Faraday cages, shielding any electric field by an enclosure of conducting material. The impact of electric and magnetic fields generated by hydrokinetic energy technologies is a concern. The WEC devices and subsea pod designs could potentially serve as Faraday cages, shielding any electric field by an enclosure of conducting material.

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184. See generally U.S. DEP’T OF ENERGY, REPORT TO CONGRESS: POTENTIAL ENVIRONMENTAL EFFECTS OF MARINE AND HYDROKINETIC ENERGY TECHNOLOGIES i (2008), available at www1.eere.energy.gov/water/pdfs/doe_eisa_633b.pdf (“[T]his report describes nine types of environmental effects that may occur and describes how monitoring and adaptive management principles might be employed to evaluate and mitigate those effects. There is no conclusive evidence that marine and hydrokinetic technologies will actually cause significant environmental impacts.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

185. See id. at 17 (“Operation of hydrokinetic or ocean energy technologies will extract energy from the water, which will reduce the height of waves or the velocity of currents in the local area. This loss of wave/current energy could, in turn, alter sediment transport and the wave climate of nearby shorelines.”).

186. See generally S.A. Abbasi & Naseema Abbasi, The Likely Adverse Environmental Impacts of Renewable Energy Sources, 65 APPLIED ENERGY 121 (2000), available at http://www.aseanenvironment.info/Abstract/41013178.pdf (“[R]enewable energy sources are not the panacea they are popularly believed to be; indeed in some cases their adverse environmental impacts can be as strongly negative as the impacts of conventional energy sources.”).


188. See id. at 2 (describing the technical aspects of wave energy converters and their potential electromagnetic fields).
could have a serious impact on freshwater and marine biodiversity. While the U.S. Department of Energy asserts that there is no conclusive evidence of significant environmental impact from hydrokinetic technologies, impacts to tidal flow, current velocity, and the generation of electric and magnetic fields could have incremental impacts with serious long-term impacts on aquatic species.

When evaluating environmental impacts from hydrokinetic energy sites, policy makers must consider the affected river habitat, the effect of water loss through evaporation, development along the river, and the accessibility of the site. Issues arising from hydrokinetic technologies are similar to those posed by small dams, which officials have already started to examine in Pakistan. With smaller dams, water storage is an issue that could lead to the construction of more low-head systems than anticipated. Additionally, greenhouse gas (GHG) emissions are at least as likely from shallow reservoirs as from large reservoirs because of the potential for methane emissions.

When the Massachusetts Renewable Energy Commission was considering hydrokinetic energy, it realized that it should avoid conducting redundant studies by using information available from conventional hydropower research to reduce the cost of informed agency decision making. Despite a friendly policy environment and modest investment in

189. See id. at 12–13 (summarizing the impacts of electromagnetic fields on aquatic species including effects on embryo development, geomagnetic navigation systems resulting in disorientation, and impaired food location).
190. See U.S. DEP’T OF ENERGY, REPORT TO CONGRESS, supra note 184, at i (noting the lack of known environmental harms and highlighting the need for further information and research to fully assess the environmental impacts).
191. See generally id. at 11–46 (describing potential environmental impacts of hydrokinetic technologies and suggesting mitigation measures for future projects).
192. See Abbasi, supra note 186, § 6.2 (asserting that the problems that result from a dispersed approach to energy generation are numerous and just as serious, per kilowatt generated, as those from more centralized hydropower generation).
193. See generally Naeem Ejaz et al., Environmental Impacts of Small Dams on Agriculture and Ground Water Development: A Case Study of Khanpur Dam, Pakistan, 10 PAK. J. ENGINEERING & APPLIED SCI. 45, 45–50 (2012) (summarizing a case study of the environmental impacts of small dams on crop production and water loss in areas of Pakistan).
194. See Abbasi, supra note 186, § 6.2 (“The problems of siltation and eutrofication are likely to be more serious with smaller and shallower bodies of water created by mini and micro projects.”).
195. See id. (comparing shallow reservoirs for hydropower to paddy fields, known contributors of methane and other GHG emissions).
research and development, the permitting of tidal devices remains a considerable barrier to hydrokinetic power advancement in the United States.\textsuperscript{197} In LDCs, the situation is much worse for research and development.\textsuperscript{198}

One of the alternate ways to measure environmental impacts is through the use of a strategic environmental assessment (SEA), which is seen as a promising approach for determining the environmental effects of policy, plans and programs.\textsuperscript{199} Used in developing and transitional countries, SEAs promote sustainable development by fostering openness and transparency in the decision-making process, and represent a more proactive approach to environmental assessments.\textsuperscript{200}

\textit{IV. Creating an Attractive Investment Regime}

Renewables cannot “rise above their paltry current market share” without changes in policy.\textsuperscript{201} Policies must be implemented in order to attain the goals of reduced environmental damage and sustainability.\textsuperscript{202} Policy changes are difficult to conceptualize by themselves.\textsuperscript{203} It is easier to


\textsuperscript{198} See United Nations \textit{Conference on Trade and Dev.}, \textit{Globalization of R&D and Developing Countries}, \textit{Proceedings of the Expert Meeting} 3 (2005), \textit{available at} http://unctad.org/en/Docs/iteia20056_en.pdf (“[M]any developing countries have fared moderately in growth and welfare creation because their R&D efforts have remained underfund and delinked from the private sector.”).


\textsuperscript{200} See \textit{id.} (highlighting the use of SEA to review projects with significant known environmental impacts, such as macroeconomic policies, investment, trade and development programs, energy, transport and other sector plans).


\textsuperscript{202} See \textit{id.} at 11 (noting that these goals will remain unobtainable without direct policy intervention).

\textsuperscript{203} See \textit{id.} at 59 (commenting that although renewable energy costs more than fossil fuel based energy, the environmental benefits of renewable energy makes positive policy changes worthwhile for their long-term benefits).
look at policy changes in a broader development context. Policy changes must account for globalization and the growth of renewable energy in the global marketplace. In order for attractive investment regimes to exist for hydrokinetic energy development, it is important to consider the causes of globalization. Pressure on companies by both consumers and competitors has forced innovation and upgrades to the quality of existing goods and services. High costs for research and development are forcing companies to downgrade the scope of their value-added activities and to seek out wider markets to create strategic alliances and networks to combine their competencies. In the energy sector, the impact of globalization and a wider international market will open avenues for competition and collaboration.

A. Education to Transition to Renewables

Pakistan’s greatest asset is its youth, the next generation of visionaries who can hope and work for a better Pakistan. The brightest young minds are located in university campuses across the country, including the Lahore University of Management Sciences, the University of Punjab, Aga Khan University, University of Peshawar, University of Engineering and Technology, Quaid-i-Azam University, the National University of Sciences and Technology, and others. Scientists and engineers can develop the technology for hydrokinetic energy, but the lack of ....

204. See generally id. (discussing the natural tension between policy intervention and developing markets).


207. See id. at 15 (analyzing the effects of globalization on markets in both developed and developing nations).

208. See id. at 40 (noting that by working together, firms can exploit their own competencies both effectively and speedily in an effort to adapt to the globalizing economy).

209. See FRANKFURT SCHOOL-UNEP CENTRE, supra note 205, at 5 (explaining that a globalizing energy sector opens “a world of opportunity for billions of people” and can lead to massive investment opportunities, stimulating the global economy, and creating jobs).

of outside funding and the low level of research and development in the energy sector will contribute to the risk of slow renewable energy development. The level of innovation required for a timely transition to renewable sources of energy is also costly.

The Electric Power Research Institute estimates that wave energy could create ten percent of the United States’ energy with the significant wave resources along U.S. coasts. Harvard University, through support from a private foundation, analyzed policy measures for energy technology innovation policy, called the Energy Research, Development, Demonstration, & Deployment (ERD3) Policy Project. Similar research has not been completed in Pakistan. The federal government of Pakistan or a private foundation in collaboration with a research university must fund a study to prepare a comprehensive set of policy recommendations for development and deployment of low-carbon energy technologies.

B. Externalities, Tax Credits, Tariffs, and Tender Schemes

The International Energy Agency’s report, Taxing Energy: Why and How, indicates that Organisation for Economic Co-operation and Development (OECD) countries are concerned with “security of energy supply” in the form of “self-sufficiency, wartime capability, minimization of adjustment lags, reduced import dependency (especially oil dependency),

211. See Felix Mormann, Requirements for a Renewables Revolution, 38 ECOLOGY L.Q. 903, 915 (2011) (showing that spillover effects, general market failures, and the dominance of the prevailing energy regime contribute to the energy sector’s low level of research and development investment in renewables and discourages industry research and development efforts).

212. See id. at 943 (arguing that government funding for research, development, and demonstration must be increased to a more significant level to meet the recommendations of various governmental and intergovernmental agencies).


and price stability. The International Energy Agency’s report considers the externalities of existing energy systems. LDCs can also learn from the OECD model for energy taxing because OECD countries are more attuned to energy concerns and have established tax and investment regimes to address issues of energy security. Tax credits incentivize investment in renewable energy technology. Feed-in tariffs offer renewable energy generators subsidized rates for power sold into the grid. Tender schemes allow regulators to solicit bids from the private sector for contracts, which set the amount of energy to be produced, and its source. Thus, there are a wide variety of ways to incentivize investment in renewable energy through tax schemes.

C. Infrastructure Improvements

Renewable energy can be harvested and used locally, allowing consumers to function independently of a conventional energy grid. Renewable energy lends itself to a system of distributed generation which does not rely heavily on centralized power plants or fuel supply chains normally associated with fossil fuels. This is a great benefit for Pakistan, where low and disperse demand in rural areas make the cost of extending high-voltage transmission lines uneconomical.

216. See id. (explaining how new forms of energy generation internalize current energy generation externalities such cost of pollution abatement and inefficiencies of existing technologies).
217. See id. at 138 (describing efforts of OECD nations to reduce oil consumption and limit vulnerability in response to the rise of oil prices in the 1970s).
218. See Mormann, supra note 211, at 940 (discussing investments in renewable power plants through investment tax credits or tax credits for the production of electricity from renewables as possible ways to incentivize investments in renewable energy).
219. See id. at 951 (cautioning that feed-in tariff schemes, that have proven successful drivers of renewables deployment in Europe, may face regulatory hurdles in other countries, such as the United States).
220. See id. at 940 (adding that tender schemes, as with feed-in tariffs, require relatively complex regulatory frameworks).
222. See id. ("[R]eliance on extensive national transmission grid systems and support from large central station power plants becomes less necessary, and ultimately dispensable.").
Another issue with the wide-spread adoption of renewable energy technologies is that they are naturally decentralized and Pakistan’s current electric power system was designed as a centralized system. Newer forms of energy generation, like hydrokinetic energy, are at odds with the conventional centralized transmission system. Centralized grid extensions can no longer be expected to reach all remaining communities unconnected to electricity grids because long distances and low demand make this approach cost prohibitive for rural areas. Village level mini-grids in the form of wind turbines, small-scale hydropower or diesel generators “may provide a more cost effective alternative, especially for compact, high-density settlements.”

Conventional energy producers will not finance its competition, so only when investment decisions for renewable energy are independent of the conventional energy business will there be serious economic competition from renewable energy. Decentralizing energy generation will create the possibility of decentralizing other aspects of the economy and limit the more harmful effects in the developing globalization of the economy. Greater reliance on either cogeneration or dispersed renewable energy sources will decentralize the sources of power, improving electrical transmission and network efficiency.

http://www.cepe.ethz.ch/education/termpapers/Yazdanie.pdf (illustrating the steep costs associated with even minor energy line construction projects in rural areas) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

224. See id. (recognizing that the infrastructure requirements of a decentralized means of energy production vary from those of centralized energy systems, which require existing system to be reconstituted for renewable energy projects).

225. See Blakeway, supra note 221, at 222 (arguing that renewable energy sources do not require traditional centralized systems, but function better through a distributed system within local communities).


227. See id. at 85 (adding the additional benefits of a decentralized system of more user accountability, easily assignable repair responsibility, proximity of decision-making to the users, and reliability as a backup to a centralized power grid).

228. See Blakeway, supra note 221, at 223 (citing further the “tremendous political . . . influence” that conventional energy has compared to renewable energy).

229. See id. at 224 (suggesting the constructive role that international organizations may play in this decentralization).

230. See Steven Ferrey, Exit Strategy: State Legal Discretion to Environmentally Sculpt the Deregulating Electric Environment, 26 HARV. ENVTL. L. REV. 109, 116 (2002) (arguing that centralized power sources are unreliable while smaller power sources that are deployed
D. Real Property and IP Regulation and Enforcement Concerns

Land is often integral to renewable energy production, but property rights and the division of ownership over a parcel may prevent its efficient use.231 Multiple individuals or institutions may claim different property rights to a single parcel, and renewable energy projects routinely stretch over multiple parcels of land.232 Overlapping local groups may also have a stake in negotiations, further complicating the governance of land rights in a region and stifling the development of such projects.233

Traditional government research subsidies have generated relatively few advances in combating climate change, and it is particularly difficult to fuel substantial policy and technological innovation through grants, controls, and regulatory measures.234 Patent awards have value,235 but provide too little incentives for the scale of innovation needed.236 Innovation prizes may provide better incentives for addressing the climate policy challenge because they can encourage the dramatic technological breakthroughs necessary to enable reductions in greenhouse gases.237

Renewable entrepreneurs should have rights to their intellectual property in the form of licensing.238 To reach this goal, Pakistan should establish technology transfer offices at universities and other research in modular form are close to the user of the electricity and this improves reliability and efficiency).

231. See Wiseman, supra note 174, at 482 (recognizing the limitations of use by a renewable energy developer without resolving these competing ownership and leasing hurdles).
232. See id. (noting the multiple property rights claims that may be made on a single parcel of land, and the challenge that this poses to renewable energy development).
233. See id. at 499–506 (noting the complexities that can create an “anticommons” that limits the ability to efficiently develop a renewable parcel).
234. See generally Jonathan H. Adler, Eyes on A Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization, 35 HARV. ENVTL. L. REV. 1, 3–4 (2011) (discussing the lack of innovation that results from both traditional government research subsidies and regulatory-driven technology advances).
235. See id. at 13 (showing how the patent system encourages innovation from unforeseen sources, drawing from a wider pool of ideas and potential innovators).
236. See id. at 42 (concluding that there are currently no economic incentives to develop technologies to achieve advances in the climate change arena, specifically there are no economic incentives focused towards reducing greenhouse gas emissions or removing existing carbon from the atmosphere).
237. See id. at 4 (“Prizes are particularly well-suited for the climate policy challenge because the threat of global warming cannot be reduced by any meaningful degree without dramatic technological breakthroughs that enable reductions in atmospheric concentrations of GHGs, and traditional innovation tools are inadequate.”).
238. See Mormann, supra note 211, at 942 (highlighting the idea of a “socially optimal” level of intellectual property protection to incentivize renewable energy entrepreneurs).
institutions to cooperate with private industry to narrow the gap between ideas and commercial execution.\textsuperscript{239}

\textbf{E. National Level Policy Strategy}

The combining of Pakistan’s Water and Power Development Authority (WAPDA) and the Petroleum and Natural Resources Ministry (PNRM) could create a single energy ministry to oversee and regulate national level power issues.\textsuperscript{240} The WAPDA was established in 1958 in an era when nearly all of Pakistan’s electricity was generated by dams.\textsuperscript{241} An integrated approach for energy generation would combine the water and power ministry with the petroleum and natural resources ministry to improve efficiency.\textsuperscript{242} Doing away with these competing bureaucracies would lead to greater management and innovation.\textsuperscript{243}

A single energy ministry is more aptly suited to tackle issues of energy efficiency, especially as they relate to line losses. Line losses in Pakistan stand at around nineteen percent, considerably higher than in other countries such as Israel and Sri Lanka.\textsuperscript{244} Iraq and Israel have managed to lower their line losses, and Argentina has cut down its line losses from twenty-four percent in 1992 to eleven percent in 2007.\textsuperscript{245}

Another strategy to consider is the creation of a national renewable energy portfolio. A mandatory renewable portfolio standard (RPS) in concert with renewable energy certificates (REC) allows power producers

\begin{itemize}
  \item \textsuperscript{239} See id. (discussing the benefits of creating technology transfer offices).
  \item \textsuperscript{240} See Farooq Tirmizi, Comment: Time to Create an ‘Energy Ministry,’ THE EXPRESS TRIBUNE (Aug. 24, 2012), http://tribune.com.pk/story/425448/comment-time-to-create-an-energy-ministry/ (calling for an integrated approach for the management of all energy systems within the nation’s competing bureaucracies and to oversee the nation’s energy infrastructure) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
  \item \textsuperscript{241} See id. (noting the formation and reach of the WAPDA).
  \item \textsuperscript{242} See id. (showing that considering all energy sources allows for broader management strategies and takes into account both cost and capacity).
  \item \textsuperscript{243} See id. (identifying the United States Department of Energy as an example of a nationally unified energy regulator for the entire power grid of the country).
  \item \textsuperscript{244} See Electric Power Transmission and Distribution Losses (% of Output), The WORLD BANK, http://data.worldbank.org/indicator/EG.ELC.LOSS.ZS (last visited Sept. 6, 2013) (indicating an average of three percent in Israel and 14.6% in Sri Lanka for the same year) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT). Although Pakistan has experienced slight declines in line losses since 2008, the average between 2008 and 2010 stood at nineteen percent. Id.
  \item \textsuperscript{245} See id. (collecting global data on electric transmission losses, including “line losses,” to show trends and comparisons). While Iraq has shown line losses nearing fifty percent, it has shown a downward trend from forty-nine percent to thirty-seven percent in 2010. Id.
\end{itemize}
to harness renewables to sell their electricity and the corresponding green certificates and earn more than the market rate for electricity alone. A national RPS has been debated in the United States. This same strategy can be implemented in Pakistan. Pakistan’s Alternative Energy Development Board could work with existing micro-finance institutions to support sustainable energy projects.

NEPRA (National Electric Power Regulatory Authority) was established under the NEPRA Act of 1997 to be an autonomous regulatory agency that ensured the “transparent and judicious economic regulation in the energy sector.” NEPRA also sought to ensure fair competition and protections for the consumer, producer, and distributor. However, the NEPRA Act of 1997 needs to be amended to improve the performance measures of distribution companies. Maintenance of all distribution transformers and pole-mounted substations is inadequate. Energy companies in Pakistan need to increase load monitoring, and undertake a host of proactive reforms in order to improve the cost and reliability of the nation’s power supply.


248. See Pandey, supra note 86, at 181–82 (providing examples of micro-finance structures allowing rural consumers to purchase solar home systems in Bangladesh and Sri Lanka).


251. See id. (establishing regulations for the generation, transmission, and distribution of electric power).


253. See id. (explaining how the transformers are overloaded and burn out at the rate of twelve percent annually).

254. See id. (discussing reforms that would improve the energy sector in Pakistan).
V. The Case for Hydrokinetic Investment in Pakistan

This Part will provide an overview of technology behind hydrokinetic energy and regulatory mechanisms for its innovation and deployment. As countries like Canada, India, and the United Kingdom are already harvesting wave energy, examinations of their regulatory and policy schemes will be used to analyze how hydrokinetic energy can be deployed in LDCs. First generation hydropower is extremely controversial because of its environmental effects, but wind, solar, and hydropower contribute a minimal amount of CO\textsubscript{2} to the atmosphere and are not directly linked to climate change. Like other renewable energy forms, hydrokinetic technology is moving beyond the research and development stage. Renewable energy sources must be competitive to ultimately succeed in the marketplace. The ideal business model for energy development would not require tax incentives, regulatory control, or legal safeguards, but the deployment of hydrokinetic technology in Pakistan would require subsidies to kick-start the business.

It is a myth that renewables require higher subsidies than fossil fuels, which are also highly subsidized. Development of renewable energy sources must be competitive to ultimately succeed in the marketplace. The ideal business model for energy development would not require tax incentives, regulatory control, or legal safeguards, but the deployment of hydrokinetic technology in Pakistan would require subsidies to kick-start the business.

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256. See Komor, supra note 201, at 6 (explaining how hydropower-fueled facilities produce no direct emission—such as oxides, carbon monoxide, sulfur oxides, or particulates—and therefore do not contribute to local or regional air quality problems)


258. See Komor, supra note 201, at 12 (noting that “markets create a complex set of forces that help ensure a technology meets the needs of users” and that market forces “cannot be duplicated by policy”).

259. See id. at 11–12 (explaining that subsidies are already used for fossil fuels and the implementation of renewable energy would only require a “policy change, rather than new policy intervention”).

energy without government subsidies is unrealistic and bound to fail.\textsuperscript{261} The
impetus to slow down rates of climate change and decrease environmental
degradation caused by fossil fuel use would provide ample support for
arguments in favor of economic incentives to develop this renewable
energy.\textsuperscript{262} While accelerated production of domestic natural gas and coal
and importation of foreign petroleum can provide short- and medium-term
solutions to Pakistan’s energy crisis, sustainable energy production is a
long-term solution for the country’s continued growth.\textsuperscript{263}

Studies indicate that small-scale hydropower, once fully developed,
could increase present rates of hydropower generation by up to 200% in the
United States.\textsuperscript{264} Similar water sources exist in Pakistan. Primary water
sources include rainfall, glaciers, rivers, surface water, and groundwater.\textsuperscript{265}
Rainfall in Pakistan varies in magnitude, timing, and geographic
distribution, with almost two-thirds of the rainfall occurring during the
summer.\textsuperscript{266} Even though rainfall is relatively low, heavy rainfall periods
coincide with high summer temperatures,\textsuperscript{267} which would allow
hydrokinetic energy to be used to counter energy shortfalls at those
times.\textsuperscript{268}
The Indus River irrigates the Indus Basin through its major tributaries, which flow through valleys parallel to the mountains of the High Himalayas and into the country’s plains, eventually leading to the tidal delta near the Arabian Sea. The Indus River System consists of the Indus River, Kabul River, Jhelum River, Chenab River, Ravi River, Setluj River, and Beas River. Aside from the Indus River, the fast-flowing Kabul and Swat Rivers, irrigation canals in the Punjab and Sindh provinces, and tidal currents in the Arabian Sea each provide strong potential for hydrokinetic electricity. A more remarkable potential exists in Pakistan’s glacier-fed mountain streams, which are normally difficult to access and lack the traditional power grid association. These mountain streams hold 16,000 MW of potential electricity. In Pakistan, as elsewhere, future water needs surpass the total potential energy supply, so the need to reduce the water losses can be accomplished through improved irrigation efficiency, construction of water reservoirs, and the adoption of artificial ground water recharge techniques to integrate the rain and excess flood water into depleted aquifers.

Relations between India and Pakistan impact the development of hydrokinetic energy resources because of access to the Indus River. This tension between the two neighboring nations further illustrates the need for Pakistan to seek alternate forms of energy sources. To achieve successful


271. See id. (discussing the alternative water sources that Pakistan has to offer).

272. See id. (noting the generative potential for glacial mountain streams in Pakistan, and noting the unique benefits of smaller mini-hydel projects).


274. See Sufi et al., supra note 269, at 42. (explaining water loss abatement techniques).

275. See Mitchell, supra note 274, at 22 (describing the history between India and Pakistan and the conflict over the Indus River Basin).

276. See Aziz Nayani, Pakistan’s New Big Threat Isn’t Terrorism—It’s Water, THE ATLANTIC (July 19, 2013),
agriculture, public health, and economic development, access to river water is crucial.\textsuperscript{278} The Indus Water Treaty of 1960 divided six major river systems between the two nations.\textsuperscript{279} However, allegations of India diverting water upstream fuel tensions between the countries because half of Pakistan’s population is involved in agriculture and more than ninety percent of the country is dependent on water from the Indus river.\textsuperscript{280} With India also suffering from energy shortages,\textsuperscript{281} hydroelectricity ranks high on India’s list of priorities.\textsuperscript{282} The long-standing water dispute between Pakistan and India can be resolved amicably through the Indus Water Treaty once India, the holder of the upper riparian rights, recognizes Pakistan’s water crisis.\textsuperscript{283}

Given such high stakes, there is a high potential for water-based conflict in the future if water becomes scarce.\textsuperscript{284} As recently as April 2012, officials in Pakistan and India expressed a willingness to negotiate on

\textsuperscript{278} See James Kraska, \textit{Sustainable Development Is Security: The Role of Transboundary River Agreements as a Confidence Building Measure (CBM) in South Asia}, 28 YALE J. INT’. L. 465, 481 (2003) ("International drainage basins link riparian states into a common and interdependent freshwater system that connects the agriculture, industry, energy, and transportation sectors into an integrated regional unit.").

\textsuperscript{279} See Indus Waters Treaty, India-Pak., Sept. 19, 1960, 419 U.N.T.S. 125 (giving Pakistan access to the Indus, Jhelum and Chenab rivers while India received access to the Sutlej, the Beas and Ravi rivers).


\textsuperscript{281} See Sam Tranum, \textit{India-Pakistan Energy Cooperation Could Get Boost Under Sharif}, WORLD POL. REV. (June 25, 2013), http://www.worldpoliticsreview.com/articles/13049/india-pakistan-energy-cooperation-could-get-boost-under-sharif (explaining that, despite required power outages, India’s energy situation is better off than Pakistan) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

\textsuperscript{282} See Hashim, supra note 280 (concluding that India will focus on hydroelectricity because of energy shortages).

\textsuperscript{283} See Shoaib-ur-Rehman Siddiqui, \textit{IWT Key to Resolve Pak-India Water Issue}, BUS. RECORDER (Nov. 21, 2012), http://www.brecorder.com/pakistan/general-news/91794.html (explaining how the Indus River Treaty solves the water dispute but it is up to India to abide by the treaty conditions) (on file with the \textit{WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT}).

\textsuperscript{284} See Hashim, supra note 280 ("Populations will continue to grow. There will be more pressure on supply. Factor in climate change and faster glacial melt . . . . That means much more will be at stake. So you could have a perfect storm which conceivably could be some sort of trigger.").
energy related issues; however, Pakistani officials are hesitant to import Indian oil. Yet talks to establish an electricity transmission line to carry power between Amritsar and Lahore are ongoing. South Asia lags behind other regions in the world in energy trade and regional integration. In South Asia, deployment of sustainable energy is less a matter of technology and more about easing regional tensions between Pakistan and India. As a result of the nations’ contentious history, it is difficult to foresee any future agreements. The disparity between the economies of Pakistan and India is related, in part, to energy infrastructure and policy. While India has forged ahead with renewable energy, corruption, bureaucracy, and poor energy policy have soured Pakistan’s attempt at entering the renewable energy revolution.

Pakistan’s Water and Power Minister assured the Prime Minister Raja Pervez Ashraf that all necessary measures were being pursued for optimal energy generation to reduce the unmet demand. Additionally, the Prime Minister recommended that hydropower projects be

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286. See id. (noting concerns about an overreliance on oil from India).

287. See Vivek Katju, Jumping Into a Power Deal with Pakistan is No Guarantee of Improved Relations, DAILY MAIL ONLINE INDIA (June 18, 2013), http://www.dailymail.co.uk/indiahome/article-2344050/Jumping-power-deal-Pakistan-guarantee-improved-relations.html (noting the progress of talks between India and Pakistan for the Amritsar-Lahore line) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

288. See Khadka, supra note 48 (quoting the regional director of the South Asian Regional Initiative for Energy, who asserted that South Asia lags behind in regional power integration).

289. See id. (explaining that geopolitical issues are more significant than market and technology barriers in cross-border energy trading).

290. See id. (“[U]nless South Asian governments really want to solve their differences, the region’s power crisis looks set to become perennial.”).


293. See Entire Power Chain Must Be Streamlined, supra note 154 (describing the meeting between the two leaders and the assurances from the Water and Power Minister).
given high priority. Hydropower should be the alternative energy of choice in Pakistan’s future. By using hydrokinetic energy, Pakistan would be able to utilize its existing energy infrastructure to harness the renewable energy technology, as has been done elsewhere.

A. Technology behind Hydrokinetic Energy

Hydrokinetic energy generates power by using submerged or partially submerged turbines that are moved by flowing water to generate electricity. This form of power generation allows power systems to be placed into flowing water with minimal harm to infrastructure or the environment. Hydrokinetic turbines should be situated in deep, strong flowing rivers or downstream from existing hydropower stations, where electric transmission facilities are located.

Capturing the energy contained in waves may have the greatest potential for energy production. The movement of ocean waves is driven by winds and is influenced undersea topography. The promise of harnessing waves to generate power comes from both resource availability and advances in technology. While no authoritative studies have been done on hydrokinetic energy in Pakistan, it is promising to look at potentials in places like the United States where studies indicate that “[e]xtracting only fifteen percent of the energy in U.S. coastal waves would

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294. See id. (noting the Prime Minister’s stated concern for the country’s water and electricity needs).
297. See id. (“[I]ntial studies indicate that these [environmental] impacts are likely to be minimal where appropriate care has been taken in site selection and project design.”).
298. See Hydrokinetic Power Barges, supra note 181 (describing typical locations for hydrokinetic barge setups).
299. See UNION OF CONCERNED SCIENTISTS, supra note 296 (discussing various potential hydrokinetic energy sources).
300. See id. (discussing the causes of wave motion and tides).
301. See id. (noting the reasons that hydrokinetic power is now viable).
generate as much electricity as currently produced at conventional hydroelectric dams.”

Experts have recognized that small-scale hydropower is an attractive renewable solution for Pakistan. Nonetheless, development of small-scale hydropower remains the domain of the provincial governments. Small-scale hydropower is flexible to engineering redesign, or removal if necessary. When policymakers discussed small-scale hydropower, they did not explore the option of hydrokinetic energy per se. In Pakistan, of the estimated 50,000 MW in hydropower potential, only 4,800 MW has been developed over the last fifty years, and only through mega-hydel plants. Hydrological surveys of northern Pakistan revealed “numerous small streams and waterfalls . . . having sufficient potential for electricity generation through micro-hydel power plants.” A number of public and private-sector organizations are investing in the development of hydroelectric plants in a range of sizes.

A 2005 report by the Commission on Science and Technology for Sustainable Development in the South points out the tremendous potential for energy

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302. Id.
304. See Quazi Asif, Can Provinces Handle the 18th Amendment?, PAKISTAN TODAY (July 22, 2011), http://www.pakistantoday.com.pk/2011/07/22/city/karachi/can-provinces-handle-the-18th-amendment/ (explaining that the local provinces have the constitutional delegation of authority to establish power generation units) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
305. See UNION OF CONCERNED SCIENTISTS, supra note 296 (explaining the construction of hydrokinetic energy mechanisms).
308. Id. at 68.
309. See id. (noting entities that are investing in hydropower projects).
development from waterfalls in Pakistan.\textsuperscript{310} Other potential rivers to exploit for hydrokinetic energy development are the Kunhar and Chitral.\textsuperscript{311} Moreover, “[w]hile aggregate hydropower capacity from these rivers might not ostensibly match the potential from large projects, the overall efficiency in distribution systems can often make them more attractive.”\textsuperscript{312}

Hydrokinetic energy can be an optimal renewable energy source in the national energy portfolio.\textsuperscript{313} Discussions on the national and regional levels should coordinate so as to effectively make use of this renewable energy source.\textsuperscript{314} The feasibility of hydrokinetic energy as a renewable energy source in Pakistan has been the subject of a cursory discussion, and the development programs at the World Bank should consider it more seriously.\textsuperscript{315} Clusters of turbines can be strategically placed to harness wave energy.\textsuperscript{316} This budding technology can be successfully deployed in Pakistan through an appropriate governance strategy, energy investment policy and regulatory regimes.\textsuperscript{317}

The funding for hydrokinetic energy projects can come from national and international sources.\textsuperscript{318} International development funds, such

\begin{itemize}
\item \textsuperscript{310} See id. at 68–70 (explaining the potential for utilizing Pakistan’s water resource for energy generation). “For example, the Punjab province has an extensive network of irrigation canals, and at many sites, small waterfalls are available, which can be exploited to employ low-head high-discharge hydropower plants.” Id. at 69.
\item \textsuperscript{311} See Ali, supra note 303, at 192–93 (identifying other rivers as potential small rivers for generating power).
\item \textsuperscript{312} Id. at 193.
\item \textsuperscript{313} See Jonathan Fahey, Renewable Energy Growth Is Rising Around The World, IEA Says, The HUFFINGTON POST (June 26, 2013), http://www.huffingtonpost.com/2013/06/26/renewable-energy-growth_n_3504265.html (“Non-hydroelectric sources such as wind, solar, geothermal and energy derived from plants are also expected to grow quickly, but they contribute a far smaller amount of energy to the global mix [than hydroelectric sources].”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item \textsuperscript{314} See Asif, supra note 304 (explaining how oil and gas in Pakistan is now under joint federal and state ownership).
\item \textsuperscript{315} See Mapping the Renewable Energy Revolution, WORLD BANK (June 17, 2013), http://www.worldbank.org/en/news/feature/2013/06/17/mapping-the-energy-revolution (explaining that the World Bank is working with countries like Pakistan to produce informational data and support other activities) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\item \textsuperscript{316} See Wind Power and Solar Energy in Pakistan, supra note 271 (explaining the effectiveness of clustering hydrokinetic turbines).
\item \textsuperscript{317} See id. (noting that the only limits on the use of alternative energy are “our ability to innovate, organize, and educate,” and discussing potential for hydropower in Pakistan).
\item \textsuperscript{318} See, e.g., RENEWABLE ENERGY ALASKA PROJECT, EMERGING ENERGY TECHNOLOGY: A GLOBAL OPPORTUNITY FOR ALASKA 5, available at http://www.legis.state.ak.us/basis/get_documents.asp?session=26&docid=7917 (listing state, national, and international funds for alternative energy) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
\end{itemize}
as those in Sweden, New Zealand, the United Kingdom, and the United States can provide funding for hydrokinetic energy research and project development.\textsuperscript{319} The Swedish International Development Cooperation Agency (SIDA) is a governmental agency which offers technical assistance and funding throughout the world by channeling its resources through non-governmental organizations (NGOs), multilateral cooperation, and the EU.\textsuperscript{320} SIDA is interested in promoting “international development cooperation” rather than simply providing “assistance.”\textsuperscript{321}

Small-scale hydroelectric development is a more sustainable option than large-scale dams.\textsuperscript{322} Barriers to the introduction, development, and implementation of hydrokinetic energy in Pakistan includes costs, technology, permitting, local community involvement, a generalized shift in the country’s energy strategy and outlook, and investment regimes.\textsuperscript{323} As with any renewable technology, the hurdles are now less about the science, and more about policy, law, and governance structure.\textsuperscript{324} The impact of hydrokinetic energy projects must be evaluated in both fresh and salt water.\textsuperscript{325} Offshore renewable energy projects affect coastal ecosystems because a single development may have an ecological footprint extending


\textsuperscript{321} See id. (noting the focus on cooperation). SIDA supports over 2,000 projects in over 100 countries. Id.

\textsuperscript{322} See Micro-Hydro Power, PRACTICAL ACTION, http://practicalaction.org/micro-hydro-power-3 (explaining that micro-hydro power systems do not dam rivers like large-scale hydropower and therefore do less damage to the environment) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{323} See Rina Saeed Khan, The Untapped Blessing of Hydropower, DAWN (July 23, 2013), http://dawn.com/news/1031357/the-untapped-blessing-of-hydropower (explaining that Pakistan’s hydropower potential will not be realized without changes in government priorities and funding techniques) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

\textsuperscript{324} See Khurram Baig, supra note 263 (describing the biggest barrier to hydropower in Pakistan as a lack of political will and consensus).

several square miles. Scientists have noted that these developments require “proper consideration of any potential impact on the ecosystem at appropriate spatial and temporal scales.” Meanwhile, the present understanding of human impact on the coastal environment is “limited and piecemeal.”

Technologies that seek to generate energy from waves and currents are called hydrokinetic energy conversion devices, and generally either convert wave motion energy or tap water movement through rotating devices. Although all such devices are still being developed, some fully permitted pilot devices have been deployed in developed countries. The industry is rapidly progressing and hopes to build commercial scale projects in the coming decade. The use of narrow blades and near two-dimensional waterflow, the turbine movement can be modeled using a “blade element momentum theory.” There are numerous promising configurations within each of these technology categories, and the lack of a clear leader today emphasizes the need to support further engineering studies and pilot deployments to establish the most cost-effective and environmentally sound options.

Hydrokinetic power barges are designed for use in river and ocean currents with a horizontal axis turbine, which is mounted on a catamaran type hull and submerged into the water. Such barges are easy to use because of their quick assembly and slow turbine rotation speed. “The barge on which the turbines are mounted . . . is able to cope with fluctuations in water levels, substantial velocity increases, and direct

326. See Andrew B. Gill, Offshore Renewable Energy: Ecological Implications of Generating Electricity in the Coastal Zone, 42 J. APPLIED ECO. 605, 605–15 (2005) (explaining that a single development can have an ecological impact over a large area).
327. Id. at 606.
328. Id.
329. See UNION OF CONCERNED SCIENTISTS, supra note 296 (discussing the categorization of hydrokinetic energy projects).
330. See id. (discussing the state of the industry).
331. See id. (discussing the goal of building commercial scale “wave parks” and turbine arrays).
334. See Hydrokinetic Power Barges, supra note 181 (describing how hydrokinetic power barges utilize currents to create electricity).
335. See id. (stating that these barges can be assembled locally according to provided design plans and drawings).
impacts from large and fast-moving debris, . . . the only flow parameter that would decrease power output would be a decrease in the flow rate of the water . . . .

B. Representative Hydrokinetic Energy Projects

A number of countries are already investing in Pakistan’s energy sector. Therefore Pakistan should consider seeking specific investment in hydrokinetic energy production and development. For example, Argentina is actively promoting technology transfer between Argentinean and Pakistani companies in the energy sector in the area of compressed natural gas. The United States is additionally providing funds to support improvement of the Mangla Dam and infrastructure and due diligence report on the Kurram Tangi Dam project. The United States seeks to invest in high-impact projects aimed at increasing Pakistan’s energy resources and helping power sector institutions more effectively meet the country’s energy needs.

Instead of improvements to large-scale hydroelectric projects, the United States should consider investing in hydrokinetic pilot projects. Assistance from the U.S. government could help Pakistan also develop a regulatory framework similar to what exists in the United States for renewable energy projects. For example, the Federal Energy Regulatory Commission (FERC) in the United States has developed a set of norms for licensing hydrokinetic pilot projects, which are used to “test new, hydrokinetic technology devices; to determine the appropriate sites for hydrokinetic projects; and to gather information on environmental and other effects of the devices.” Project review occurs under FERC’s existing

336. Id.
339. See id. (announcing that funds from the United States will support improvements to Mangla Dam and infrastructure support and due diligence work on the Kurram Tangi Dam project).
authority and regulations. Once a license is granted, the developer can
collect revenue from generating electricity while still testing. The United
States is still experimenting with hydrokinetic technology for its own use
because the technological feasibility of commercial hydrokinetic energy
production is still only in the development stage.

Tidal stream energy converter projects are planned or in use in the
East River of New York City, the Juan de Fuca Strait off the southern coast
of Vancouver Island in Canada, and the arctic seas of northern Norway as
well as in Scotland, Russia, South Korea, and India. In Strangford Lough
in Northern Ireland, a 1.2 MW tidal stream energy converter became
operational in 2008, the largest in the world at the time. These energy
development projects are motivated by “the desire for energy supply
security and concerns with the environmental impacts of fossil fuel
combustion.”

The technical complexities of hydrokinetic power generation aside,
the regulatory and administrative support afforded to hydropower is key to
its successful development and implementation. The following
subsections will illustrate how hydrokinetic energy projects are being
deployed in both developed nations and LDCs. Understanding and
conceptualizing the legal and regulatory framework for how other nations
have explored hydrokinetic energy as a renewable energy source will
illustrate the potential for investment and development in Pakistan.

Commission’s ongoing effort to support the advancement and orderly development of
innovative hydrokinetic technologies).

341. See id. at 4 (noting that FERC seeks to adapt existing rules and grant waivers
rather than drafting new rules).

342. See id. (“When granted, a license would allow the developer to realize a revenue
stream from generating while testing and would provide for Commission enforcement of
license conditions.”).

343. See Rachael Salcido, Siting Offshore Hydrokinetic Energy Projects: A
Comparative Look at Wave Energy Regulation in the Pacific Northwest, 5 GOLDEN GATE U.
ENVTL. L.J. 109, 112 (2011) (considering the approaches that Oregon, California, and
Washington have taken to address the need for additional renewable energy while also
undertaking a shift to comprehensive ocean management).

344. See generally J. Blanchfield, et al., Tidal Stream Power Resource Assessment for
study of the power potential of a tidal stream connecting a bay to the open ocean).

345. See id. (noting when the converter entered service).

346. Id.

347. See Hon. Jon Wellihof, James Pederson & David L. Morenoff, Facilitating
Hydrokinetic Energy Development Through Regulatory Innovation, 29 ENERGY L.J. 397,
399 (2008) (discussing how implementing a regulatory framework increases the potential for
hydrokinetic energy).
1. United Kingdom

The United Kingdom, the former colonial ruler of pre-partition India, has been a forerunner in hydrokinetic energy.\(^{348}\) The British government has provided infrastructure support to Pakistan.\(^{349}\) Seeking technological know-how and reviewing the United Kingdom’s regulatory mechanisms for hydrokinetic energy would be constructive. Developments in wind turbine technology and off-shore oil exploitation have made marine energy generation economically feasible.\(^{350}\) The predictability and energy potential of harnessing tidal energy outweigh the difficulties of harnessing this energy source.\(^{351}\) The Sustainable Energy Research Group at the University of Southampton in the United Kingdom is a pioneer in the development and design of marine current energy converters that extract energy from tidal flows.\(^{352}\) Several of the group’s research projects have dealt with issues of designing marine current energy converters, which essentially look like an “underwater wind turbine.”\(^{353}\) The European Marine Energy Centre (EMEC) in Scotland tests commercial scale wave and tidal technologies and seeks to develop performance standards and best practices for commercial scale marine energy projects.\(^{354}\)

\(^{348}\) See Hydrokinetic and Ocean Energy, PR NEWS WIRE (Feb. 9, 2012), [http://www.prnewswire.com/news-releases/hydrokinetic-and-ocean-energy-139004879.html](http://www.prnewswire.com/news-releases/hydrokinetic-and-ocean-energy-139004879.html) (“Countries that have strong marine resources, such as the United Kingdom, the United States, Australia, South Korea, and Portugal, have committed to supporting the industry in some capacity—with the United Kingdom being the clear leader.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).


\(^{351}\) See id. (“Although the marine environment is harsh, the energy available is more predictable and far denser than that available from wind.”).

\(^{352}\) See id. (“Southampton’s Sustainable Energy Research Group is at the forefront of the development and design of marine current energy converters that extract energy from tidal flows.”).

\(^{353}\) See id. (discussing some of the University of Southampton’s marine energy projects).

\(^{354}\) See EMEC, ENVIRONMENTAL IMPACT ASSESSMENT (EIA) GUIDANCE FOR DEVELOPERS AT THE EUROPEAN MARINE ENERGY CENTRE 1, 1–15 (2005), [available at http://hydropower.inel.gov/hydrokinetic_wave/pdfs/day3/4_final_emec_procedure.pdf](http://hydropower.inel.gov/hydrokinetic_wave/pdfs/day3/4_final_emec_procedure.pdf) (demonstrating that the EMEC seeks to ensure the marine energy industry considers environmental implications of its projects and technologies in the early stages of design and
2. Canada

Canada is another leader in hydrokinetic energy and could prove to be a substantial ally for Pakistan in creating a hydrokinetic program of its own. The Nova Scotian government aims to derive ten percent of its energy supply from tidal and wave energy. This level of ambition in terms of the percentage of hydrokinetic energy generated overall correlates with wave, wind, and water conditions of Nova Scotia. While Pakistan may not have the same potential hydrokinetic energy as Nova Scotia, it can model renewable energy targets optimistically based on its level of production capacity and scale. The government of Nova Scotia has set the target as part of its vow to reduce fossil fuel consumption. The Fundy Ocean Research Centre for Energy, a government and privately funded testing facility, began work on developing test devices in 2012. But even in Canada, internal election politics may impede the generation of tidal energy.

4. Sri Lanka

Sri Lanka’s development of hydrokinetic energy is particularly striking. In Sri Lanka legislative and policy actions were undertaken by the national government to create investment options for renewable
development for the purposes of best practice is being carried forward into commercial scale developments) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).


357. See id. (“Nova Scotia is well-placed to become global player in this emerging energy industry.”).

358. See id. (discussing Nova Scotia’s plan to generate more tidal energy).

359. See id. (describing the Centre’s work on tidal energy).

technology. In 1997 the Energy Services Delivery (ESD) promoted a host of private renewable energy projects, and drew financing through banks and micro-finance institutions with assistance from the World Bank and the GEF. Based on the success of the ESD project, a new project—the Renewable Energy for Rural Economic Development (RERED)—is now underway, with the two institutions financing hydropower projects for the Sri Lankan grid. Over 100 hydro projects have been installed in villages, and 80,000 solar home systems have been sold commercially. The growth of small hydropower and solar home systems in Sri Lanka can be attributed to projects financed by the World Bank and GEF. One of the participating credit institutions working with the World Bank and GEF on this program is a leading micro-finance agency in Sri Lanka, and the RERED program constitutes thirty percent of its lending portfolio.

5. Ghana

The government of Ghana began financing its renewable energy and energy efficiency products from taxes on oil in the mid-1980s. Ghana adopted a national energy policy for 2006 to 2020, in which it hoped to achieve fifteen percent penetration of rural electrification through decentralized renewable energy by 2015, expanding to double that amount five years later. The policy also plans to receive twenty percent of its energy from renewable sources by 2020. While there is no present policy or regulatory framework to assist hydrokinetic renewable energy investment, sites have been identified for small hydrokinetic energy projects. While these sites have not historically been used, the Parliament


362. See Pandey, supra note 86, at 178. (highlighting how the International Development Association of the World Bank and the GEF implemented the projects from 1997–2002 with $19.70 credit lines).

363. See id. (discussing the joint hydropower project of RERED and ESD).

364. See id. (discussing the success of the project).

365. See id. at 181 (noting that the success of the project in Sri Lanka can be attributed to the World Bank and GEF).

366. See id. at 181 (noting the important relationship between micro-finance and small scale renewable energy development).

367. See Veronica B. Miller et al., Hydrokinetic Power for Energy Access in Rural Ghana, 36 RENEWABLE ENERGY 671, 672 (2011) (“Since the mid-1980s, the Ghanaian government has been financing projects using small levies on petroleum products.”).

368. See id. (noting the adoption of a strategic national energy plan).

369. See id. (discussing the plan’s renewable energy goals).

370. See id. (noting the existence of potential hydrokinetic sites).
of Ghana is setting forth new policies for use of these sites. Pakistan can look to Ghana as an example of how to set renewable energy targets.

6. China

Pakistan should consider steps to further improve its alliance with China for the purposes of energy production. Pakistan’s current alliance with China is already proving fruitful through Chinese investments in Pakistani infrastructure. While there are countries other than Pakistan that will be able to better utilize hydrokinetic energy and develop technology, Pakistan is an ideal place to use this technology because of the acute need for energy. China’s hydroelectric resources are estimated to be the largest in the world. The Chinese excel in engineering and harvesting energy from non-fossil fuel sources. China’s future energy economy and its burgeoning population depend on its ability to become a leader in seeking out better alternatives to fossil fuels. Sustainable energy is the thumping heart of China’s future and continued growth. If Pakistan’s government and civil society can collaborate with the Chinese architects of water energy and Chinese urban planners, Pakistan will be one step closer to having sustainable energy sources.

371. See id. (discussing the unique potential benefits from hydrokinetic power in rural Ghana).
373. See WORLD ENERGY COUNCIL, supra note 12 (discussing the unmet demand for electricity in Pakistan).
374. See Robert W. Gee et al., China’s Power Sector: Global Economic and Environmental Implications, 28 ENERGY L.J. 421, 431 (2007) (stating that China’s total hydroelectric potential is estimated at 300,000 MW, two-thirds of which is in the remote southwestern quadrant of the country).
377. See id. (“The government’s recently-announced five-year action plan to fight smog in China’s cities relies on reducing coal use in surrounding areas.”).
International organizations can play a constructive role in developing a contemporary renewable energy regime. The international community should collaborate “to keep the energy question alive by developing it further in the mainstream agenda.” A sustainable energy future cannot be actualized without new international instruments. The United Nations “Sustainable Energy for All” initiative is a highly ambitious, virtually impossible tripartite goal to provide: 1) universal access to modern energy services, 2) doubled rates of energy efficiency, and 3) doubled shares of renewable energy in the global energy mix by 2030. The focus on renewable energy sources is driven primarily by fears of climate change and long-term aspirations for sustainable energy. UN Secretary-General Ban Ki-moon promotes the push for sustainable energy enterprises. The Sustainable Energy for All initiative realizes the central role energy plays in development. As a leading voice for eco-efficiency, the United Nations Division on Sustainable Development under the Department of Economic and Social Affairs, has made it a goal to: 1) “[f]acilitate intergovernmental negotiations, consensus-building and decision-making[;]” 2) “[p]rovide technical assistance, expert advice and capacity building to support developing countries and countries with economies in transition in their efforts to achieve sustainable development;” 3) “[f]acilitate inter-agency and inter-organizational cooperation, exchange and sharing of information, and catalyze joint activities and partnerships within the United Nations system and with other international organizations, governments and civil society groups in support of sustainable development;” 4) “[p]romote and facilitate monitoring and evaluation of, and reporting on, the implementation of sustainable energy policies.”

378. See Blakeway, supra note 221, at 224 (exploring ways that the international community can enact policies to foster renewable energy development).
380. Lakshman D. Guruswamy, Energy, Environment & Sustainable Development, 8 CHAP. L. REV. 77, 78 (2005) (noting that sustainable energy requires international agreements dealing with “science and technology (S&T), trade and investment (T&I), research and development (R&D), technology transfer, and [sustainable development]”).
381. See Ki-Moon, supra note 18, at 4 (enumerating the “three linked objectives” that “underpin the goal of achieving sustainable energy for all by 2030”).
382. See id. at 5 (exploring the threat of climate change and the imperative for clean energy).
383. See id. at 4 (outlining his goals in support of sustainable energy).
384. See id. at 8 (“Proper incentives are needed to . . . spur innovation to drive down the cost curve, invest in business-led solutions, and satisfy demand.”).
development at the national, regional and international levels;” and 5) “[u]ndertake in-depth strategic analyses to provide policy advice.”

The United Nations’ priorities appear hefty, but the central goals are negotiation, exchange of innovation, and appreciation for the process of cultivating and fostering sustainable development principles. The United Nations’ sustainable development goals align with and assist state development goals. Market-oriented policies pursued by national governments and regional authorities have favored liberalization and deregulation of markets, privatization of state-owned enterprises, and the removal of structural distortions. These changes have worked to enhance cross-border corporate integration.

Legal instruments regarding sustainable development share certain legal principles. For the purposes of sustainable energy and international investment, it is helpful to consider these principles broadly to establish a framework for legal and policy changes. International norms are not self-executing and many nations must enact their own national environmental law to give domestic force to multilateral environmental agreements and international environmental norms. Beyond these internationally encouraged norms, far larger bodies of environmental norms are independently enacted within each nation. International society lacks the sort of hierarchical decision-structures that are responsible for law making

386. See id. (outlining the division’s goals).
387. See id. (noting that the United Nations’ goals seek sustainable development through cooperation on international, regional, and state levels).
388. See The New Globalism and Developing Countries, supra note 206, at 15 (discussing changes that have promoted direct foreign investment).
389. See id. at 2 (discussing the rise of global economic interdependence).
390. See Roland Kläger, Fair and Equitable Treatment in Int’l Investment Law 199–200 (2011) (explaining that the International Law Association (ILA) recognized seven principles of concern for sustainable development by analyzing treaty regimes, tribunal decisions and other international legal practices).
391. See Nicholas A. Robinson, Enforcing Environmental Norms: Diplomatic and Judicial Approaches, 26 Hastings Int’l & Comp. L. Rev. 387, 397 (2003) (discussing the enforcement of environmental laws and its importance in attaining the international objective of sustainable development).
392. See id. (discussing the different legal means of reaching international environmental goals).
and implementation at the domestic level. No central legislative organ exists at the international level. While treaties and custom remain the dominant paradigms of international norms, they are not the only forms available.

Another area to consider is international investment agreements (IIA), which are treaties that address issues related to cross-border investments. The deployment of hydrokinetic energy requires international investment for development. Investment treaties are aimed at creating institutions that back up an international market economy in which capital flows are more efficiently allocated while protecting and promoting investment flows in bilateral relationships. Investment treaties have a larger constitutional function for providing a legal framework for international investment activities. For the most part, international investment law is designed to grant protection for foreign investments instead of regulating access to foreign countries and allowing the free circulation of capital. Investment treaties seek to protect foreign investor’s assets in the host country and account for the reality of financing and structuring foreign investment activities through several layers of companies in various jurisdictions. International investment law, like general international law, should address the concept of International Corporate Social Responsibility (ICSR) in the development of laws, rules, procedures, and decision-making.

394. See id. (“[W]hereas treaties and custom continue to be the prime constructs of international norms, other legal forms do exist.”).
396. See STEPHAN W. SCHILL, THE MULTILATERALIZATION OF INTERNATIONAL INVESTMENT LAW 17 (2009) (discussing that attempts to develop a theory of international investment law are complicated by the numerous, largely bilateral treaties that are enforced by arbitral panels on a case-by-case basis).
397. See id. (noting that investment treaties are not intended to operate as private law contracts that order the relationship between a limited number of parties and contain the exchange of specific transactions).
398. See id. (discussing the structure of international law).
399. See id. at 200 (discussing the protection that investment treaties afford to investors).
Of the many justifications (legal, humanitarian, strategic) for encouraging sustainable development in Pakistan by the United States, the most compelling justification is the strategic justification. In addition to the humanitarian aid provided, the endowment of aid can serve a national self-interest. Providing aid for Pakistan’s energy sector is consistent with and furthers U.S. national security interests. It is in the U.S.’s national interest to promote sustainable energy in Pakistan and assist in alleviating implementation and investment hurdles.

VI. Conclusion

While the future of renewable energy for Pakistan remains uncertain, hydrokinetic energy could be harnessed to combat Pakistan’s energy woes with the appropriate technology and policy momentum. The solution is to leverage regulation and policy to promote this future energy idea. The technology and investment will follow. Islamabad policymakers and politicians easily balk at innovation because they believe it cannot be accomplished in Pakistan because of the enormous levels of corruption, government waste, and nepotism. Or, they boast about the potential for innovation in their country and fail to actualize this potential. In a country founded on zeal for self-determination, but tangled in bureaucratic and geopolitical tussles, this innovation in the energy industry is critical. Pakistan needs only to look at its neighbors, India and China, to see the potential of hydrokinetic energy. The United Nations has raised the stakes for developing nations vying for sustainable development opportunities. Pakistan should not wait for developed countries to take charge, but should lead the way on its own.

Report 2003 (2003); UNCTAD, Social Responsibility, Series on Issues in International Investment Agreements (2001)) (noting that ICSR obligations are “the quid pro quo for the protection of investors and investments under international investment protection agreements and international economic rules such as of the WTO”).

401. See Royal C. Gardener & Ezequiel Lugo, Official Development Assistance: Toward Funding Sustainability, in AGENDA FOR A SUSTAINABLE AMERICA 399, 399 (John C. Dernbach ed., 2009) (“While legal and moral rationales might provide reasons for the United States to provide foreign assistance that encourages sustainable development, a strategic rationale consistent with the national security interests of the United States is the most compelling justification.”).

402. See id. at 401 (explaining that the ramifications of weak and failed states can extend beyond a country’s borders).
Is It Time to Revoke the Tax-Exempt Status of Rural Electric Cooperatives?

W. G. Beecher

Abstract

Rural electric cooperatives (RECs) were created with government assistance in the mid-1930s as part of a campaign to bring electricity to rural areas in an effort to improve economic output and quality of living. By the early 1950s, the entirety of America had access to electricity, fulfilling the federal government’s mission. Today, these cooperatives strongly resemble their for-profit counterparts, but remain tax-exempt under § 501(c)(12) of the Internal Revenue Code. This note will argue that, in light of the changes that RECs have undergone and the environment in which they now operate, their tax-exempt status is no longer warranted and in fact works against REC member interests. This note will then explore the impact of taxing RECs as regular cooperatives, which are subject to taxation under Subchapter T of the Internal Revenue Code.

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* Washington and Lee University School of Law, Class of 2014. The author would like to thank Professor Albert V. Carr for his invaluable guidance and insight.
I. Introduction

Rural electrical cooperatives ("RECs" or "electrical cooperatives") are an integral part of the electrical infrastructure in the United States, providing power to a significant portion of the American people. Despite their size and reach, RECs differ from investor-owned or municipal electric utilities in three distinct ways. First, they function under a cooperative business model, in which the consumers own the utility rather than investors or municipalities. Second, RECs were created specifically to serve rural areas where investor- or municipally-owned electric companies did not offer electrical service. Third, Congress specifically designated RECs as tax-exempt nonprofits and created a program of federally subsidized loans to speed the electrification of rural America. These three factors combined to make RECs incredibly effective in spreading access to electricity across the United States: just a few decades after their creation, every corner of the country had gained access to electrical service.

Part II will discuss the history of the rural electric cooperative movement and the reasons why early cooperatives were seen as meriting tax exemption. Part III will explore the types of RECs as well as the organizational and operational requirements necessary to maintain their tax exemption. Part IV considers changes that the electrical cooperative sector
has undergone in recent years and the problems that have arisen as RECs have begun to resemble for-profit entities. Lastly, Part V questions the continued value of sustaining the tax and regulatory exemptions of these cooperatives, and explores ways to encourage behavior that is in keeping with cooperative principles.  

II. History of the Electric Cooperative Movement

A. The Early Years

Cooperatives were not the first model of electrical distribution in America. In the late nineteenth and early twentieth centuries, almost all electricity was generated and distributed by investor-owned power companies. In these early years, electricity was primarily available to urban areas, where higher population densities made distribution profitable because the close proximity of customers to one another meant that fewer power lines needed to be strung. These power companies refused to serve rural areas because the overhead cost of wiring and providing service to these areas was deemed to be too much for the company to absorb, and if passed on to the rural customers through price increases, electricity would be prohibitively expensive. Moreover, because rural customers lacked the funds to purchase machinery that would use large amounts of electricity, private power companies would not receive sufficient returns on their investments.

With private power companies uninterested, farmers and rural communities began forming cooperatives in the early years of the twentieth century to distribute electricity themselves. Modeled on those in Canada and Europe, farmers saw the first RECs as little different from the

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8. This note will not examine the federal loan program for RECs, a subject that has been thoroughly examined elsewhere. See, e.g., Richard P. Keck, Reevaluating the Rural Electrification Administration: A New Deal for the Taxpayer, 16 ENVTL. L. 39, 87–89 (1985) (criticizing subsidized government lending to electrical cooperatives as a costly government venture with no remaining public policy purpose).
10. See id. (explaining the financial reasons why urban populations were first to receive electrical service).
11. See id. (stating the reasons for the slow rate at which rural areas were being wired by investor-owned power companies).
12. See id. (noting the problems with electrifying rural areas).
13. See id. at 13 (discussing the early attempts by farmers to organize electrical cooperatives).
agricultural cooperatives that had long served them.\textsuperscript{14} Such early attempts at self-help were few, limited in scope, and saw mixed success because organizers faced hostility from the private power companies from which they purchased their electricity.\textsuperscript{15} Further, these organizers lacked the technical and managerial expertise to operate the cooperatives.\textsuperscript{16} As a result, the 1920 census found that fewer than five hundred thousand of six million farms reported having electric lights.\textsuperscript{17} Those numbers dwindled in the rural west and south, where electrification ranged between ten and less than one percent.\textsuperscript{18}

\textbf{B. The New Deal and the REA}

The Depression-era enactment of the Rural Electrification Act\textsuperscript{19} and creation of the Rural Electrification Administration by executive order\textsuperscript{20} dramatically changed the landscape of power distribution in America.\textsuperscript{21} Although bringing electricity to rural areas had been a progressive cause for the preceding decade, the movement gained vital support from the federal government during the Great Depression as a part of Franklin D. Roosevelt’s New Deal.\textsuperscript{22} In response to increasingly vocal demands for federal action to improve economic output in rural areas, President Roosevelt created the Rural Electrification Administration (“the REA”) in May of 1935 to spend the 100 million dollars that Congress had allocated for rural electricity distribution.\textsuperscript{23} Despite early government reluctance, providing cooperatives with administrative guidance and low

\begin{itemize}
  \item \textsuperscript{14} See id. at 16–18 (stating that American farmers looked to the success of electrical cooperatives in Canada and Europe, where ninety percent of farms had electricity).
  \item \textsuperscript{15} See id. at 15 (noting the mortality rate of early cooperatives and the causes of their failure).
  \item \textsuperscript{16} See id. (explaining that a lack of necessary expertise damaged early RECs).
  \item \textsuperscript{17} See id. at xv (“[T]he federal census of 1920 . . . reported that of the total 6,000,000 farms in the United States, only 452,620 had electric lights and 643,899 had some form of running water.”).
  \item \textsuperscript{18} See id. at xvi (“The Midwest and South ranked lowest, ranging from 10 percent to less than 1 percent.”).
  \item \textsuperscript{19} Ch. 432, 49 Stat. 1363 (1936).
  \item \textsuperscript{20} Exec. Order No. 7037 (May 11, 1935).
  \item \textsuperscript{21} See generally BROWN, supra note 7 (discussing the changes that took place in the American electrical utility industry after the enactment of the REA).
  \item \textsuperscript{22} See id. at 35–46 (explaining that tireless advocates of rural electrification—chiefly Morris L. Cooke, who would be appointed the first Director of the REA—and an experimental electric cooperative within the Tennessee Valley Authority highlighted the need and economic feasibility of bringing power to rural communities, greatly bolstering the cause in Washington).
  \item \textsuperscript{23} See id. (chronicling the formation of the REA).
\end{itemize}
interest loans was soon recognized as the quickest and most efficient means of fulfilling the agency’s objectives.24

The choice to foster the formation and growth of electrical cooperatives as a means of national electrification was an overwhelming success.25 In just a few years, the REA had been transformed from a temporary relief organization into a permanent government agency within the Department of Agriculture, making subsidized loans to the hundreds of newly formed RECs that were requesting funds to string electrical wires through their communities.26

The process of rural electrification was rapid: In 1939, approximately twenty-five percent of all farms had electrical service.27 Less than two decades later, the REA had loaned over 2.7 billion dollars to over one thousand cooperatives and other entities, facilitating the electrification of the entire country.28 The original RECs were almost exclusively distribution cooperatives that delivered power to consumers.29 Only after distribution networks were firmly established did RECs begin to generate and transmit their own electricity.30 Most rural electrical cooperatives formed at the REA’s encouragement are still in operation today.31 They are represented in Washington by the National Rural Electrical Cooperative Association (“NRECA”), whose 905 members own 42% of the nation’s electrical distribution lines, and serve an estimated 42 million people in 47

24. See id. at 48–57 (recounting how that agency had originally planned to work with private power companies, but ultimately settled on promoting and assisting cooperatives because the private companies failed to present plans that would have made electricity affordable).
25. See id. at 74–75 (outlining improvements made by electrification).
26. See id. at 58–66 (chronicling changes at the REA as it became a permanent government agency within the Department of Agriculture).
27. See id. at 75 (“By 1939 the improvements wrought by electricity were visible in rural life. REA had 417 cooperatives serving 268,000 households and had loaned $3,644,711 for wiring and plumbing. About 25 percent of all farms had service.”).
28. See id. at 113 (“The agency had, since 1935, loaned a total of $2,788,136,191 to 983 cooperatives, 44 public power districts, 26 other public bodies and 25 electric companies.”).
29. See Joel A. Youngblood, Alive and Well; the Rural Electrification Act Preempts State Condemnation Law: City of Morgan City v. South Louisiana Electric Cooperative Ass’n, 16 Energy L.J. 489, 491–92 (1995) (noting that RECs, as a result of the REA, “began to urge rural residents to form cooperatives—private, non-profit membership corporations organized under state law—for the purpose of supplying members with central station power”).
30. See id. at 492 (explaining that the construction of transmission and generation facilities (G&Ts), which generate and transmit their own electricity, increased markedly as the “integrity of the rural power distribution improved”).
31. See id. at 493 (“Today, most RECs have come full circle and engage not only in the distribution of power, but also in its generation and transmission.”).
In addition, cooperative electrical generation companies produce nearly 5% of the nation’s power. Despite their rural moniker, RECs now serve a significant number of urban and suburban areas as well. Throughout this growth and modernization, cooperatives have retained their distinctive business model—and their federal tax-exempt status.

III. Organization and Tax Characteristics of Cooperatives

A. Types of RECs

RECs fall into two basic categories: distribution cooperatives, and generation and transmission cooperatives (G&Ts). Distribution cooperatives, sometimes called “DISCOs,” carry electricity from transmission substations to consumers. Because of the expense and technical demands of electrical generation and transmission, the RECs formed during the early years of the REA were almost exclusively created to distribute electricity to rural farms. These cooperatives purchased power from investor-owned utilities or Federal Power projects and distributed it to their members. Today, many purchase power from other

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32. See Co-op Facts and Figures, supra note 2 (describing the current state of the nation’s consumer-owned electric utility network).
33. See id. (noting the electrical production of RECs).
34. See Jim Cooper, Electric Co-ops: From New Deal to Bad Deal?, 45 HARV. J. ON LEGIS. 335, 336 (2008) (“Most co-ops operate in a few rural counties where customers live far apart, although an increasing number of co-ops serve populous suburbs.”).
35. See Keck, supra note 8, at 71 (explaining that the tax exempt status of the cooperatives reduces REC power costs).
36. See Youngblood, supra note 29, at 491–93 (describing the benefits of distribution cooperatives and generation and transmission facilities (G&Ts), which have developed as a result of the REA).
38. See Garwood & Tuthill, supra note 6, at 14 (“During the first few years of the program, over 80 percent of the customers of REA-borrowers were farmers.”).
39. See COMPTROLLER GENERAL, GENERAL ACCT. OFFICE, CED-81-14, FINANCING RURAL ELECTRIC GENERATING FACILITIES: A LARGE AND GROWING ACTIVITY 7 (1980) [hereinafter FINANCING RURAL ELECTRIC GENERATING FACILITIES] (“For the most part, the cooperatives purchased electric power from Federal power projects or electric companies and distributed it to consumers.”).
The majority of RECs operating today adhere to this model: 840 of the 905 members of NRECA are solely distribution cooperatives. As their name implies, G&T cooperatives serve to generate power and transmit it to members. The members of these RECs are not consumers of electricity, but are distributors who sell the electricity to the consumers. As REC-owned distribution networks became established after the Great Depression, RECs began to form cooperatives among themselves to assist in the purchasing and distribution of power. At first, these cooperatives served primarily as service organizations to assist their members in arranging and contracting for the bulk purchase of power. Eventually, many of them began to build their own generation capability to reduce their dependence on outside sources of electric power. This process was facilitated in large part by the REA’s subsidized loans, which allowed RECs to finance these projects far more easily than investor-owned utilities. For the first five years of the REA loan program, only about three percent of the REA’s loans were for generation and transmission projects. By the latter half of the 1950s, that number had jumped to thirty-one percent. The soaring interest rates of the late 1970s and early 1980s allowed RECs to use their highly preferential government loans to finance generation facilities far more affordably than could private companies.

40. See Electricity 101, supra note 37 (noting that companies which provide both general and transmission functions are now “owned by the distribution cooperatives to whom they supply wholesale power”).
41. See Co-op Facts and Figures, supra note 2 (specifying that out of the 905 NRECA cooperative members, 840 are distribution cooperatives and 65 are G&T cooperatives).
42. See Electricity 101, supra note 37 (explaining that G&Ts provide both generation and transmission functions).
43. See id. (“Many electric utilities are exclusively distribution utilities—that is, they purchase wholesale power from others to distribute it, over their own distribution lines, to the consumer.”).
44. See Keck, supra note 8, at 47 (describing the shift from purely distribution to G&T).
45. See FINANCING RURAL ELECTRIC GENERATING FACILITIES, supra note 39, at 7 (“Initially, these power cooperatives served largely as a service organization for the members, . . . contracting for the purchase of bulk power, which in turn was sold to distribution members.”).
46. See id. (“[S]ome of these power cooperatives began to build their own generating capability to reduce their dependence on outside sources of electric power.”).
47. See id. (noting the subsidized loans provided by the REA).
48. See GARWOOD & TUTHILL, supra note 6, at 15 (noting the amounts loaned to G&T cooperatives).
49. See FINANCING RURAL ELECTRIC GENERATING FACILITIES, supra note 39, at 7 (noting the increase in funds loaned to G&Ts).
50. See John Simpson, Co-ops Battle Clinton Plan to Cut REA Loan Program, 131 PUB. UTIL. FOR. 41, 41 (1993) (explaining that REA loans have come under frequent attacks in the last few decades because of the advantages they bestow on RECs. Presidents
During this period, G&T cooperatives began to form joint ventures with private power companies eager to gain access to RECs’ dramatically lower borrowing rates. G&Ts nonetheless remain few in number, accounting for only a fraction of NRECA’s membership.

B. Tax Characteristics of Cooperatives

Rural electric cooperatives have been exempt from federal taxation since the Revenue Act of 1916, well before the New Deal. Today, all are organized as nonprofit entities and granted tax-exempt status under § 501(c)(12) of the Internal Revenue Code (“the Code”). This section of the modern Code permits tax exemption for “benevolent life insurance associations of a purely local character, mutual ditch or irrigation companies, mutual or cooperative telephone companies, or like organizations.” Electrical cooperatives have been viewed as “like organizations” appropriate for tax exemption virtually since their inception. In 1980, Congress formalized this status by amending § 501(c)(12) to include § 501(c)(12)(C), which explicitly includes RECs in

Reagan, H. W. Bush, and Clinton each sought to reduce the subsidy of loans to RECs, only to be thwarted by Congress).

51. See Joe D. Pace & John H. Landon, Introducing Competition into the Electric Utility Industry: An Economic Appraisal, 3 ENERGY L.J. 1, 7 (1982) (“G&Ts and some distribution cooperatives have also received REA loan guarantees in order to finance purchase of ownership shares in investor-owned utilities’ large coal and nuclear generating plants.”).

52. See Electricity 101, supra note 37 (noting that only 65 of NRECA’s 905 members are G&T cooperatives).


55. See Internal Revenue Code, 26 U.S.C. § 501(c)(12) (2012) (exempting “cooperative telephone companies, or like organizations; but only if 85 percent or more of the income consists of amounts collected from members for the sole purpose of meeting losses and expenses”).

56. Id. at § 501(c)(12)(C); see also Treas. Reg. § 1.501(c)(12)–1 (as amended in 1979) (“The phrase of a purely local character applies to benevolent life insurance associations, and not to the other organizations specified in § 501(c)(12).”).

its scope.\textsuperscript{58} To qualify for tax exemption under 501(c)(12), the Internal Revenue Service (“the Service” or “the I.R.S.”) requires organizations to: (1) be organized and operated under cooperative principles; (2) adhere to the activities for which it was created; and (3) derive no less than eighty-five percent of its income from members.\textsuperscript{59}

\textit{1. Organization and Operation as a Cooperative}

All organizations exempt from federal taxation under § 501(c)(12) must adhere to a cooperative structure.\textsuperscript{60} At its most basic, a cooperative is an organization owned and operated by customers who join together for their mutual benefit.\textsuperscript{61} The purpose of the organization must be to help the members serve themselves, rather than to generate a profit.\textsuperscript{62} Outside of these generalities, the diversity of cooperatives makes more specific characteristics difficult to pin down.\textsuperscript{63} Justice Brandeis once noted this fact when he wrote that “[n]o one plan of organization is to be labeled as truly co-operative to the exclusion of others.”\textsuperscript{64}

Nonetheless, the seminal discussion of the cooperative model comes from \textit{Puget Sound Plywood, Inc. v. Commissioner},\textsuperscript{65} where Judge Pierce identified the three fundamental principles that have persisted since the earliest formal cooperatives:

\begin{enumerate}
\item Subordination of capital, both as regards control over the cooperative undertaking, and as regards the ownership of the pecuniary benefits arising therefrom;
\item democratic control by the worker-members themselves; and
\item the vesting in and the allocation among the worker-members of all fruits and increases arising from their cooperative
\end{enumerate}

\textsuperscript{58} See Miscellaneous Revenue Act of 1980, Pub. L. No. 96-605, 94 Stat. 3521 (codified in scattered sections of 26 U.S.C.) (listing “mutual or cooperative electric company” in § 501(c)(12)(C)).

\textsuperscript{59} See Seto & Chasin, supra note 57, at 177 (identifying the three requirements for tax exemption under § 501(c)(12)).

\textsuperscript{60} See id. at 178 (“[T]he three basic requirements apply to cooperatives described in section 501(c)(12) as well as those described in Subchapter T and I.R.C. 521. They must be satisfied to qualify for and maintain exemption under I.R.C. 501(c)(12).”).

\textsuperscript{61} See Carlisle, supra note 54, at 567 (defining “cooperative” as an enterprise owned and operated primarily for the benefit of those using its services).

\textsuperscript{62} See id. (explaining that cooperatives have not been organized “for the production of profit attributable to the enterprise itself,” but to help members serve themselves).

\textsuperscript{63} See id. (noting that the application of specific characteristics to cooperative associations is difficult).

\textsuperscript{64} Frost v. Corp. Comm’n, 278 U.S. 515, 546 (1929).

endeavor (i.e., the excess of the operating revenues over the costs incurred in generating those revenues), in proportion to the worker-members’ active participation in the cooperative endeavor.\textsuperscript{66}

The first principle, the subordination of capital, orients the cooperative to serve the member-patrons (“members”) rather than those who supplied capital.\textsuperscript{67} The result is that members, the very individuals or entities that patronize the organization, are the primary beneficiaries of cooperative activities.\textsuperscript{68} This orientation is distinct from that of a corporation, where investors have the ability to control the business and receive pecuniary gain based upon their investment.\textsuperscript{69}

The second principle, democratic control, requires that members have a voice in the cooperative’s operation.\textsuperscript{70} Each member has one, and only one, vote in electing the organization’s officers and other important decisions.\textsuperscript{71} This is notably different from a corporation, where votes are allocated by share, allowing those with larger ownership stakes to have a greater voice in business decision-making.\textsuperscript{72}

The third principle of cooperatives is the proportional vesting and allocating of profits to members. A cooperative’s net income immediately vests to members as “member equity,” based on the amount that each member used the organization’s services.\textsuperscript{73} In other words, the cooperative returns to its members the funds that it would otherwise retain as profits

\begin{itemize}
  \item \textsuperscript{66} Id. at 308.
  \item \textsuperscript{67} See Seto & Chasin, supra note 57, at 178 (explaining that subordination of capital “requires the contributors of capital to the cooperative, in their status as equity owners, neither control the operations nor receive most of the pecuniary benefits of the cooperative’s operations,” making cooperatives more member-oriented).
  \item \textsuperscript{68} See Puget Sound Plywood, Inc. 44 T.C. at 309 (“The fruits and increases which the worker-members produce through their joint efforts are vested in and retained by the workers themselves, rather than in and by the association, as such, which functions only as an instrumentality for the benefit of the workers . . . .”).
  \item \textsuperscript{69} See id. (distinguishing between the pecuniary gain distribution scheme of a cooperative and that of a corporation).
  \item \textsuperscript{70} See Seto & Chasin, supra note 57, at 178 (“A cooperative satisfies [the democratic control requirement] by ‘periodically holding democratically conducted meetings, with members, each one with one vote, electing officers to operate the organization’”).
  \item \textsuperscript{71} See Puget Sound Plywood, Inc. 44 T.C. at 308 (discussing the second principle of cooperative economic theory). See also id. and accompanying text.
  \item \textsuperscript{72} See id. at 309 (“In the case of the corporation-for-profit, . . . equity owners . . . select the management and control the functions and policies of their entity— not on a one-person one-vote basis without use of proxies, but rather through multiple voting in proportion to the number of shares of capital stock which they hold.”).
  \item \textsuperscript{73} See id. (noting that profits immediately vest and are retained by the cooperative members).
\end{itemize}
proportionate to each member’s use of the cooperative.\textsuperscript{74} This has the effect of paying back a portion of each dollar spent by members on the cooperative’s services during a given period.\textsuperscript{75} Because any profits are instead distributed back to the members as “savings,” this model encourages the operation of a cooperative at cost.\textsuperscript{76} Together, these principles of cooperative organization and operation illustrate that they are designed to be owned and controlled by their patrons.\textsuperscript{77}

In addition to fundamental principles of cooperative structure, the Service requires electrical cooperatives to follow a number of ancillary rules.\textsuperscript{78} First, RECs must at all times maintain records showing each member’s interest in the assets of the organization, and cannot accumulate funds beyond the “reasonable needs of the organization’s business.”\textsuperscript{79} Upon dissolution, gains from the sale of appreciated assets must also be distributed to members during the ownership period of the asset proportionate to the amount of business between the member and the organization.\textsuperscript{80} Because members’ rights and interests cannot be forfeited,\textsuperscript{81} former members who have since left the electrical cooperative may be entitled to a portion of the distribution upon dissolution.\textsuperscript{82} In practice, these rules serve to clarify the duties of RECs rather than burden them with additional obligations.\textsuperscript{83}

\textsuperscript{74} See Seto & Chasin, \textit{supra} note 57, at 178 (explaining that the immediate vesting of profits prevents a cooperative from operating at a profit or a loss).
\textsuperscript{75} See id. (“A cooperative’s savings belong to its member-patrons, not the organization, and it must allocate the savings to its member-patrons in proportion to the amount of business it did with each.”).
\textsuperscript{76} See id. (discussing how the vesting of excess net revenues acts as “savings” for cooperative members).
\textsuperscript{77} See Puget Sound Plywood, Inc., 44 T.C. at 307–08 (describing how the cooperative principles work together).
\textsuperscript{78} See Rev. Rul. 72-36, 1972-1 C.B. 151 (including a question and answer section to provide guidance on the ancillary rules).
\textsuperscript{79} See id. (requiring organizations to keep any records necessary to determine the rights and interests of members, and prohibiting them from accumulating more funds than necessary to operate the organization).
\textsuperscript{80} See id. (“[G]ains should be distributed to all persons who were members during the period which the asset was owned by the organization in proportion to the amount of business done by such members during that period, insofar as is practicable.”).
\textsuperscript{81} See id. (explaining that organizations that forfeit rights and interests of former members are not cooperatives and are therefore not exempt).
\textsuperscript{82} See Rev. Rul. 81-109, 1981-1 C.B. 347 (“Inasmuch as a former shareholder does not receive from the organization his pro-rata share of the annual savings accumulated while he was a member when his membership is terminated upon the sale of his stock, he should receive the distribution upon dissolution.”).
\textsuperscript{83} See Seto & Chasin, \textit{supra} note 57, at 178 (specifying that the revenue ruling serves to explain the Code’s requirements).
2. Adherence to Specified Activities

Cooperatives receiving federal tax exemption must hew closely to the activities for which they were created and for which the Code provides exemption. For RECs, this means generating or providing electrical service to members. Courts have held that the sale, repair, manufacture, or financing of electrical appliances, or the installation of electrical systems, are not exempt activities under § 501(c)(12). If a business is organized as a cooperative and engages in exempt activities, it is immaterial that each of its members are themselves cooperatives, or that it acts in furtherance of rural electrification. In addition to the activities specifically permitted by the statute, § 501(c)(12) alludes to “like organizations,” a term that the Service has interpreted narrowly:

[I]t is clear that the term “like organizations” as used in the statute is limited by the types of organizations specified in the statute, and is applicable only to those mutual or cooperative organizations which are engaged in activities similar in nature to the benevolent insurance or public utility type of service or business customarily conducted by the specified organizations.

The “public utility type” activities standard has allowed RECs to expand their service offerings in a number of new directions without tax consequences. The Service has specifically determined that a cooperatively structured organization providing public utility type services is a “like organization” appropriate for tax exemption. As a result, RECs are permitted to own natural gas, water, and sewer services in addition to providing electricity. Other activities, even those that are energy related, are not tax-exempt. For example, the sale of tanked propane gas is not appropriate for tax exemption because it is not a traditional utility-type

84. See Consumers Credit Rural Elec. Co-op. Corp. v. Comm’r, 37 T.C. 136, 143 (1961), aff’d 319 F.2d 475 (6th Cir. 1963) (determining that financing consumer purchases was not a “like organization” under the Code).

85. See id. at 143 (explaining that merely organizing a business as a cooperative will not automatically bring them into the category of those organizations exempt under § 501(c)(12)).


87. See Rev. Rul. 67-265, 1967-2 C.B. 205 (finding “like organization” to mean “those . . . cooperative organizations which are engaged in activities similar in nature to the . . . public utility type of service or business customarily conducted by the specified organizations”).

service, regulated by the state or reliant on extensive infrastructure. The I.R.S. has chosen to tax this activity as unrelated business income rather than prohibit it outright as some states have done. Although this article does not investigate the numerous state statutes governing the operation of RECs, many state courts are unforgiving of deviations from the traditional electrical service role for which these organizations were created.

3. The Eighty-Five Percent Requirement

The most significant requirement to maintain tax exemption for most RECs today is the rule that “85 percent or more of [their] income consists of amounts collected from members for the sole purpose of meeting losses and expenses.” Added with the Revenue Act of 1924, this language allows for some income to be generated by a cooperative from non-member sources. The requirement was designed to relax the financial rules governing RECs, permitting them to invest their financial reserves in interest-bearing accounts while nonetheless preventing them from becoming de facto investment houses. For the purposes of the requirement, member income refers only to income that is derived from members and from “like organization” activities. Thus, income unrelated to electrical service, such as the sale of propane discussed earlier, cannot be counted as member income because it is not a “like organization” activity, even if the sale is made to a member. Furthermore, income not meeting

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89. See Rev. Rul. 2002-54, 2002-2 C.B. 527 (determining that propane sale and distribution was not a utility-type service for purposes of § 501(c)(12)).
90. See id. (concluding that the sale of tanked propane would be subject to unrelated business income tax §§ 511–13).
91. See, e.g., Lewis v. Jackson Energy Co-op. Corp., 189 S.W.3d 87 (Ky. 2005) (concluding that rural electric cooperatives are prohibited from distributing propane on the grounds that the state statute defined the permissible activities of cooperatives).
93. Revenue Act of 1924, Pub. L. 68-176, 43 Stat. 253 (“[M]utual or cooperative telephone companies, or like organizations; but only if 85 per centum or more of the income consists of amounts collected from members for the sole purpose of meeting losses and expenses.”).
94. See 65 Cong. Rec. 7, 128–29 (1924) (discussing the purpose of the eighty-five percent requirement).
95. See Rev. Rul. 2002-54, 2002-2 C.B. 527 (determining that income derived from activities that are not “like organization” activities constitutes nonmember income for the purposes of the eighty-five percent member income test).
96. See id. (finding that sales of tanked propane to members represent nonmember income for purposes of calculating the eighty-five percent member income test).
these requirements is subject to the unrelated business income tax.\textsuperscript{97} This means that when meeting the eighty-five percent requirement, tax exemption applies only to the “like organization” activities and does not shield the organization’s other ventures from federal taxation.\textsuperscript{98} The eighty-five percent requirement is computed each taxable year, and an REC may fail the test one year while passing it in subsequent years.\textsuperscript{99}

There is a surprising amount of complexity in the eighty-five percent requirement. First, the scope of member income and permissible “losses and expenses” has yet to be settled by the Service and the courts.\textsuperscript{100} In addition, there are a number of categories of income that the federal statute specifically excludes from the eighty-five percent requirement, such as income from “qualified pole rentals” or “nuclear decommissioning” transactions.\textsuperscript{101} The I.R.S. has further determined that profits from the sale of excess fuel at cost during the year of its purchase need not be counted.\textsuperscript{102} While these complexities affect peripheral cases, the basic REC model meets the eighty-five percent requirement when it bills its members at cost and does not deviate from its core business.

\textit{IV. Problems with RECs Today}

\textit{A. Changing Identity}

Most electrical cooperatives were organized with the specific purpose of serving poor rural areas that would not otherwise receive electrical service.\textsuperscript{103} They generally formed as a response to the unwillingness of private power companies to extend service into rural areas,

\begin{itemize}
\item \textsuperscript{97} See id. ("The unrelated business income tax provisions, §§ 511–513, provide that the income of a cooperative exempt under § 501(c)(12) is subject to unrelated business income tax if the income is derived from an activity unrelated to its exempt purpose.").
\item \textsuperscript{98} See id. (concluding that tax exemption does not apply to non-exempt activities, even though the organization’s utility-type activities may be exempt).
\item \textsuperscript{99} See Rev. Rul. 65-99, 1965-1 C.B. 242 (describing the annual computation of the eighty-five percent requirement).
\item \textsuperscript{100} See Clayton S. Reynolds, Tax-Exempt Electric Cooperatives: A Discussion of Issues Relating to the 85% Member Income Requirement, 55 TAX LAW. 585, 600–02 (2002) (exploring various ambiguities in the eighty-five percent member income requirement).
\item \textsuperscript{101} See § 501(c)(12)(C) (excluding income earned from qualified pole rentals, certain sales of electric energy distribution and transmission services, any nuclear decommissioning transaction, or any asset exchange or conversion transaction).
\item \textsuperscript{102} Internal Revenue Service, Publ’n 557: Tax-Exempt Status for Your Org. 58 (2011) ("An electric cooperative’s sale of excess fuel at cost in the year of its purchase is not income for purposes of determining compliance with the 85% requirement.").
\item \textsuperscript{103} See Patrick Dahl, The Next Greatest Thing 40–41 (Richard A. Pence ed., 1986) (describing the incredible lack of services and conveniences in rural areas caused by the lack of electricity in the early twentieth century).
\end{itemize}
and with encouragement of the federal government. Municipal power companies were even less helpful. While the lack of electricity was seen by progressives as an inequity, it took on dramatic new importance as the federal government looked for ways to improve rural economic output during the Great Depression. Thus, the creation of the REA put the government directly in the business of promoting rural electrification, and providing loans and administrative guidance was quickly determined to be the most efficient way forward.

Well before the REA made electrical cooperatives an integral part of the nation’s electrical network, the federal government had granted these and similar cooperatives tax exemption with the Revenue Act of 1918. The exemption was granted—and is maintained today—on the premise that RECs serve a public good without profit motives, and are therefore worthy of tax exemption. Cooperatives and other mutual organizations have enjoyed a privileged status since the first income tax in America, with one senator in 1894 calling the intent to tax such organizations a “crowning infamy.” Popular sentiments aligned with the realities of the time: cooperatives and mutual companies were recognized as ways to protect poor and rural farmers from their precarious economic environment. Furthermore, mutual and cooperative organizations at the time were so small and generated so little income that Congress noted that “[t]he securing of returns from them has been a source of annoyance and expense and has resulted in the collection of either no tax or an amount which is

104. See Brown, supra note 7, at 11–12 (noting the reasons for the slow rate at which rural areas were being wired by investor-owned power companies).
105. See id. at 52 (recounting the unwillingness of municipal power companies to partner with the REA to extend service to rural areas).
106. See id. at 35–39 (discussing the rural electrification work of the Tennessee Valley Authority). The Tennessee Valley Authority was an important forerunner to federal electrification programs. Specifically designed to improve the lives of the people living in and around the Tennessee River in numerous ways, the TVA launched a government-sponsored REC with great success, showing the social and economic benefit of providing electricity to rural areas, but also the financial feasibility of electrical cooperatives. Id.
107. See id. at 47–57 (explaining that the continued refusal of investor-owned power companies left cooperatives as the only viable partners for the REA).
109. See id. § 231(10) (stating that tax exemption for these organizations resulted from their income consisting of fees collected from members for the sole purpose of meeting expenses rather than to collect a profit).
111. See id. at 536 (discussing the rationale for exempting mutual and cooperative organizations).
RECs were viewed as especially noble because of the era in which they emerged. In addition to the hope and modernity they brought to farming communities, electrical cooperatives were seen as a stand by small farmers against greedy capitalists at a time when the Great Depression highlighted the disparities of class and wealth in America. The United States today looks very different, and the question of continued tax exemption of RECs should now be revisited. First and most importantly, the goal of national electrification has been achieved; by 1962, 97.6% of farms were receiving central service station electricity. The REA was created to combat the poverty of rural farming communities, granting them access to a world of mechanized equipment, electric lighting, and indoor plumbing. There is no question that rural areas now have these amenities. No household or business in America today is denied access to electricity because of its geographic location. The mission, therefore, has been successfully accomplished. This is important because the federal government launched the REA and its REC-friendly policies for the sole purpose of rural electrification and development. The REA persists today however, repackaged as the Rural Utility Service within the Department of Agriculture.

In completing the government’s mission, the cooperatives themselves have changed. The first RECs were truly community affairs, with a handful of neighbors organizing a cooperative for the wiring of their farms. Modern RECs are large, complex, and hierarchical organizations often far removed from the community spirit that defined their early years.

113. See DAIHL, supra note 103, at 39–59 (discussing the era in which early RECs, and later the REA, were formed).
115. See AMITY SHILAES, THE FORGOTTEN MAN: A NEW HISTORY OF THE GREAT DEPRESSION 175 (2007) (discussing the government’s goals for rural electrification). The Roosevelt administration’s four goals were to (1) provide electricity to homes and farms; (2) increase its use in all homes to provide a better standard of living; (3) reduce the cost of electricity to the average consumer; and (4) create a “new and more prosperous form of society.” Id.
116. See DAIHL, supra note 103, at 75 (extolling the triumph of the rural electrification cause).
117. See SHILAES, supra note 115 and accompanying text.
119. See DAIHL, supra note 103, at 82 (recounting the creation of the early RECs as community affairs that went door-to-door to secure support for electricity).
The median electrical cooperative has 13,000 members, with the largest having nearly a quarter million spread over 8,100 square miles. RECs today hold monopolies over their service areas, are managed by highly paid professionals, and have lobbyists in Washington. Moreover, they are now widely seen as de facto public utilities because of their obligation to offer membership to all those living in their defined geographic service area, and the necessity of electricity in modern living. This growth and formalization has made RECs into big business: today they collectively serve 42 million people and have assets totaling $140 billion. The $40 billion in revenue that they collected in 2010, however, remains exempt from federal taxation.

In addition, RECs are no longer strictly rural. The communities they serve have grown from rural towns into small cities as suburban sprawl has replaced farmland. The Rural Electrification Act defines rural as any area “not included within the boundaries of any city, village, or borough having a population in excess of fifteen hundred inhabitants.” Although the populations of their service areas have swollen—driving down the distribution costs per customer—RECs have continued to operate as usual. This is sometimes true even where portions of their service area are annexed by a municipality with its own electrical service.

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120. See Co-op Facts and Figures, supra note 2 (listing the median number of members today).
121. See 2011 Annual Report, PEDERNALES ELECTRICAL COOPERATIVE 6, available at http://www.pec.coop/docs/default-source/annual-reports/2011_Annual_Report.pdf?sfvrsn=5 (showing the Pedernales Electrical Cooperative in Texas to be the largest REC in the country, with 203,810 members holding 242,331 active accounts at the close of 2011 and covering a service area nearly the size of New Jersey) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
122. See Cooper, supra note 34, at 339 (stating that the NRECA serves as the trade association and lobbying arm for RECs).
123. See ROGER D. COLTON, THE REGULATION OF RURAL ELECTRIC COOPERATIVES § 1.1.2 (1993) (noting the different factors that have generally led modern courts to conclude that RECs are public utilities, even where exempt from state utility commission jurisdiction).
125. See COLTON, supra note 123 (noting the revenue RECs received in 2010).
126. See GARWOOD & TUTHILL, supra note 6, at 27 (discussing the rise in urban sprawl and its relation to RECs).
128. See Co-op Facts and Figures, supra note 2 (showing the current status of electric cooperatives and their relative distribution cost to investor- or publicly-owned corporations).
129. See, e.g., City of Morgan City v. S. Louisiana Elec. Co-op. Ass’n, 31 F.3d 319, 324 (5th Cir. 1994) (determining that a municipality’s attempt to condemn an REC’s service area so that the members would become customers of the municipal power company was
currently provide electricity to suburbs of cities such as Atlanta, Orlando, Washington, D.C., Cincinnati, Fort Worth, Austin, Denver, and Nashville. 130 Today wholly 29.2% of the counties served by RECs are classified as metropolitan, 9.4% of which have populations of one million or more. 131 These changes are significant because of the economic realities they represent. REC tax exemption is premised on the belief that cooperative members are too dispersed for electrical service to be provided to them profitably. 132 If population densities are such that other power companies can now profitably provide electricity to a cooperative’s service area, the REC’s tax exemption no longer advances the public interest, and should not continue. In sum, the reality of modern RECs is far different than their venerable forebears. The sentiments that insulated the first generation of RECs from taxation regulation are not applicable to modern RECs.

B. Straying from Their Mission as RECs and Tax-Exempt Nonprofits

Many electric cooperatives today have drifted from their duties as nonprofits and their obligations as cooperatives. First, some RECs are failing to provide “at-cost” service to their members by unnecessarily retaining member equity rather than refunding it or lowering their rates. 133 While there is no bright line rule governing the return of member equity or the lowering of rates, RECs have kept an increasing portion of member equity that should have been returned to their members or not collected at all. 134 In 2006 alone, equity across all RECs grew by $2 billion, though only $499 million was refunded. 135 Because members are not generally provided with statements of their total equity in the organization (though such impermissible and frustrated the purpose of the Rural Electrification Act to provide affordable power to rural areas).

130. See Cooper, supra note 34, at 350 (listing a number of cities the suburbs of which have expanded into regions served by RECs).
132. The cooperative model was promoted by the REA only after investor-owned and municipal power companies found serving rural areas prohibitively expensive. See Brown, supra note 7, at 48–54 (recounting how that agency had originally planned to work with private power companies).
133. See Cooper, supra note 34, at 355–56 (explaining the practice of retaining member equity and producing non-itemized bills for cooperative members).
134. See id. at 351 (discussing the volume of member equity that RECs now keep).
135. See id. at 352 (noting that these large refunds represent only a fraction of the sum that could be refunded).
records must be kept) or the refund rates of other cooperatives, they are left uninformed, grateful for any funds returned to them.\textsuperscript{136} The funds retained by RECs are used in lieu of loans because they are viewed as even less expensive and more readily available than subsidized loans from the Rural Utilities Service.\textsuperscript{137} Member equity is also used to fund efforts to prevent mergers and takeovers, despite the fact that such takeovers could result in greater efficiency and lower rates for members.\textsuperscript{138} Even when not used in these ways, equity is not actively benefitting members: A number of metrics suggest that RECs are overcapitalized by roughly ten to thirty percent.\textsuperscript{139} Despite their obligation to remit capital, the lax oversight and minimal reporting requirements make returning member equity difficult to monitor and enforce.\textsuperscript{140} Easy access to member equity funds weakens the incentive for more efficient operation, and does not comport with cooperatives’ member-focused principles.\textsuperscript{141}

In addition to withholding member equity, some RECs have expanded their operations away from electrical generation and transmission.\textsuperscript{142} Most of these new ventures are in other utility sectors (sewer, water, telephone, etc.), but some are simply for-profit subsidiary ventures.\textsuperscript{143} As mentioned above, the I.R.S. now allows cooperatives to distribute propane, even though this activity is unrelated to electricity and is not a utility-type activity.\textsuperscript{144} Some RECs have gone even further, using subsidiaries to diversify into golf courses, newspapers, shopping centers, }

\footnotesize{\textsuperscript{136} See id. (discussing the rate at which RECs refund member equity and the disclosures surrounding this rate).
\textsuperscript{137} See id. at 367 (explaining that REC administrators view member equity as a free or extremely cheap source of capital).
\textsuperscript{138} See id. at 340 (noting that most RECs contribute to a fund that serves to prevent takeover attempts and territorial disputes).
\textsuperscript{139} See id. at 365 (concluding that RECs are overcapitalized based on their TIER and equity as a percent of assets).
\textsuperscript{140} See id. at 345 ("Co-ops continue to be largely free from regulation due to political reluctance to interfere with what appear from the outside to be smoothly-running operations. . . . Customer ownership is another reason for lack of scrutiny. In theory, electric co-ops are continually self-regulating . . . .")
\textsuperscript{141} See id. at 351 (stating that NRECA has warned its members to return member equity in order to preserve their tax and legal statuses).
\textsuperscript{142} See id. at 341 (discussing a Texas cooperative that borrowed money to buy a golf course).
\textsuperscript{144} See supra notes 69–70 and accompanying text.}
and hotels. While income from these activities would presumably be classified as taxable “nonmember” income for purposes of the eighty-five percent requirement, such an expansion into for-profit ventures shows the need for regulatory oversight and runs counter to the spirit which granted RECs their tax-exempt status.

V. Remedies

A. New Scrutiny of Nonprofits

Taken as a whole, nonprofit electrical cooperatives today act much like their for-profit counterparts. Despite their humble roots, today’s RECs are large and professionally managed organizations that are a far cry from their populist past. Moreover, many seem to have lost focus on their member-centric mission, failing to adhere to their traditional nonprofit purposes.

This situation is not unique to RECs. Nonprofit hospitals have seen their purpose and place in the community change in a manner that mirrors what has happened to electrical cooperatives. Originally founded as almshouses to provide medical care to the poor, hospitals have transformed into large, professional, and economically viable businesses with wealth and power far exceeding their charitable forebears. This transformation has resulted in charges that nonprofit hospitals do not

145. See Steven Mufson, Defaults Plague Little-Known Lender, WASH. POST, Apr. 30, 2007, at D1 (discussing the financial problems related to some RECs’ non-utility investments).

146. See Reynolds, supra note 100, at 596 (discussing the I.R.S. conclusion that all subsidiary income is classified as non-member income).

147. See Roger D. Colton & Doug Smith, Co-Op Membership and Utility Shutoffs: Service Protections that Arise as an Incident of REC Membership, 29 IDAHO L. REV. 2, 2–3 (discussing the populist movement from which RECs developed and the similarities between RECs and investor-owned utilities).

148. See id. at 5 (“RECs are no longer small groups of individuals who have voluntarily banded together to serve themselves.”).

149. See id. (“RECs are most often large, complex, hierarchical organizations that are often far removed—physically as well as in spirit—from the needs of their less fortunate members.”).

150. See, e.g., James B. Simpson & Sarah D. Strum, How Good a Samaritan? Federal Income Tax Exemption for Charitable Hospitals Reconsidered, 14 U. PUget Sound L. Rev. 633, 663 (“Charitable hospitals have become wealthy institutions, with power and presence in the community far beyond their almshouse forebears.”).

151. See id. (discussing the practice of charitable hospitals denying care to those for whom they were meant to provide care).

152. See id. at 634–44 (discussing changes in the hospital industry).
provide charitable care sufficient to justify their tax exemption.\footnote{153} Because the public they serve is not meaningfully different from their for-profit counterparts, these hospitals have been subjected to increasing scholarly criticism for the tax breaks that they receive.\footnote{154}

The line between nonprofit and for-profit activities has blurred in other sectors as well.\footnote{155} Nonprofits have increasingly entered sectors once reserved for private industry or government, prompting complaints of unequal tax burdens for otherwise equal organizations.\footnote{156} In 1984, the Small Business Administration released a report that questioned the continued value of tax-exemption for nonprofits that did not provide a clear public benefit.\footnote{157} Although this report and subsequent Congressional hearings\footnote{158} did not ultimately change the Service’s treatment of nonprofits, the subject continues to be discussed by Congress and the general public.\footnote{159}

\subsection*{B. Increased Oversight}

Many of the more troubling REC activities persist in part because of lax oversight.\footnote{160} The malfeasance of electrical cooperatives received

\begin{footnotes}
\footnotetext[153]{See Cong. Budget Office, 109th Cong., Nonprofit Hospitals and the Provision of Community Benefits 2 (2006), available at http://www.cbo.gov/fpdocs/76xx/doc7695/12-06-Nonprofit.pdf (finding that 4.7\% of operating expenses go to uncompensated care, which is not significantly greater than the 4.2\% spent by for-profit hospitals).}
\footnotetext[154]{See, e.g., M. Gregg Bloche, Health Policy Below the Waterline: Medical Care and the Charitable Exemption, 80 Minn. L. Rev. 299, 404 (1995) (“[T]he current federal tax exemption of nonprofit hospitals is neither explicable nor justifiable in terms of the logic or efficiency or reward for virtue.”).}
\footnotetext[155]{See Heather Gottry, Profit or Perish: Non-Profit Social Service Organizations & Social Entrepreneurship, 6 Geo. J. On Poverty L. & Pol’y 249, 250 (1999) (suggesting that the operations of nonprofits are very similar to those of for-profit businesses because nonprofits also generate large profits, pay high salaries, make investments, and engage in lobbying efforts).}
\footnotetext[156]{See id. at 256 (“As non-profits began to enter the for-profit arena, the Small Business Administration and a collection of other trade groups began pressuring the Government to . . . decrease the overall tax exemptions granted to non-profits.”).}
\footnotetext[157]{See Office of Advoc., U.S. Small Bus. Admin., Unfair Competition by Nonprofit Organizations with Small Business: An Issue for the 1980s (1983) (“[T]he fact that nonprofits are increasingly competing with for-profit firms in a wide range of activities is evidence that many nonprofits are not providing ‘public goods’ which private competitive firms will not otherwise provide.”).}
\footnotetext[159]{See Gottry, supra note 155, at 273 (noting the continued interest in the subject despite the lack of Congressional action).}
\footnotetext[160]{See Colton & Smith, supra note 147, at 4 (highlighting that RECs are not within the jurisdiction of state public utility commissions).}
\end{footnotes}
Congressional attention in 2008 after directors of the nation’s largest REC gave themselves excessive salaries, bonuses, and other compensation whilst using $700,000 of member equity to fund lavish personal travel and entertainment. These abuses stemmed from the lack of transparency in the REC’s operation and the closed election process. While cooperative leaders sought to paint the incident as an isolated case of board corruption, the investigation highlighted how little information members have about the operations of their cooperatives.

Electric cooperatives are subject to minimal regulatory oversight. As de facto public utilities, RECs are subject to consumer protection statutes and common law duties to the people in their service areas. Additionally, the principles and structure that undergird cooperatives are designed to prevent the sort of abuses that can manifest with private utilities. While these elements are theoretically sufficient, in reality they are inadequate to prevent inefficiencies and the mistreatment of members. Despite the prevalence of state statutes addressing the formation and operation of cooperatives, state utility commissions do not generally govern RECs. In fact, only thirteen states regulate the rates charged to members, a mere seven of which regulate RECs comparably to private power companies. The Federal Energy Regulation Commission has authority over wholesale sales and bulk transmission of electric power, but is explicitly excluded from regulating cooperatives.


162. See id. (noting, through the statements of several witnesses, that lack of oversight and the closed election of directors were at the root of the abuses).

163. See id. (underscoring the lack of information that the members had as the events unfolded).

164. See Colton & Smith, supra note 147 and accompanying text.

165. See Colton, supra note 123, ¶ 4 (discussing the common law duties that RECs owe to their members and to the people in their service areas).

166. See Melissa A. Jamison, Rural Electric Cooperatives: A Model for Indigenous Peoples’ Permanent Sovereignty Over Their Natural Resources, 12 Tulsa J. Comp. & Int’l L. 401, 440 n.255 (2005) (“The [investor-owned utilities] would only provide such services if farmers would pay costs of construction, which at the time, could be as high as $2,000 per mile.”).

167. See Colton & Smith, supra note 147, at 5 (arguing for consumer protections from RECs similar to those that consumers have from investor-owned utilities).

168. See Gottry, supra note 159 and accompanying text.

169. See Cooper, supra note 34, at 342 n.50 (discussing the state regulation of RECs).

Utilities Service has authority over RECs, but can only enforce affirmative covenants, spending limitations, and financial disclosure requirements connected to its loans.\textsuperscript{171} Moreover, almost half of the money loaned to electrical cooperatives today comes from the National Rural Utilities Cooperative Finance Corporation, a nonprofit bank created by the RECs.\textsuperscript{172} Loans originating from this lender have no public reporting requirements.\textsuperscript{173} In fact, the only organization that has authority over all electrical cooperatives is the I.R.S., which can withhold tax-exempt status from organizations that do not meet its exemption prerequisites.\textsuperscript{174} Furthermore, I.R.S. Form 990, which must be completed by all tax-exempt organizations annually, is the only publicly available document common to all electrical cooperatives.\textsuperscript{175} In sum, RECs are largely unmoored from regulatory oversight, and face only negligible public reporting requirements.\textsuperscript{176}

There is no doubt that a state-sanctioned regional monopoly of an essential service raises the potential for abuse and inefficiency.\textsuperscript{177} Municipal and investor-owned utilities are subject to rate and other regulations by federal and state utility commissions because of the inherent vulnerability of their customers.\textsuperscript{178} RECs have escaped this regulation by claiming that they are not utilities but are instead nonprofits created to serve the public agency, and giving neither the Federal Power Commission nor its successor agency, the Federal Energy Regulatory Commission, authority to regulate RECs).

\textsuperscript{171.} See Cooper, \textit{supra} note 34, at 344 (describing the limited authority that the Rural Utility Service has over cooperatives).

\textsuperscript{172.} See Keck, \textit{supra} note 8, at 57 (discussing the National Rural Utilities Cooperative Finance Corporation, which was formed by RECs at the urging of Congress as way to reduce reliance on REA loans).

\textsuperscript{173.} See Cooper, \textit{supra} note 34, at 344 (stating that these loans do not require public disclosures).

\textsuperscript{174.} See Seto & Chasin, \textit{supra} note 59 and accompanying text.

\textsuperscript{175.} See Cooper, \textit{supra} note 34, at 359–60 (“The only new window on co-op performance is the availability of IRS Form 990, a disclosure required from any tax-exempt entity.”).

\textsuperscript{176.} See id. at 343 (“[C]o-ops are lightly regulated at both the federal and state level.”).

\textsuperscript{177.} See Note, \textit{Condemnation of Public Utilities: A New York Statute and a New Approach}, \textit{54 Colum. L. Rev.} 916, 916 (1954) (“But since monopolistic power opens the door to abuse, these . . . utilities are ordinarily subjected to government regulation.”).

\textsuperscript{178.} Public utilities commissions are found in all fifty states and are represented collectively by the National Association of Regulatory Utility Commissions. These commissions generally cite consumer protection as one of their missions. For example, the California Public Utilities Commission states on its website that it “serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, with a commitment to environmental enhancement and a healthy California economy.” \textit{Cal. Pub. Util. Comm’n}, http://www.cpuc.ca.gov/puc/ (last visited Oct. 3, 2013) (on file with the \textit{Washington and Lee Journal of Energy, Climate, and the Environment}).
The courts no longer accept this line of argument, and one court notes that designation as a utility “does not depend on legislative definition, but on the nature of the business or service rendered.” Yet RECs are nonetheless specifically exempt from most state utility commissions. This freedom from scrutiny is premised on the idea that, in addition to their noble and populist past, the cooperative model was inherently self-regulating and without profit motive. Electrical cooperatives, the argument went, did not need regulation. While this may have been true at the time of their provincial origins, their present size and complexity undermines this rationale, as evidenced both by the scandals that have emerged and the persistent failure of cooperatives to refund member equity. Because today’s RECs can subject their members to abuses and overcharges no different than investor-owned or municipal power companies, they should now face similar regulatory scrutiny. Cooperatives may argue that the rural nature of their members drives up their per-capita distribution costs, making their rates incomparable to the more densely populated areas served by private and municipal power companies. However, these differences are minimal and shrinking, and are easily outweighed by the need for transparency and oversight. Subjecting RECs to the same cost-of-service regulations as their municipal and investor-owned peers would ultimately benefit their members.

Increased transparency could eliminate some of the more problematic electric cooperative activities. For example, the I.R.S. could require RECs to annually disclose data relating to their member equity accounts. Cooperatives forced to disclose the amount of member equity

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179. See Colton, supra note 123, § 1.1.2 (discussing the determinative characteristics of whether RECs should be treated as a public utility).
181. See Cooper, supra note 34, at 342 n.53 (noting that only thirteen states regulate RECs).
182. See id. at 345 (noting that RECs appear to some to be “smooth running operations”).
183. See id. (“In theory, electric co-ops are continually self-regulating . . . .”).
184. See supra Part IV, supra.
185. See Colton & Smith, supra note 167 and accompanying text.
186. See Keck, supra note 8, at 70–71 (discussing the differing costs of serving rural versus urban customers).
187. See id. (concluding that these differences are negligible).
188. See Cooper, supra note 34, at 368 (arguing “at cost” service will see reduced rates, volume, or patronage capital, which are benefits for members).
189. See id. at 370 (highlighting governance as a way to achieve “at cost” service and prevent cooperatives from retaining surplus member equity).
190. See id. at 373 (“Empowerment begins with requiring all co-ops to disclose each member’s equity stake at least annually.”).
they retain would feel pressured to return more of it because members would have more insight into the finances of their cooperative. In the absence of other regulations, such disclosure could be achieved through amendments to I.R.S. Form 990. This form was revised in 2008 to encourage good governance of tax-exempt organizations through increased transparency. The revisions have dramatically increased the required disclosures of financial information and governance practices. Most notably, the form seeks to address concerns surrounding nonprofit hospital activities by requiring them to complete a series of industry-specific questions in Schedule H, on the theory that requiring the disclosures will yield better practices. RECs could be tasked with a similar reporting requirement. Requiring disclosures specific to RECs could force these cooperatives to publicly release financial and governance information important to their members. Although they do not share the community benefit requirement of hospitals or other charities, RECs could provide information about financial health, voting policies, and equity accounts that would likely be of interest to their members. Members would then be able to make informed decisions when voting in REC board elections, and could replace directors with whom they became sufficiently dissatisfied.

191. See id. at 339 (“[C]o-ops have tried to hide information from their members—information to which owners are entitled in other business contexts.”).
193. See id. at 10 (describing recent changes to the Form 990).
194. See id. (detailing the different types of information that the revised Form 990 requires to be disclosed).
196. See Cooper, supra note 34, at 359 (arguing comparisons with other cooperatives would allow for greater industry-wide understanding of cooperative procedures).
198. See Cooper, supra note 34, at 373 (discussing methods of empowering cooperative members, such as disclosure of members’ equity and allowance of proxy voting).
199. See Puget Sound Plywood, Inc., 44 T.C. at 308 (noting the democratic nature of cooperatives).
C. Removing Tax-Exempt Status

Increasing the disclosure requirements in Form 990 will fully address the complexity and varied operations of RECs today. While additions to this disclosure statement might provide valuable information, they would not go far enough to protect members from abuse and inefficiency, nor would they empower individual members who live within state-ordained regional electrical monopolies. RECs may have been originally exempt from federal income taxation because of their humble and honorable purpose, but they were also exempt on the theory that there would be no income to tax; every dollar that the cooperative did not spend on its operations was to be returned to the members.200 Thus, such cooperatives were nonprofits by design.201 Modern RECs that retain member equity above their operating costs undermine this rationale.202 Their use of member funds for non-operational expenditures shields them from market forces that might encourage more efficient business practices.203 Because members lack information about the funds owed to them and the value they receive as members, RECs have little incentive to seek more honest and efficient operations.204

A better approach may be to remove the § 501(c)(12)(C) exemption entirely.205 While this might at first appear unduly harsh to RECs, the reality is that this change would free them to pursue ventures available to other power companies while simultaneously encouraging more efficient operations.206 This is not to say that RECs would be abolished and replaced with investor-owned corporations.207 Removing their tax exemption would not alter their status as cooperatives or their duty to conform to cooperative principles: RECs would still be obligated to serve members rather than

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200. See Seto & Chasin, supra note 57, at 178 (discussing the centrality of the subordination of capital to the cooperative structure).
201. See Cooper, supra note 34, at 345–46 (discussing fundamental characteristics of electric cooperatives at their creation, including their status as non-profit companies).
202. See id. at 350–51 (noting that NRECA found that the failure of cooperatives to return equity to their customers was a fundamental problem).
203. See id. at 363–67 (“Some co-ops operate almost entirely on equity, if only due to their board’s distaste for debt. Equity is perceived as either costless or extremely cheap.”).
204. See id. at 352 (stating that members are grateful for any refund and do not compare their investment with their refund).
205. See id. at 375 (acknowledging the possibility of removing tax exempt status from wealth cooperatives).
206. See id. at 374 (“Selective removal [of federal subsidies] could also be an effective enforcement tool against co-ops that refuse to become more efficient or member-friendly.”).
207. See Clayton S. Reynolds, What Then to Do with A Non-Cooperative Cooperative?, 56 TAX LAW. 825, 825 (2003) [hereinafter Non-Cooperative Cooperative] (explaining that the primary purpose of cooperatives still is to provide the best price to their members).
investors, provide equal voting for members, and remit member equity. \textsuperscript{208} Rather, they would be taxed as non-exempt cooperatives. \textsuperscript{209}

Subchapter T of the Code governs the taxation of non-exempt cooperatives. \textsuperscript{210} Even before this Subchapter was enacted as part of the Revenue Act of 1962, \textsuperscript{211} it was the Service’s longstanding position that member equity distributed to members could be deducted from a cooperative’s taxable income, provided that it was operating according to cooperative principles. \textsuperscript{212} Under this arrangement, cooperatives are subject to taxation like any corporation, but with the ability to deduct the equity returned to members. \textsuperscript{213} To take advantage of this subchapter, they still must operate according to cooperative principles. \textsuperscript{214} Subchapter T additionally requires that cooperatives separate their member and non-member income when calculating their gross income so that they cannot use an operating loss of their membership activities to offset gains from non-member activities. \textsuperscript{215} While the I.R.S. has advocated that fifty percent of the cooperative’s value should be derived from members, \textsuperscript{216} it conceded that failing to meet this benchmark would not deny a cooperative access to the benefits of Subchapter T. \textsuperscript{217}

\textsuperscript{208} See id. at 828 (discussing the requirement that non-exempt cooperatives still follow cooperative principles).
\textsuperscript{210} See I.R.C. § 1381(a)(2)(C) (excluding cooperatives “engaged in furnishing electric energy” to rural areas from this subchapter).
\textsuperscript{212} See Rev. Rul. 54-10, 1954-1 C.B. 24 (1954) (“A cooperative association may exclude from its gross income true patronage dividends when made pursuant to a prior agreement between the cooperative organization and its patrons.”); see also Rev. Rul. 57-59, 1957-1 C.B. 24 (1957) (concluding that income derived from non-members cannot be excluded from gross income).
\textsuperscript{214} See Non-Cooperative Cooperative, supra note 207, at 828 (noting the I.R.S. requirement that organizations adhere to fundamental cooperative principles in order to take advantage of Subchapter T).
\textsuperscript{215} See Farm Serv. Co-op. v. Comm’r, 619 F.2d 718, 727 (8th Cir. 1980) (stating that member and non-member income must be segregated for the purposes of calculating gross income).
\textsuperscript{216} See Rev. Rul. 72-602, 1972-2 C.B. 510 modified by Rev. Rul. 93-21, 1993-1 C.B. 188 (explaining the I.R.S.’s position that fifty percent of the company’s business needed to come from members to maintain cooperative status under Subchapter T).
\textsuperscript{217} See Rev. Rul. 93-21, 1993-1 C.B. 188 (abandoning its previous stance).
RECs would presumably object to losing their tax-exempt status.\textsuperscript{218} Although their tax burden would be small compared to their size, the amount of taxation could still be substantial.\textsuperscript{219} Their trade organization, NRECA, would object to this change because it undermines the REC image as organizations committed to community improvement.\textsuperscript{220} Nonetheless, removing RECs’ § 501(c)(12) exemption and subjecting them to taxation as non-exempt cooperatives would have two significant benefits.\textsuperscript{221} First, it would allow a cooperative to pursue income from non-member patrons without restrictions on the business activity or a member-business requirement.\textsuperscript{222} Such activities would be taxed separately from unallocated member income, in order to prevent the offsets previously mentioned.\textsuperscript{223} This would allow RECs that want to diversify into new areas the room to do so without the limitations of the eighty five percent requirement.\textsuperscript{224} However, because RECs do not have investors, there would be little incentive to engage in projects that do not benefit members.\textsuperscript{225} Permitting electrical cooperatives to diversify would allow them to meet the needs of their members more successfully.\textsuperscript{226}

\begin{itemize}
  \item \textsuperscript{219} See Farm Serv. Co-op., 619 F.2d at 727 (“A nonexempt cooperative simply may not use patronage losses to reduce its tax liability on nonpatronage-sourced income.”).
  \item \textsuperscript{221} See Miller, supra note 213, at 358 (“Very early on, it became evident that they could function more efficiently if they commanded large sums of money beyond what could be raised from outside lenders.”).
  \item \textsuperscript{222} See id. at 359 (discussing the how the Service categorizes different forms of cooperative income).
  \item \textsuperscript{223} See id. (discussing the different tax treatment of member and non-member income).
  \item \textsuperscript{224} See Rev. Rul. 2002-54, 2002-2 C.B. 527, supra note 95 and accompanying text.
  \item \textsuperscript{225} See Mufson, supra note 145, at D1 (quoting a Fitch rating analyst’s claim that a cooperative’s primary goal is to provide competitive rates for its members).
  \item \textsuperscript{226} For example, Dominion, an investor-owned utility spanning four states, offers customers a variety of home protection services that augment the electrical, gas, and water services it provides. See Home Protection, Dominion Energy Solutions, https://dominionenergy.com/en/home-protection (last visited Oct. 3, 2013) (presenting a range of services that Dominion offers in addition to providing electricity) (on file with the Washington and Lee Journal of Energy, Climate, and the Environment).
\end{itemize}
In addition to allowing them to expand the menu of services they offer, ending the tax exemption of electrical cooperatives would greatly incentivize the distribution of member equity. 227 RECs would be able to exclude from taxation not only income from members, but also the income from any activity directly related to the cooperative’s principle function. 228 Because holding onto member equity increases the tax burden, cooperatives would be more willing to stand by their cooperative principles and return equity to the members. 229 A prototypical REC would be subject to only the smallest amount of taxation because almost all of its income over operating costs would be vested in member accounts and distributed to members on a regular basis. 230 Because this remittance could have tax consequences for some members, the cooperative would be pressed to charge members as near cost as possible. 231 The nuances of Subchapter T and the permutations of its application are beyond the scope of this note. It is nonetheless clear that taxation encourages RECs to remit member equity and pursue more efficient operations. 232

VI. Conclusion

Some RECs retain many characteristics from their New Deal-era creation as democratically managed organizations serving poor rural communities that might otherwise struggle to afford electric service. 233 Many others are now large and professionally managed organizations whose members view them as little different from for-profit utilities. 234 Such organizations lack transparency or accountability, allowing inefficient and detrimental practices to fester. 235 Without regulations, disclosures, or taxation, there is no outside force to encourage RECs to pursue honest and efficient operations. 236 The tax and regulatory exemptions that RECs have maintained through the years serve no contemporary purpose and fail to

227. See Reynolds, supra note 207, at 837 (highlighting the I.R.S.’s arguments regarding consequences of failure to operate at cost).
228. See Miller, supra note 213, at 365–67 (discussing the types of income that are considered “directly related” to a cooperative’s principle business).
229. See Reynolds, supra note 227 and accompanying text.
230. See Cooper, supra note 183 and accompanying text.
231. See Miller, supra note 213, at 362 (discussing the tax consequences that cooperative distributions would have for different members).
232. See Reynolds, supra note 227 and accompanying text.
233. See Colton & Smith, supra note 34, at 336 (“Most co-ops operate in a few rural counties where customers live far apart . . . .”).
234. See Bloche, supra note 154 and accompanying text.
235. See Colton & Smith, supra note 167 and accompanying text.
236. See Colton & Smith, supra note 164 and accompanying text.
benefit cooperative members. On the contrary, they shield cooperatives from their obligations to remit equity to their members and seek more efficient business practices. Lifting the tax exemption of § 501(c)(12) would subject RECs to taxation under Subchapter T of the Internal Revenue Code, which would encourage efficient practices, allow expansion into new ventures, and expose it to a greater degree of market forces. The government sought to help rural citizens gain access to electricity by protecting electric cooperatives from taxation and regulation. These protections now work to insulate cooperatives that do not act in their members’ best interest. Maybe it is time for them to end.

237. See Cooper, supra note 188 and accompanying text.
238. See Cooper, supra note 205 and accompanying text.
239. See Cooper, supra note 206 and accompanying text.
240. See BROWN, supra note 22 and accompanying text.
241. See Cooper, supra note 206 and accompanying text.
“To Comply or Not To Comply?” An Argument in Favor of Increasing Investigation and Enforcement of MARPOL Annex I Violations

Katriel Statman*

Abstract

The 1973 International Convention for the Prevention of Pollution from Ships and the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) seek to protect the world’s oceans from environmental harms. Traditional maritime law, principles of international law, and difficulties in detecting violations of MARPOL 73/78 have made it difficult for nations to enforce the strict requirements regarding oil pollution under Annex I. In light of these difficulties, the United States authorities have used other means under United States law to prosecute these violations. This note argues that while the United States’ increased enforcement is controversial it is necessary in order to ensure that MARPOL 73/78 is effective and to protect the world’s oceans from environmental disaster.

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* 2014 J.D. Candidate, Washington and Lee University School of Law. I would like to thank Professor Sarah Wiant for her never-ending help, assistance, and feedback during this process, as well as Christopher Nolan for helping me find a topic in admiralty law. I would also like to thank my wife and family for their never-ending support.
When the words “oil,” “pollution,” and “ocean” are put together, an instant mental reaction is to think of the Deepwater Horizon events of 2010 or the Exxon-Valdez event of 1989. Yet tremendous disasters such as these do not generate the majority of oil pollution in our world’s oceans today. The vast majority of ocean oil pollution comes from discharges of oil and oily mixtures from shipping operations. Even though these discharges violate the 1973 International Convention for the Prevention of Pollution from Ships and the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from ships (taken together, MARPOL), compliance with the provisions of the treaty is poor.

1. See Andrew Griffin, MARPOL 73/78 and Vessel Pollution: A Glass Half Full or Half Empty?, 1 IND. J. GLOBAL LEGAL STUD. 489, 489–90 (1994) (discussing the accessibility and newsworthy nature of large disasters such as Exxon Valdez compared to operational discharges).

2. See David P. Kehoe, United States v. Abrogar: Did the Third Circuit Miss the Boat?, 39 ENVTL. L. 1, 3 (Winter 2009) (comparing the volume of oil from the Exxon Valdez spill with the annual volume of oil discharged from daily operations).

3. See id. (explaining the vast amount of oil dumped in the ocean is from operation of large vessels).

Over the past twenty years, the United States has increased enforcement of violations of MARPOL, as codified in the Act to Prevent Pollution from Ships (APPS). The United States has received criticism both for the practice of using whistleblowers as an investigatory tool and for aggressively prosecuting MARPOL violators. If oil pollution in the world’s oceans is to be eradicated, the United States must increase enforcement against the companies that own, operate, and have direct control over shipping and transportation in the oceans.

This Note considers whether increased enforcement of MARPOL and APPS is effective and has been an effective tool in the attempt to eradicate or reduce oil pollution from our oceans. Part II addresses the history, background, and litigation surrounding MARPOL and the APPS in the United States. Part III asks whether a large whistleblower award is an effective tool, whether the United States is violating principles of international law, and which parties should prosecute MARPOL violations. The final part of this Note examines a number of different options regarding solutions to increase enforcement of MARPOL, and argues that an increased use of the whistleblower provisions, increased penalties for MARPOL violators, and mandatory whistleblower awards are necessary to further incentivize voluntary compliance and promote the goals of MARPOL.


7. See Berg, supra note 6, at 254–55 (explaining that clients are being warned globally of the potential increases in liability exposure); see also Chalos & Parker, supra note 6, at 209–10 (explaining that the United States pursues an aggressive prosecutorial style for deliberate violations of environmental laws and regulations).
II. Background


In the 1950s, the British government was concerned with ocean oil pollution because it had started to encroach on the British coast. In 1954, the International Convention for the Prevention of Pollution in the Sea by Oil (OILPOL 54) was drafted and implemented by the thirty-two countries responsible for the majority of merchant shipping tonnage in the world. “[OILPOL 54] prohibited the discharge from any tanker of oil and oily mixtures of more than 100 parts per million, and established prohibition zones extending 50 miles from the shoreline in which intentional discharges were totally prohibited.”

In 1962 and 1969, OILPOL 54 underwent significant amendments due to poor enforcement and the lack of available technology required for compliance. The 1962 amendments enlarged the prohibition zones and prohibited any vessel that was 20,000 tons or greater from discharging oil or “oily mixtures.” Due to a lack of incentives for ship owners to use the available technology to separate oil from bilge water and use on-shore reception facilities, the 1962 amendments failed to effectively increase compliance. The 1969 amendments allowed ships to use a load-on-top procedure to separate oil from bilge water. Because the load-on-top

11. Id.
12. See id. at 760–61 (explaining that a poor record of enforcement and lack of available technology led to a conference to amend OILPOL 54).
14. See DE LA RUE & ANDERSON, supra note 10, at 760 (discussing the shortfalls of the 1962 amendments to OILPOL 54 and the need for more amendments).
15. See Griffin, supra note 1, at 492 (describing load-on-top as “a procedure in which operational waters are allowed to settle during the voyage back to the loading port,” giving oil and water time to separate so the water can be siphoned off, after which new cargo can be
procedure was too difficult to use and implement, it also failed to significantly reduce oil pollution.\textsuperscript{16}

In 1973 an International Conference was held to bring OILPOL 54 in line with modern tanker practices and operations.\textsuperscript{17} This conference produced the International Convention for the Prevention of Pollution from Ships (MARPOL 73).\textsuperscript{18} MARPOL 73 was the first comprehensive regime that aimed to completely eradicate the intentional pollution of the oceans by oil and other harmful substances,\textsuperscript{19} including noxious liquid substances carried in bulk, harmful substances carried in package form, sewage, garbage, and air pollution.\textsuperscript{20}

In 1978 another convention was convened to address the high costs and mandatory requirements of MARPOL 73.\textsuperscript{21} The Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships (MARPOL 78)\textsuperscript{22} was adopted and allowed any state that ratified MARPOL 78 to automatically ratify MARPOL 73.\textsuperscript{23} MARPOL 78 included more stringent requirements for oil management and discharges during daily ship operations.\textsuperscript{24}

President Jimmy Carter signed MARPOL 73/78 in 1978, and the United States Senate ratified the treaty in 1980.\textsuperscript{25} MARPOL 73/78 is not a

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\textsuperscript{16}“loaded on top of the oily slop”); see also De La Rue & Anderson, supra note 10, at 760 (discussing the changes to OILPOL 54 required to promote compliance).

\textsuperscript{17} See De La Rue & Anderson, supra note 10, at 760–61 (discussing the difficulties that the 1969 amendments to OILPOL 54 faced); see also Griffin, supra note 1, at 492 (“The difficulty with LOT is that in order to be effective it requires a skilled and conscientious crew to follow the correct procedures. Also, since the separation process takes considerable time, LOT does not work well for short coastal voyages.”).

\textsuperscript{18} See id. (explaining the history of MARPOL 73).

\textsuperscript{19} See id. at 761–71 (summarizing the results of the 1973 Convention); see generally MARPOL 73, supra note 4 (laying out the agreement produced at the 1973 convention).

\textsuperscript{20} See id. at 760–61 (noting the importance of MARPOL 73 to international law).

\textsuperscript{21} See MARPOL 73, supra note 4, Annexes II–VI (governing these forms of pollution).


\textsuperscript{23} See id. art. I(2) (incorporating MARPOL 73 and MARPOL 78 into a single instrument); see also De La Rue & Anderson, supra, note 10, at 765 (discussing the process for adoption of MARPOL 78).

\textsuperscript{24} See De La Rue & Anderson, supra note 10, at 765–71 (noting some of the changes that MARPOL 78 made to MARPOL 73).

\textsuperscript{25} See 126 Cong. Rec. 18, 492–93 (July 2, 1980) (voting to ratify MARPOL 78); 2 Thomas J. Schoenbaum, Admiralty and Maritime Law 240 (4th ed. 2004) (discussing the United States legislative history with respect to MARPOL 78).
self-executing treaty and became part of United States law when the Act to Prevent Pollution from Ships (APPS) was enacted in 1980. The APPS repealed the United States implementing legislation for OILPOL 54. The treaty came into force in 1983 when, “twelve months after the date on which not less than fifteen states, the combined merchant fleets of which constitute not less than 50 per cent of the gross tonnage of the world’s merchant shipping, have become parties to it in accordance with Article IV.” MARPOL has been signed and ratified by 152 countries, representing ninety-nine percent of the world’s shipping tonnage.

B. Relevant Provisions of MARPOL 73/78 and the APPS

The APPS applies to ships that operate under the authority of the United States, and with respect to Annexes I and II, any ship within the navigable waters of the United States. Under Annex I, the United States has jurisdiction to enforce all violations of MARPOL/APPS within the navigable waters of the United States. The navigable waters of the United States for APPS are defined as the territorial waters of the United States, reaching out to twelve nautical miles. The United States may prosecute any United States flagged ship for MARPOL violations.

26. See Whitney v. Robertson, 124 U.S. 190, 194 (1888) (“When the stipulations are not self-executing, they can only be enforced pursuant to legislation to carry them into effect, and such legislation is as much subject to modification and repeal by congress as legislation upon any other subject.”).


28. See DE LA RUE & ANDERSON, supra note 10, at 781 n.58 (stating that APPS repealed OILPOL 54 in the United States).

29. MARPOL 78, supra note 22, art. V.

30. See INT’L MAR. ORG., STATUS OF MULTILATERAL CONVENTIONS AND INSTRUMENTS IN RESPECT OF WHICH THE INTERNATIONAL MARITIME ORGANIZATION OR ITS SECRETARY-GENERAL PERFORMS DEPOSITARY OR OTHER FUNCTIONS DEPOSITARY OR OTHER FUNCTIONS 108-12 (2013) [hereinafter STATUS OF MULTILATERAL CONVENTIONS], available at: http://www.imo.org/About/Conventions/StatusOfConventions/Documents/Status%20-%202013.pdf (listing each nation that has signed and ratified MARPOL 78 and the number and percentage of nations that are a party to MARPOL 78) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).

31. See 33 U.S.C. § 1902 (providing the jurisdictional requirements of the APPS).

32. See MARPOL 78, supra note 22 (providing each nation with the authority to prosecute MARPOL violations that occur within their own territorial waters).


The Secretary of Defense is authorized to inspect the discharge of a harmful substance in violation of MARPOL by any ship that is at a port or terminal within United States control. Any prosecution for an illegal discharge by a foreign or United States flagged ship within the United States territory is subject to principles of comity, international law, and maritime law.

If the violation is by a ship registered in or of the nationality of a country party to the MARPOL protocol . . . or one operated under the authority of a country party to the MARPOL protocol, . . . the Administrator . . . may refer the matter to the government of the country of the ship’s registry or nationality, or under whose authority the ship is operating for appropriate action.

Taken together, these provisions give the United States both discretionary enforcement powers and an obligation to abide by international law.

A discharge must meet specific requirements to avoid violating MARPOL/APPS. An oil tanker may not discharge oil or oily mixtures within fifty nautical miles of the nearest land from a cargo bilge unless the discharge does not exceed fifteen ppm. In general discharges may not exceed fifteen ppm under MARPOL Regulations 12–16.

To combat the difficulty of monitoring discharges on the high seas, Regulation 20 requires maintenance of an Oil Record Book (ORB). The

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35. See § 1903 (providing the authority to promulgate regulations under APPS); § 1904(c)(2) (subjecting such ships to inspection while under US jurisdiction).
36. See § 1912 (requiring any application of APPS to comply with international law); § 1902(i) (including savings clause resolving inconsistencies with maritime or customary international law).
38. See MARPOL 73, supra note 4, Annex I, Regulation 15 (providing the specific discharge requirements of MARPOL); MARPOL 78, supra note 22, Annex I, Regulation 15 (leaving unchanged the corresponding regulation from MARPOL 73); see also De La Rue & Anderson, supra note 10, at 760–63 (discussing MARPOL restrictions on vessel discharges in operation).
39. See MARPOL 73, supra note 4, Annex I, Regulation 34 (providing the specific discharge requirements of MARPOL); MARPOL 78, supra note 22, Annex I, Regulation 34 (leaving unchanged the corresponding regulation from MARPOL 73).
41. See MARPOL 78, supra note 4, Annex I, Regulations 17, 36 (requiring that all discharges by ships are accurately recorded in an ORB).
ORB must be maintained accurately and kept for three years.\textsuperscript{42} It must have a record of any discharge of oil or oily mixtures as permitted under Regulation 11 or any accidental or exceptional discharge of oil or oily mixtures that is not covered by a Regulation 11 exception.\textsuperscript{43} Failure to maintain an ORB is a violation of MARPOL.\textsuperscript{44} Under MARPOL and the APPS the failure to maintain an accurate ORB can lead to a criminal penalty.\textsuperscript{45} If the inspection and the investigation of the supposed discharge of harmful substances leads to a criminal penalty, up to one half of the fine may be awarded to the person who gave information that lead to the conviction.\textsuperscript{46}

\textbf{C. Process of Enforcement}

While all investigations and violations have their own natures, the Fifth Circuit in \textit{United States v. Jho} described how MARPOL investigations often occur.\textsuperscript{47} In \textit{Jho}, the U.S. Coast Guard searched the \textit{M/T Pacific Ruby} while the ship was in Port Neches, Texas.\textsuperscript{48} Based on a tip from one of the \textit{Pacific Ruby}’s engineers, the Coast Guard investigated both an unlawful discharge of oil and the manipulation of pollution detection equipment by Chief Engineer Jho.\textsuperscript{49}

The Coast Guard has the statutory authority to:

\begin{quote}
[M]ake inquiries, examinations, inspections, searches, seizures, and arrests upon the high seas and waters over
\end{quote}

\textsuperscript{42} See MARPOL 73, \textit{supra} note 4, Annex I, Regulation 17 (specifying prompt recording and retention requirements); MARPOL 78, \textit{supra} note 22, at Annex I, Regulation 17 (adopting the corresponding regulation from MARPOL 73 with a technical amendment).

\textsuperscript{43} See MARPOL 73, \textit{supra} note 4, Annex I, Regulation 17 (describing each type of discharge that must be recorded in the ORB); MARPOL 78, \textit{supra} note 22, at Annex I, Regulation 17 (adopting the corresponding regulation from MARPOL 73 with a technical amendment).

\textsuperscript{44} See MARPOL 73, \textit{supra} note 4, Annex I, Regulation 17 (imposing the bookkeeping requirement); \textit{id.} Art. 4 (deeming noncompliance a violation and providing for penalties); MARPOL 78, \textit{supra} note 22, Art. I (incorporating the operative provisions of MARPOL 73).

\textsuperscript{45} See Act to Prevent Pollution from Ships, 33 U.S.C. § 1908(a) (2012) (making a knowing violation of MARPOL to be a class D felony).

\textsuperscript{46} See \textit{id.} at § 1908(b)(2) (allowing a whistleblower to collect an award from the damages awarded against the MARPOL violator).

\textsuperscript{47} See \textit{generally} United States v. Jho, 534 F.3d 398 (5th Cir. 2008) (holding that Jho could be held liable for failure to maintain an accurate ORB even though the discharge at issue did not occur in the United States' navigable waters).

\textsuperscript{48} See \textit{id.} at 400 (discussing the events that led to Jho’s prosecution).

\textsuperscript{49} See \textit{id.} (discussing the Coast Guard’s reasons for investigating Jho and the \textit{M/T Pacific Ruby}).
which the United States has jurisdiction, for the prevention, detection, and suppression of violations of the laws of the United States. For such purposes, commissioned, warrant, and petty officers may at any time go on board of any vessel subject to the jurisdiction, or to the operation of any law, of the United States, address inquiries to those on board, examine the ship’s documents and papers, and examine, inspect, and search the vessel and use all necessary force to compel compliance.\footnote{14 U.S.C. § 89(a) (emphasis added).}

The Coast Guard needs to show only a reasonable suspicion of criminal activity to survive a Fourth Amendment challenge for unwarranted search and seizure.\footnote{See United States v. Varlack Ventures, Inc., 149 F.3d 212, 216–17 (3d Cir. 1998) (discussing the requirements that the Coast Guard must fulfill in order to a search a vessel without a warrant).}

During the investigation the Coast Guard discussed the ORB entries with both Jho and the ship’s captain.\footnote{See Jho, 534 F.3d at 400 (discussing the Coast Guard’s investigation of the M/T Pacific Ruby).} Initially the Coast Guard determined that there was no violation; however, they later obtained corroborating evidence of MARPOL violations.\footnote{See id. at 400–01 (discussing the Coast Guard’s actions after the initial investigation).} The government eventually brought charges against Jho for eight counts of knowing failure to maintain an oil record book as required by 33 U.S.C. § 1908(a) and 33 C.F.R. § 151.25.\footnote{See id. at 401 (describing the charges that were brought against Jho for his failure to properly maintain an accurate ORB).}

If a ship is either liable for a fine or a civil liability or if there is reasonable cause to believe that a ship, its owner, operator, chief engineer, or someone in charge is subject to such liability, the Secretary of the Treasury, on request of the Secretary of Defense, may keep the ship in port by revoking the ship’s clearance to leave.\footnote{See generally Giuseppe Bottiglieri Shipping Co. S.P.A. v. United States, 843 F. Supp. 2d 1241, 1244–45 (S.D. Ala. 2012) (discussing the retention of plaintiff’s vessel in port pending the proceedings for APPS violations and the failure of the Coast Guard to}

\footnote{See 46 U.S.C. § 60105 (2011) (requiring vessels to receive permission from the Secretary of Homeland Security before leaving a United States Port); see also 33 U.S.C. § 1908(e) (2008) (allowing the Secretary of the Treasury to revoke the clearance required under 46 U.S.C. § 60105 for a ship to leave a United States port if under investigation or suspicion of a MARPOL violation).}
When the Coast Guard receives information from a whistleblower, the court will provide the whistleblower with an attorney to represent the whistleblower’s interests in the proceeding against the violator.\textsuperscript{57} The whistleblower is sequestered from the rest of the ship’s crew at the expense of the ship-owner or lessor pending proceedings.\textsuperscript{58}

A whistleblower may recover up to one half of the award against the MARPOL violator in both civil and criminal proceedings.\textsuperscript{59} If the penalty imposed against the violator is a criminal penalty, then the whistleblower award is granted at the court’s discretion.\textsuperscript{60} If the penalty is a civil penalty, then the whistleblower award is granted at the discretion of the Secretary of Defense or the Administrator of the Environmental Protection Agency depending on whether the Secretary or the Administrator has found that a party violated MARPOL.\textsuperscript{61}

If the whistleblower award arises out of a criminal prosecution and is a matter of the court’s discretion, then the whistleblower will be required to petition the court separately to receive the statutorily permitted award.\textsuperscript{62} Whistleblowers will often be required to retain counsel to petition for their award.\textsuperscript{63} Moreover, mere judgment against a MARPOL violator does not guarantee that the whistleblower will receive any part of the penalty assessed.\textsuperscript{64} This places the whistleblower in a difficult position: The whistleblower has not worked since the proceeding began, has likely lost

\begin{itemize}
\item[57.] See United States v. Overseas Shipholding Grp., Inc., 625 F.3d 1, 4 (1st Cir. 2010) (describing that when the grand jury proceedings against Overseas Shipholding Group had begun, the magistrate judge appointed an attorney to Barroso, the whistleblower, to represent Barroso’s interests in the proceedings against Overseas Shipholding Group).
\item[58.] See Chalos & Parker, supra note 6, at 234–35 (criticizing the Coast Guard’s aggressive use of 33 U.S.C. § 1908(e) to detain ships and 18 U.S.C. § 3144 authorizing the government to temporarily detain material witnesses at their employers expense).
\item[59.] See generally 33 U.S.C. § 1908(a)–(b) (2011) (allowing whistleblowers to recover at the discretion of the court, the Secretary of Defense, or the Administrator of the EPA up to one half of the award issued against the MARPOL violator).
\item[60.] See id. § 1908(a) (establishing that the court has discretion to provide the whistleblower with an award when the case is criminal).
\item[61.] See id. § 1908(b) (establishing that the Secretary of Defense or the Administrator of the EPA has discretion to grant a whistleblower award in civil cases).
\item[62.] See Overseas Shipholding Grp., Inc., 625 F.3d at 5 (discussing the potential difficulty that Barroso would face in securing his right to the whistleblower award).
\item[63.] See, e.g., id. (discussing Barroso’s retention of counsel).
\item[64.] See Anderson v. United States, 2012 WL 6087283, *5 (N.D. Cal. 2012) (“Even if the Court had subject matter jurisdiction, Plaintiff has failed to state a claim for violation of his due process rights. Plaintiff has not shown that he has a property right in the portion of the penalty that he seeks because the award is discretionary.”).
\end{itemize}
his or her job, and may find it difficult to attain new work in the maritime industry.\textsuperscript{65} Therefore, while a whistleblower may receive a windfall, a whistleblower also faces substantial risks.\textsuperscript{66}

D. Environmental Impact of Oil Bilge and Sewage Dumping in the World’s Oceans

The issue of ocean oil pollution was largely ignored until OILPOL 54 sixty years ago.\textsuperscript{67} The majority of ocean oil pollution is the result of daily operational ship discharges.\textsuperscript{68} Yet, public reaction and contempt for oil pollution is generally not voiced until major catastrophic events like the recent catastrophe in the Gulf of Mexico at the Macondo well.\textsuperscript{69}

Coast Guard Lieutenant Benedict Gullo noted the vastness of the oil pollution problem in our oceans:

\begin{quote}
Each year up to 810,000 tons of oil waste are intentionally and illegally dumped into the world’s oceans by commercial vessels. As a consequence, seabird populations are reduced, the habitats for slow-moving shellfish such as clams, oysters, and mussels are poisoned, and fish—if not killed by harmful toxins of the oil—lose the ability to reproduce, reproduce deformed offspring, or upon ingestion of the oil create even more toxic substances.\textsuperscript{70}
\end{quote}

Oil pollution harms the whole ocean environment, but is particularly harmful to seabirds.\textsuperscript{71} The oil from ship discharges damages the water

\textsuperscript{65} See id. at *1 (discussing Anderson’s statements to United States authorities that he was putting his job at risk merely by talking to them); see also Overseas Shipholding Grp., Inc., 625 F.3d at 9 (arguing that the reason for the whistleblower award is to create incentives when there is a risk of retaliation from the whistleblower’s employer).

\textsuperscript{66} See Anderson, 2012 WL 6087283 at *5 (stating that Anderson does not have a right to the whistleblower award because it is merely discretionary, notwithstanding the risk to his job from reporting the violation).

\textsuperscript{67} See De La Rue & Anderson, supra note 10, at 760–62 (discussing the history and background of MARPOL 73/78).

\textsuperscript{68} See Gullo, supra note 56, at 210 (discussing the principal sources of ocean oil pollution); see also Kehoe, supra note 2, at 3 (comparing estimates of discharge-related oil pollution to the Exxon-Valdez catastrophe from 1989).

\textsuperscript{69} See Andrew Griffin, MARPOL 73/78 and Vessel Pollution: A Glass Half Full or Empty?, 1 IND.J. GLOBAL LEGAL STUD. 489, 489–90 (1994) (discussing the attention that large events like Exxon-Valdez receive by the public and legislatures unlike the more disastrous daily discharges when considered in their aggregate).

\textsuperscript{70} Gullo, supra note 56, at 122–23.

\textsuperscript{71} See Schulkin, supra note 13, at 112 (2002) (discussing all types of cruise ship pollution and the effect that these pollutants have on the marine environment).
repellent and body temperature maintenance properties of seabirds’ feathers, causing them to die from exhaustion or drowning.\textsuperscript{72} Oil ingested during preening also has a significant impact on their digestive and reproductive processes.\textsuperscript{73}

The primary cause of ocean oil pollution is from ships’ daily operational discharges in violation of MARPOL, rather than large accidental discharges.\textsuperscript{74} The Exxon-Valdez released 37,000 tons of oil into Prince William Sound off the coast of Alaska in 1989.\textsuperscript{75} The world witnessed the worst ocean oil spill in history in 2010 when an explosion occurred at the Macondo well in the Gulf of Mexico.\textsuperscript{76} This spill should not be ignored as an extreme environmental catastrophe, nor should questions regarding the safety and procedures of deep-sea resource extraction be ignored. Nonetheless, the explosion and subsequent release of oil yielded only approximately 660,877 tons of oil.\textsuperscript{77} Therefore, the crux of the ocean oil pollution problem is from daily ship discharges in violation of MARPOL.

\textbf{E. How Have the Court’s Dealt with MARPOL/APPS Violations?}

\textbf{1. United States v. Royal Caribbean Cruises Ltd.}\textsuperscript{78}

United States v. Royal Caribbean Cruises Ltd. was one of the first cases that the Department of Justice and the Coast Guard vigorously

\begin{itemize}
  \item \textsuperscript{72} See id. (discussing the effects of ocean oil pollution on birds’ ability to repel water and control body temperature)
  \item \textsuperscript{73} See id. (discussing the effects of ocean oil pollution on birds’ digestive and reproductive systems).
  \item \textsuperscript{74} See Kehoe, supra note 2, at 3 (critiquing the lack of attention paid to discharge based oil pollution compared with accident based oil pollution); see also Gullo, supra note 56, at 124–25 (discussing the ongoing battle with the illegal discharge of oil on the high seas).
  \item \textsuperscript{75} See Kehoe, supra note 2, at 3 (“Arguably the worst ecological disaster in U.S. history, the grounding of the Exxon Valdez oil tanker spilled approximately 37,000 tons of crude oil into Prince William Sound, Alaska on March 24, 1989.”).
  \item \textsuperscript{77} See id. (stating that the spill at the Macondo well is estimated to have leaked more than four million barrels of oil into the Gulf of Mexico).
  \item \textsuperscript{78} See generally United States v. Royal Caribbean Cruises Ltd., 11 F. Supp. 2d 1358 (S.D. Fla. 1998) (denying defendant Royal Caribbean’s motion to dismiss claims under the False Claims Act for providing an inaccurate ORB to the United States Coast Guard).
\end{itemize}
pursued for violations of MARPOL/APPS. In *Royal Caribbean*, the United States brought suit against Royal Caribbean cruise line for violating the False Claims Act, instead of bringing suit for MARPOL violations, because the MARPOL violation occurred outside of the United States territorial waters. Therefore, the United States did not have jurisdiction to prosecute the illegal discharge, but did have jurisdiction to prosecute violations of the False Claims Act for actions inside the United States’ territorial waters.

In February of 1993, the Coast Guard observed, via infrared technology, the discharge of oil from the *Nordic Empress*, one of Royal Caribbean’s many cruise ships. The discharge occurred in Bahamian sovereign waters. When the *Nordic Empress* entered the port of Miami, the Coast Guard investigated the illegal discharge and observed that the ORB did not indicate the illegal discharge observed by the Coast Guard.

Because the *Nordic Empress* sailed under the flag of Liberia, the United States referred the violation to Liberia pursuant to international law, practice, and MARPOL requirements. Liberia declined to prosecute because there was reasonable doubt that a MARPOL violation occurred. After Liberia failed to prosecute Royal Caribbean for violating MARPOL, the United States brought suit under the False Claims Act for presenting to the United States Coast Guard a false ORB.

Royal Caribbean argued that the United States does not have jurisdiction to prosecute the illegal discharge in this case under MARPOL because it occurred outside the United States’ territorial waters. Therefore,

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80. See False Claims Act, 18 U.S.C. § 1001(a) (2011) (imposing fines and imprisonment for knowing and willful falsification or concealment of a material fact, false representation, or false writing in a matter involving a federal entity).

81. See *Royal Caribbean Cruises*, 11 F. Supp. 2d at 1367 (noting that while jurisdiction for the MARPOL violation belonged to the flag state, Liberia, the government had instead brought an FCA claim for the misleading ORB, over which the US did have jurisdiction notwithstanding MARPOL).

82. See id. at 1368 (“To the extent that the presentation of the materially false Oil Record Book to the Coast Guard constitutes a separate, actionable crime under United States law, MARPOL does not bar that prosecution.”)

83. See id. at 1361 (reciting the facts of the case).

84. See id. (reciting the facts of the case).

85. See id. (reciting the facts of the case).

86. See id. (reciting the facts of the case).

87. See id. at 1361–62 (reciting the facts of the case).

88. See id. at 1362 (reciting the history of the indictment).

89. See id. (reciting the defendant’s motion to dismiss arguments).
any prosecution would violate the terms of MARPOL, traditional maritime law, and principles of international law. The government argued that Royal Caribbean was not prosecuted for the illegal discharge in the Bahamas, but for presenting a false ORB to the Coast Guard in a United States port. The court agreed. Presenting the false ORB to the Coast Guard is illegal under the False Claims Act, and the United States has jurisdiction to prosecute crimes committed within its territorial boundaries.

The court found that the United States had jurisdiction over Royal Caribbean for violations of the False Claim Act and that the prosecution did not violate principles of international law. The court noted that “even if the statement is arguably true at the time it was made in the location in which it was made, if the statement is false as a matter of United States law and fulfills the other requirements for § 1001 claim, it is actionable.” The court then determined that if the government could substantiate the prima facie elements of the False Claims Act claim, Royal Caribbean’s statements could be actionable under the Act for providing an ORB that did not include the illegal discharge observed in the Bahamas by the Coast Guard.

2. United States v. Petraia Maritime, Ltd.

In 2007 the District Court for the District of Maine held that the court lacked jurisdiction to prosecute MARPOL violations by foreign-flagged ships that do not occur within the United States’ territorial waters. The court held, however, that it does not lack jurisdiction to prosecute violations of ORB maintenance requirements by foreign-flagged ships when that ship is in the United States’ territorial waters. The court has the power to adjudicate any MARPOL violation that occurs within the territory

90. See id. (reciting the defendant’s motion to dismiss arguments).
91. See id. at 1368 (“The discharge of oil in an improper manner is one crime; the failure to keep an Oil Record Book as required under MARPOL/APPS is another; and the deliberate presentation of a false material writing to the U.S. Coast Guard is another.”)
92. See id. at 1368–69 (determining that MARPOL does not preclude an FCA claim).
93. See id. (determining that MARPOL does not preclude an FCA claim).
94. Id. at 1363–64 (citing United States v. Godinez, 922 F.2d 752 (11th Cir. 1991)).
95. See id. (“If the [ORB] documents are [routinely used by federal officials], and the prima facie requirements of the five elements of a § 1001 claim are met . . . then the statement is action-able under § 1001.”).
97. See id. at 38–39 (determining that, on these facts, the reasoning in Royal Caribbean precluded the federal government from jurisdiction over the MARPOL violation).
98. See id. (determining that Royal Caribbean did, however, afford the government jurisdiction for the separate offense concerning the ORB violation).
of the United States, including ORB maintenance violations, even if the discharge at issue in the ORB did not occur within the United States territorial waters.\textsuperscript{99}

In \textit{Petraia}, the ship \textit{M/V Kent Navigator} sailed under the flag of Gibraltar and was owned by a Swedish company incorporated in the British Virgin Islands.\textsuperscript{100} Petraia argued that the case should be dismissed because the United States lacked jurisdiction to prosecute under MARPOL because

the alleged inaccuracies in the vessel’s oil record book involve a discharge on the high seas outside the territorial jurisdiction of the United States, the actions constituting the crimes alleged in the indictment occurred outside the jurisdiction of the United States, which may not bring such charges under MARPOL and [the United Nations Convention on the Law of the Sea].\textsuperscript{101}

The court disagreed.\textsuperscript{102} Citing \textit{Royal Caribbean}, the court concluded that the criminal violation Petraia was charged with was not for the illegal discharge of oil on the high seas under MARPOL, but for failure to maintain an accurate ORB while in the United States territorial waters.\textsuperscript{103} By failing to maintain an accurate oil record book while in U.S. territorial waters, Petraia violated MARPOL/APPS—which requires specifically recording all legal and illegal discharges—giving the United States the authority to prosecute violations.\textsuperscript{104} Therefore, jurisdiction in the District Court of Maine was deemed proper.\textsuperscript{105} The court then specifically noted,

to find to the contrary would raise serious questions about the government’s ability to enforce, as a matter of domestic law, false statements made in connection with such matters as bank fraud, immigration, and visa cases, where the false statements at issue were made outside of the United States,

\textsuperscript{99} See id. (discussing the jurisdictional status of the various violations).
\textsuperscript{100} See id. at 36 (stating that the ship was registered with the government of Gibraltar, owned by a corporation located in Sweden, and incorporated under the laws of the British Virgin Islands).
\textsuperscript{101} Id. at 36–37.
\textsuperscript{102} See id. at 38 (relying on the reasoning in \textit{Royal Caribbean} to reject defendant’s argument).
\textsuperscript{103} See id. (discussing the reasoning of the court in \textit{Royal Caribbean}).
\textsuperscript{104} See id. at 38–39 (“\textit{T}he concurrent jurisdiction provision of MARPOL allowed the United States to prosecute what was clearly a crime in and of itself: the presentation of a false Oil Record Book to the Coast Guard.”).
\textsuperscript{105} See id. (determining that the facts were not sufficiently distinct from \textit{Royal Caribbean} to justify foreclosing jurisdiction).
perhaps acceptable or in the alternative unnecessary under the appropriate foreign regulatory scheme, but nonetheless illegal under United States law. 106


Since Petraia the Fifth, Second, and Eleventh U.S. Circuit Courts of Appeal have held that jurisdiction is proper for prosecutions of ORB violations when the ship was in a United States port. 107 In Jho, the defendants argued the United States could prosecute only ORB violations that had actually occurred within the United States under MARPOL/APPS. 108 The Fifth Circuit summarily rejected this argument, focusing on the purpose and intent of MARPOL/APPS, to prevent oil pollution at sea. 109 The court stated:

Accurate oil record books are necessary to carry out the goals of MARPOL and the APPS. If the record books did not have to be “maintained” while in the ports or navigable waters of the United States, then a foreign-flagged vessel could avoid application of the record book requirements simply by falsifying all of its record book information just before entry into a port or navigable waters. 110

If ship owners’ arguments were accepted, then the goal of preventing ocean oil pollution would be undermined. 111 Based on the Fifth Circuits holding in Jho, ship owners, charters, and chief engineers have an

106. Id. at 38 (quoting United States v. Royal Caribbean Cruises Ltd., 11 F. Supp. 2d 1358, 1364 (S.D. Fla. 1998)).
107. See United States v. Jho, 534 F.3d 398 (5th Cir. 2008) (holding that under APPS there is a duty to keep accurate ORB, violation of which could be prosecuted); United States v. Ionia Mgmt., 555 F.3d 303 (2d Cir. 2009) (holding the same); United States v. Pena, 684 F.3d 1137 (11th Cir. 2012) (holding the same).
108. See Jho, 534 F.3d at 402–03 (discussing the defendant’s claim that because the alleged misconduct was made in international waters, it was outside U.S. ports or navigable waters).
109. See id. at 403 (“[T]he duty to maintain puts the regulation at odds with MARPOL and Congress’ clear intent under the APPS to prevent pollution at sea according to MARPOL.”).
110. Id.
111. See id. (“We refuse to conclude that by imposing limitations on the APPS’s application to foreign-flagged vessels Congress intended so obviously to frustrate the government’s ability to enforce MARPOL’s requirements.”).
TO COMPLY OR NOT TO COMPLY?

affirmative duty to keep a properly maintained ORB at all times in United States territorial waters.\footnote{The defendants in Jho also argued that jurisdiction was improper because it violated principles of customary international law and the United Nations Convention on the Laws of the Sea (UNCLOS).} The defendants argued that the United States did not have jurisdiction to prosecute the violations alleged because the ship in question, the \textit{M/T Pacific Ruby}, was registered in Liberia, and under the law of the flag, only Liberia had jurisdiction to prosecute MARPOL violations by the defendants.\footnote{The court rejected these arguments, asserting that the law of the flag doctrine cannot be used as a shield from the jurisdiction of United States courts.}

The court stated that, “it has long been established that a state has the power to prosecute violations of its laws committed by foreign-flagged vessels in its ports as long as the port state has not abdicated authority to do so.”\footnote{Because the prosecutions in \textit{Jho} were for violations of United States law, the violation of the ORB maintenance requirements occurred within the United States territorial waters, and the United States had not abdicated its sovereignty, the United States had authority to prosecute \textit{Jho} for failing to properly maintain the ORB.} Because the Department of Justice\footnote{In \textit{Ionia Management}, the Second Circuit addressed similar questions for the first time.} owned the 600-foot oil tanker named the \textit{M/T Kriton}.\footnote{The Second Circuit addressed similar questions for the first time.} The ship made numerous deliveries of oil to ports along the eastern seaboard of the United States.\footnote{During this period, its chief engineers routinely discharged oily waste directly into the ocean by diverting the waste around the oily water separator, none of which were recorded in the \textit{Kriton}’s oil record book.} The Department of Justice
indicted Ionia for thirteen counts of violations of APPS, one count of conspiracy, three counts of falsifying records in a federal investigation, and one count of obstruction of justice.\textsuperscript{125} While the circumstances of the investigation are not divulged in the Second Circuit’s opinion, the court adopted the analysis of the Fifth Circuit in \textit{Jho}, finding that the district court had jurisdiction for the indictments that were issued under MARPOL/APPS.\textsuperscript{124} Quoting \textit{Jho}, the court noted that

\begin{quote}
[the] Supreme Court has recognized that the law of the flag doctrine does not completely trump a sovereign’s territorial jurisdiction to prosecute violations of its laws: The law of the flag doctrine is chiefly applicable to ships on the high seas, where there is no territorial sovereign; and as respects ships in foreign territorial waters it has little application beyond what is affirmatively or tacitly permitted by the local sovereign.\textsuperscript{125}
\end{quote}

In the most recent case to address United States enforcement of MARPOL, \textit{United States v. Pena},\textsuperscript{126} the Eleventh Circuit continued the trend of upholding jurisdiction for prosecutions of MARPOL violations in United States courts.\textsuperscript{127} In \textit{Pena}, the defendant did not violate the ORB maintenance requirement; however, Pena did violate MARPOL certification requirements.\textsuperscript{128} While \textit{Pena} does not involve a failure to properly maintain an accurate ORB or an illegal discharge, the analysis of the court is important and displays the reach of the holdings in \textit{Royal Caribbean}, \textit{Petraia}, \textit{Jho}, and \textit{Ionia Management}.\textsuperscript{129}

\begin{itemize}
\item \textsuperscript{123} See id. at 306 (reciting the basis for the indictments).
\item \textsuperscript{124} See id. at 308 ("[T]he court [in \textit{Jho}] found that the ORB offenses were charged ‘in accordance with’ the law of the flag . . . . We agree for substantially the reasons stated by the Fifth Circuit.”).
\item \textsuperscript{125} Id. (citing United States v. Jho, 534 F.3d 398, 406 (5th Cir. 2008)).
\item \textsuperscript{126} United States v. Pena, 684 F.3d 1137 (11th Cir. 2012).
\item \textsuperscript{127} See id. at 1141–42 (“[W]e hold that the United States has jurisdiction to prosecute surveyors for MARPOL violations committed in U.S. ports.”).
\item \textsuperscript{128} See id. at 1143–44 (reciting the facts of the case).
\item \textsuperscript{129} See United States v. Royal Caribbean Cruises Ltd., 11 F. Supp. 2d 1358, 1364 (S.D. Fla. 1998) (holding that whether the United States has the authority to regulate potentially illegal discharges or failure to properly update an ORB outside of United States jurisdiction does not affect the United States Coast Guard’s ability to regulate maintenance of an ORB inside U.S. waters); United States v. Petraia Maritime, Ltd., 483 F. Supp. 2d 34, 38 (D. Me. 2007) (citing and agreeing with the holding from \textit{Royal Caribbean}); \textit{Jho}, 534 F. 3d at 404 (affirming that the gravamen of the action is not the illegal discharge but the misrepresentation to the United States government); \textit{Ionia Mgmt.}, 555 F.3d at 309 (joining
\end{itemize}
Hugo Pena was employed by the Universal Shipping Bureau as a ship inspector and conducted ship inspections necessary to receive a certification that the ship complied with MARPOL requirements. In order to comply with all necessary regulations it was required to have a new IOPP certificate issued. The IOPP certificate is a certification under MARPOL that indicates that a certified ship complies with the MARPOL requirements for proper disposal of bilge water and other oily mixtures. Pena conducted the survey of the Island Express I and issued the certification even though he was aware that the oily water separator was not operational, and that the Island Express I’s engineer had fashioned a means to pump the bilge water from the engine room directly to the ship’s deck. This system rendered the Island Express I ineligible for certification.

Pena sought to dismiss the suit because he was issuing certifications for Panama and not the United States. He argued that any suit against him in the United States would offend notions of extra-territorial enforcement of the law. The Eleventh Circuit was not persuaded, and concluded that because Pena was operating out of Miami, Florida, and the certification was issued while the Island Express I was in United States territorial waters, that the United States had adequate jurisdiction to prosecute this particular violation of MARPOL. Pena’s other arguments—that the indictment failed to allege he had a duty to conduct a complete MARPOL survey, and that failure to conduct a survey is not a crime—were also found to lack merit.

the Fifth Circuit and holding that the APPS imposes a duty on ships to have an accurately maintained ORB when entering a U.S. port).

130. See Pena, 684 F.3d at 1143–44 (discussing the factual and procedural history).
131. See id. at 1143 (reciting the facts of the case).
132. See id. at 1142–43 (noting that the certificate is issued upon successful completion of an inspection by the flag state, either on its own or through a designated “surveyor”).
133. See id. at 1143–44 (reciting the facts of the case).
134. See id. at 1142 (discussing the MARPOL requirements concerning bilge water discharge).
135. See id. at 1145 (discussing Pena’s jurisdictional argument).
136. See id. (discussing Pena’s jurisdictional argument).
137. See id. at 1145–46 (noting that a port state’s jurisdiction over matters occurring in port is settled law and that MARPOL provides the flag state with mere concurrent jurisdiction over such matters).
138. See id. at 1147–48 (discussing and rejecting these arguments).
III. Discussion

A. Use of the Whistleblower Provision of the APP as a Tool in Enforcing MARPOL 73/78

The recent growth in enforcement proceedings under MARPOL and APPS is partially attributable to the 1987 amendment to the APPS. The 1987 Amendment provided that a whistleblower may be able to receive up to one half of the damages awarded in a successful prosecution for MARPOL/APPS violations. Over the past ten years the United States Department of Justice has significantly increased its use of this provision and subsequently increased the number of prosecutions for MARPOL violations. In 2010, for example, the number of vessel pollution case referrals was double the ten-year annual average.

This rise in prosecution and general enforcement has created a sense of unease in the maritime shipping community. As the law firm Chalos & Co. contends, there is a concern that many of these whistleblowers are acting only out of spite for their employers or out of...
personal greed. Chalos & Co. cites an incident from Corpus Christi, Texas in which a whistleblower claimed that his vessel, the M/T Wilmina, violated MARPOL. Upon receiving the tip, the Coast Guard detained the ship pending further investigation. This investigation did not result in charges under APPS or MARPOL. The detention of a ship and subsequent investigation significantly impacts both the company and crew from loss of revenues and daily pay.

While Chalos & Co. presents a valid argument, they ignore the necessity and importance of awarding whistleblowers. These awards are particularly useful when it is difficult to detect violations of laws and relevant treaties. Ocean pollution laws are perfectly suited for these additional detection and enforcement measures. It would be an onerous and prohibitively expensive task for the United States and every major shipping country to have a fleet of ships dedicated solely to policing the oceans for MARPOL violations. By employing a regulatory scheme that relies on whistleblowers instead of a large enforcement apparatus, the United States is able to enforce MARPOL more efficiently because it is

145. See Chalos 2011, supra note 139 (“[W]histleblowers have been said to be motivated to use the U.S. whistleblower program for self-serving purposes of revenge and exacting large monetary rewards.”) (on file with the WASHINGTON AND LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT).
146. See id. (discussing a 2010 dispute between a whistleblower and a foreign-flagged oil tanker, after the whistleblower reported a MARPOL violation).
147. See id. (discussing the initial investigation for MARPOL violations).
149. See Ho-Sam Bang, Recommendations for Policies on Port State Control and Port State Jurisdiction, 44 J. MAR. & COM. 115, 118–19 (Jan. 2013) (“Almost every vessel at sea has tight schedules which are arranged by ship owners or charterers. Ship detention in a port causes the owner or charterer of the vessel to lose money.”).
150. See Stefan Rutzel, Snitching for the Common Good: In Search of a Response to the Legal Problems Posed by Environmental Whistleblowing, 14 TEMP. ENVTL. L. & TECH. J. 1, 34 (1995) (reasoning that whistleblowers provide a necessary incentive to private organizations, which tend to correct wrongdoing with minimal efforts and are reluctant to investigate other environmental damage).
151. See id. at 35, 43 (examining the “legitimate reasons” to maintain silence about the illegal acts of others and why mandating whistleblowing will incentivize employees to come forward, particularly in the area of pollution and environmental misconduct); see also Gullo, supra note 56, at 134 (discussing the ways in which vessel polluters avoid detection).
152. See Rutzel, supra note 150, at 46 (discussing the expensive approach of having the government investigate and prosecute each violation); see also Gullo, supra note 56, at n. 100 (explaining the Coast Guard’s ability to detect oil spills and the costs associated with detection).
more economically viable. Therefore, in order to efficiently enforce MARPOL oil pollution requirements, enforcement authorities must rely on crewmembers that are willing to testify to the proper authorities, whether in the United States or other MARPOL nations. Moreover, without this information, the proper authorities would be hard pressed to have the reasonable belief necessary to justify an in-depth examination and investigation of a ship’s practices.

Chalos & Co. is also concerned that whistleblower awards are too large and therefore over incentivize crewmembers reporting violations to the authorities, particularly those in the United States. The United States prosecutions and settlement awards tend to be consistently greater than those awarded by other MARPOL signatories; and because the United States has high punitive damage awards, the possible reward for a whistleblower is significant. The significance of a multi-million dollar award is great when compared to the average ship crewmember salary of $12,000 per year. Additionally, there are indications that whistleblowers may hold information until their ship reaches the United States or a United States port abroad, so as to be eligible for generous awards under United States law.

Grasso and Linsin recognize, however, that because the risks that companies and ship owners take for violating provisions of MARPOL when they enter U.S. ports around the world has increased, there is a trend of

153. See Rutz, supra note 150, at 35 (“[E]xternal whistleblowing helps to update environmental data and to make government aware of problems in compliance, leading to more efficient future regulation and a better determination of the crucial control issues.”); see also Gullo, supra note 56, at 155 (“To some individuals involved with the maritime industry and legal counsel representing the interests of vessel owners and operators, whistle-blowers are considered ‘one of the U.S. [G]overnment’s biggest weapons’ in vessel pollution prosecutions.”).

154. See Gullo, supra note 56, at 155 (explaining the vital role that whistle-blowers play in MARPOL prosecutions).

155. See Rutz, supra note 150, at 36 (explaining that actual violations are often detected after a reported suspicion, even a false one, leads to an investigation).

156. See Chalos 2011, supra note 139 (arguing that the credibility of whistleblowers should be questioned due to the lucrative rewards available to them, thus potentially over-incentivizing them); see also Grasso, supra note 139, at 8 (reporting that more than fifty-percent of new cases stem from whistle-blowers, most likely because of the lucrative rewards).

157. See Cost Savings, supra note 5, at 49 (comparing MARPOL fines between several countries).

158. Compare Gullo, supra note 56, at 143–44 (discussing low crewmember wages) with U.S. v. Ionia Mgmt. S.A., 555 F.3d 303, 311 (providing an award of $4.9 million against the ship owner for MARPOL violations).

159. See Grasso & Linsin, supra note 139, at 10 (discussing whistleblowers collecting evidence to document the violation and waiting until they arrive back in the United states to disclose the information).
increased MARPOL compliance. For example, some companies have adopted open reporting systems. In an open reporting system, a ship owner provides hotlines or anonymous electronic reporting for crewmembers that witness MARPOL violations. In some instances the ship owner will provide an internal monetary award for reports of MARPOL violations.

Although the maritime industry is responding to United States enforcement measures and is beginning to adopt policies to abide by MARPOL and curb oil pollution (or any pollution of the ocean), enforcement by MARPOL nation authorities is necessary. Without enforcement by the Coast Guard and the Department of Justice (and the corresponding authorities in other MARPOL signatories), internal procedures to comply with MARPOL more efficiently would not have been adopted. Because compliance remains far from universal, enforcement must increase both within the U.S and abroad.

B. Effect of Department of Justice Enforcement of ORB violations on Principles of International and Maritime Law

In many MARPOL enforcement cases, defendants argue that enforcement of MARPOL in United States courts violates principles of international and maritime law. The argument is that the courts are reaching beyond their jurisdiction in permitting prosecution of ORB violations because these have their roots in illegal discharges that occurred

160. See id. at 9 (discussing the many ways companies have dedicated increased resources to improve management practices for environmental compliance).
161. See id. (explaining how some companies have decided to “augment the DPA reporting system under their Safety Management System by providing open hotlines or anonymous electronic reporting options to crew members whereby they can alert shoreside management of environmental deficiencies or violations aboard a ship”).
162. See id. (describing the benefits of an “Open Reporting System”).
163. See id. (discussing the efforts of several companies instituting a monetary reward system).
164. See id. (explaining how vessel owners are on notice and have taken proactive steps towards compliance).
165. See id. (discussing the link between increased enforcement and increased efforts towards compliance).
166. See Gullo, supra note 56, at n. 16 (explaining that despite the increased enforcement the level of noncompliance remains high).
167. See United States v. Jho, 534 F.3d 398, 405 (5th Cir. 2008) (arguing that prosecuting a violation would violate the principles of international law); see United States v. Royal Caribbean, 11 F. Supp. 2d 1358, 1362 (S.D. Fla. 1998) (arguing that the prosecution is inconsistent with the principles of MARPOL and the Law of the Sea Convention of 1982 and would therefore upset the international legal regime).
outside of United States jurisdiction. These arguments ignore the limited nature and specific crimes that the United States successfully prosecutes.

The principles of comity and the law of the flag doctrine involve the respect that nations provide to each other when enforcing laws against citizens of other states. Comity is traditionally defined as “the recognition which one nation allows within its territory to the legislative, executive, or judicial acts of another nation, having due regard both to international duty and convenience, and to the rights of its own citizens, or of other persons who are under the protection of its laws.” Law of the flag doctrine is similar to the international law principle of comity. Under the Convention on the High Seas, a state has jurisdiction over vessels that fly its flag, a principle adopted from customary international law’s treatment of ships on the high seas beyond any sovereign’s territorial jurisdiction. Comity interacts with the law of the flag doctrine, in that a port state may, but need not, refrain from exercising its rightful jurisdiction over actions taken in port or territorial waters, yielding instead to adjudication by the flag state. From this doctrine, it is clear that there is a long-standing respect for the laws and acts of other nations as part of traditional maritime law.

It has been argued that the United States’ aggressive policy of MARPOL enforcement violates the above traditional principles of international and maritime law specifically enacted in MARPOL and the APPS. If this is the case—that United States’ prosecutions are really prosecutions for MARPOL violations occurring on the high seas—then the United States is violating MARPOL, the law of the flag doctrine, and

168. See Jho, 534 F.3d at 405 (reciting defendants’ argument that the United States surrendered its jurisdiction to prosecute violations where the prosecution is not in accordance with international law); see Royal Caribbean, 11 F. Supp. 2d at 1362 (reciting defendant’s argument that a false statement concerning discharges made in Bahamian waters was not within the jurisdiction of the Coast Guard).
169. See Jho, 534 F.3d at 405–06 (defining the “law of the flag doctrine” and discussing sovereign exercise of jurisdiction).
171. See Jho, 534 F.3d at 406–08 (discussing the United Nations’ opinion on a vessels’ flag and a countries jurisdiction in enforcement against that country).
172. See id. at 405 (discussing comity in admiralty cases).
173. See Hilton, 159 U.S. at 169–70 (discussing the right of English courts to execute foreign decrees in admiralty, recognized as early as 1607); see also Kathryn T. Martin, Comment, U.S. Control Over Extraterritorial Water Pollution: The Interplay Between International and Domestic Law, 22 J. NAT. RESOURCES & ENVT'L L. 209 (2008–2009) (discussing a number of cases illustrating “a growing tendency in U.S. Courts to respect international law and recognize it as a body of law that exists concurrently with U.S. law.”).
174. See Martin, supra note 173, at 214 (discussing the Government’s position in Ionia and its appearance of arguing the supremacy of U.S. law in regards to standards such as MARPOL).
traditional principles of comity.  

As Grasso and Linsin note, “none of the recent MARPOL enforcement cases brought in the United States have involved allegations of intentional pollution in U.S. waters.”

MARPOL’s focus and goals must be considered when addressing the principles of international law and comity. While it is undoubtedly important to respect basic principles of international law, the United States and the majority of major shipping nations in the world have all signed and ratified MARPOL based on a belief that the pollution of our oceans is a problem. Moreover, because MARPOL is not self-executing, every nation is required to expressly draft and pass legislation enacting the provisions of MARPOL. MARPOL requires legislation that enacts the provisions of the treaty within a nation’s laws and indicates that the signatory countries agree that the principles and goals are important and a worthwhile venture.

If the United States is violating principles of international and maritime law, it may be necessary to increase the legitimacy of MARPOL internationally and convince the other signatory nations that they ought to do the same. Yet, because the world’s oceans must be protected, if other MARPOL nations refuse or are unable to enforce MARPOL adequately, then the United States must be the lone crusader acting to protect this precious resource by whatever means necessary. If that requires prosecutions of actual discharges on the high seas or extending the APPS to include all discharges that occur within the United States economic zone, then that is what the United States ought to do.

This argument—that the United States is distorting and violating traditional principles of international and maritime law—also ignores the


176. Grasso & Linsin, supra note 139, at 10.

177. See MARPOL 73/78, supra note 22, at 547 (“The Parties . . . Recogniz[e] also the need to improve further the prevention and control of marine pollution from ships, particularly oil tankers . . . .”).


179. See id. (discussing the requirements for a non-self-executing treaty to become binding).

limited scope of the prosecutions brought against chief engineers and ship owners. Both prosecutors and courts are careful to prosecute and punish only MARPOL violations that actually occur in United States territorial waters. Of the five cases discussed earlier, none of the crimes alleged or charged were for the illegal discharge of oil or oily mixture, but rather only for the failure to have a properly maintained ORB while in United States territorial waters. As noted earlier in Jho, ship owners and chief engineers have an affirmative duty when in the United States territorial waters to have a properly maintained ORB.

Moreover, in Royal Caribbean, the court noted that if Royal Caribbean had properly recorded the improper discharge, no criminal prosecution would continue, at least in the United States. The enforcement of MARPOL ORB violations in the United States can have a positive impact on both ocean pollution and the legitimacy of MARPOL as a large multi-national treaty without violating the law of the flag doctrine or principles of international law. If Royal Caribbean had recorded the illegal action, it would have been far more difficult for their flag state, Liberia, to ignore the violation.

181. See generally Jho, 534 F.3d 398 (charging chief engineer with records violation and false statements in port); Petraia, 483 F. Supp. 2d 34 (charging company with records violation and false statements in port); Ionia, 555 F.3d 303 (same); United States v. Pena, 684 F.3d 1137 (11th Cir. 2012) (charging the compliance surveyor with conspiring to violate records, failing to make required inspection, and false statements to Coast Guard officials); Royal Caribbean, 11 F. Supp. 2d 1358 (same).

182. See Berg, supra note 6, at 257 (discussing United States jurisdiction over foreign-flagged vessels).

183. See generally Jho, 534 F.3d 398 (determining that the United States is able to prosecute a failure to maintain an accurate oil record book); Petraia, 483 F. Supp. 2d 34 (same); Ionia, 555 F.3d 303 (same); Pena, 684 F.3d 1137 (same); Royal Caribbean, 11 F. Supp. 2d 1358 (same).

184. See Jho, 534 F.3d at 403 (describing the duty upon foreign-flagged vessels to ensure that its oil record book is accurate upon entering the ports of navigable waters of the United States).

185. See Royal Caribbean, 11 F. Supp. 2d. at 1371 ("[W]ere the Oil Record Book accurate, in that it reflected any and all alleged illegal oil discharges, there would be no possible §1001 prosecution in this action.").

186. See Cost Savings, supra note 5, at 52 (noting that stringent enforcement, inspection, and surveillance can be deployed simultaneously to effectively deter polluters); see also Kehoe, supra note 2, at 3–4 (discussing the utility of federal sentencing guidelines for imposing jail time on offenders who, absent U.S. prosecution, would be overlooked by the "flags of convenience" states).

187. See Martin, supra note 173, at 217–18 (noting that stronger enforcement efforts, in which vital U.S. ports are a key part, fortifies the international legal regime).

188. See Royal Caribbean, 11 F. Supp. 2d at 1361–62 ("Liberia filed its determination that there was reasonable doubt that the Nordic Empress was in contravention of MARPOL..."
By increasing the risk of prosecution for failure to have a properly maintained ORB, and thereby enhancing the incentives for compliance with MARPOL’s records requirements, the United States will be able to refer cases to flag states with evidence that the flag state will be hard pressed not to prosecute.\(^\text{189}\) With the potential for international backlash and shaming from a failure to prosecute clear MARPOL violations by flag states, these flag states of convenience will no longer be able to ignore the harm that the shipping industry is doing to the oceans, which they aid and abet through non-enforcement.\(^\text{190}\) In order for this to be successful, the United States and other nations that collect evidence of MARPOL violations will have to actively publicize this information in order to hold the refusing state accountable in the eyes of the world.\(^\text{191}\) This means that the United States and other countries have the opportunity to help instigate MARPOL prosecutions by other signatory nations by enforcing compliance with the narrow ORB maintenance requirement.\(^\text{192}\)

The United States policy of strict MARPOL enforcement is not a violation of principles of extra-territorial enforcement because the treaty and statute specifically address non-domestic conduct, making it enforceable under its own terms.\(^\text{193}\) As Schoenbaum notes, “A criminal statute may have extra-territorial effect if it is not limited to domestic conduct by its terms and if legislative intent of extraterritorial application can be inferred from its policy or legislative history.”\(^\text{194}\) MARPOL/APPs limits prosecutorial jurisdiction over illegal discharges to those committed and that it was ‘difficult’ to respond to the allegations of ‘improperly recorded’ Oil Record Book entries under the facts as presented . . . .”\(^\text{189}\).

\(^\text{189}\) See id. at 1361–62, 1371 (noting that the U.S. prosecution was pursued only after Liberia found favorably for Royal Caribbean, but that U.S. prosecution would have been groundless if the ORB reflected the unlawful discharge).

\(^\text{190}\) See Sandeep Gopalan, Alternative Sanctions and Social Norms in International Law: The Case of Abu Ghraib, 2007 Mich. St. L. Rev. 785, 786 (2007) (arguing that shaming can be a powerful tool “to influence the offending state to take corrective action and fill the enforcement gap in international law”).

\(^\text{191}\) See id. at 820 (describing the success that Amnesty International has had through collection and exposure of international law violations, and moral appeals to pressure compliance).

\(^\text{192}\) See id. at 813–15 (explaining that international agreement and compliance with a social norm encourages other countries to comply in order to signal “respect for the rule of law,” with an eye to future cooperative interactions); see also Martin, supra note 173, at 217–18 (noting that the international MARPOL regime would be strengthened by multinational extraterritorial enforcement).

\(^\text{193}\) See Royal Caribbean, 11 F. Supp. 2d at 1364 (“[T]he extraterritoriality doctrine providing jurisdiction over certain extraterritorial offenses whose ‘extraterritorial acts are intended to have an effect within the sovereign territory’ seems applicable to this case.”).

\(^\text{194}\) 1 Schoenbaum, supra note 8, at 152–53 (citing United States v. Williams, 617 F.2d 1063 (5th Cir. 1980)) (emphasizing the importance of legislative intent when determining whether a statute has extraterritorial effect).
in a nation’s territorial waters or by ships of its flag, but the United States prosecutions at issue in these cases are not inconsistent with this jurisdictional requirement. The actions that are prosecuted are violations of domestic law occurring within the United States, and insofar as these crimes entail violations of MARPOL, there is no requirement that these prosecutions or cases be referred to flag states as this decision is left to the discretion of the nation where the violation occurred. Therefore, even if the MARPOL prosecutions at issue were extra-territorial, the United States is justified in continuing to prosecute them.

The argument that the United States is violating UNCLOS when prosecuting ORB violations ignores that the United States, as a sovereign nation, has the right to enforce its own laws within its own jurisdiction, even though parts of UNCLOS overlap with United States common law as customary international law. In Royal Caribbean, even though the root

195. See 33 U.S.C. § 1902(a)(2) (“This chapter shall apply . . . with respect to Annexes I and II to the Convention, to a ship, other than a ship referred to in paragraph (1), while in the navigable waters of the United States.”).
196. See United States v. Jho, 534 F.3d 398, 398 (5th Cir. 2008) (alleging that Jho gave false testimony to the U.S. Coast guard and knowingly failed to maintain an oil record book); see also United States v. Petraia Maritime, Ltd., 483 F. Supp. 2d 34, 39 (D. Me. 2007) (holding that the United States had jurisdiction to bring charges for having an inaccurate ORB while in the United States’ navigable waters); United States v. Ionia Mgmt. S.A., 555 F.3d 303, 308 (2d Cir. 2009) (joining the Fifth Circuit and holding that the APPS imposes a duty on ships to have an accurately maintained ORB while entering a U.S. port); United States v. Pena, 684 F.3d 1137, 1146 (11th Cir. 2012) (quoting Wilson v. Girard, 354 U.S. 524, 529 (1957) (per curiam)) (“The United States ‘has exclusive jurisdiction to punish offenses against its law committed within its borders, unless it expressly or impliedly consents to surrender its jurisdiction.'”); Royal Caribbean, 11 F. Supp. 2d at 1364 (holding that whether the United States has the authority to regulate potentially illegal discharges or failure to properly update an oil record book outside of United States jurisdiction does not affect the United States Coast Guard’s ability to police the maintenance of an oil record book inside U.S. waters).
197. See MARPOL 73, Art. IV(2) (stating that when there occurs “[a]ny violation . . . within the jurisdiction” of a state party, that state must “[c]ause proceedings to be taken in accordance with its law” if it does not turn evidence over to the flag state); 33 U.S.C. § 1908(f) (stating that where a ship sails under the flag of a foreign MARPOL signatory, “the Secretary . . . may refer the matter to the government of the country of the ship’s registry or nationality”) (emphasis added).
198. See Royal Caribbean, 11 F. Supp. 2d at 1364 (“The extraterritoriality doctrine providing jurisdiction over certain extraterritorial offenses whose ‘extraterritorial acts are intended to have an effect within the sovereign territory’ seems applicable to this case.” (quoting U.S. v. Padilla-Martinez, 762 F.2d 942 (11th Cir. 1985))).
199. See id. at 1368 (noting that the federal government’s ability to enforce MARPOL-violating discharges in international waters “does not bear upon our inquiry as to whether the United States has jurisdiction to enforce its [domestic] laws in port in Miami, Florida”).
200. See 1 SCHOENBAUM, supra note 8, at 24 (“With respect to the traditional uses of the sea, therefore, the United States accepts the [Law of the Seas] Convention as customary international law, binding upon the United States.”).
cause of the crime was an illegal discharge under MARPOL, Royal Caribbean was prosecuted for violations of the False Claims Act, a United States law.\textsuperscript{201} No nation can be obligated to not enforce its own laws within its own territorial limits against foreign individuals.\textsuperscript{202} Therefore, the enforcement of ORB requirements is merely the United States applying the laws of the United States against those who choose to avail themselves of the United States territory and the United States ports.\textsuperscript{203}

\textit{IV. What is the Correct Path Forward?}

\textbf{A. Practical Considerations and Realities of Large Multi-National Treaties}

Because large portions of the oceans are not part of any sovereign nation and because of the necessity of ocean travel, a multi-national treaty addressing the ocean oil pollution is necessary.\textsuperscript{204} And as noted before, without strict enforcement by all signatories, the treaty loses legitimacy and power to accomplish its goal.\textsuperscript{205} In the case of MARPOL, the world is interested in protecting one of the largest, if not the largest, natural resources on the planet.\textsuperscript{206} The most effective solution to the problem of effective enforcement of MARPOL is to create an international court that is the sole adjudicative body for MARPOL violations.\textsuperscript{207} An international MARPOL court would

\begin{itemize}
\item \textsuperscript{201} See Royal Caribbean, 11 F. Supp. 2d at 1369 ("[C]ustomary international law principles, which can be binding as a component of domestic law, require this Court to consider UNCLOS as setting forth binding principles of international law.").
\item \textsuperscript{202} See id. at 1364 ("Under MARPOL . . . the United States . . . has the duty and the obligation to board and inspect ships while in port and to pursue appropriate measures to address any violations thereof."); see also Amanda M. Caprari, \textit{Lovable Pirates? The Legal Implications of the Battle Between Environmentalists and Whalers in the Southern Ocean}, 42 Conn. L. Rev. 1493, 1513 (July 2010) (discussing the undeniable duty to enforce national anti-piracy laws but not legal duty to enforce UNCLOS anti-piracy laws outside of a nations territorial waters).
\item \textsuperscript{203} See id. (discussing the application of the extraterritoriality doctrine).
\item \textsuperscript{204} See 1 S\textit{CHOENBAUM, supra note 8, at 22 (explaining the unique nature of the law of the seas as customary international law and the need for an enforcement mechanism); see also D\textit{E LA RUE & A\textit{NDERSON, supra note 10, at 3–7 (listing the international conventions that govern the law of the sea).}
\item \textsuperscript{205} See William Burke-White, Dean and Professor of Law, University of Pennsylvania Law School, Transnational Law Institute Lecture Series (Jan. 31, 2013) \textit{available at http://www.youtube.com/watch?v=pMrCZdsfag (arguing that treaties require strict adherence by parties in order for them to bear meaning).}
\item \textsuperscript{206} See MARPOL 78 \textit{supra note 22, at 546 (describing the need to protect international oceans from pollution).}
have original jurisdiction for violations of all of the MARPOL Annexes and avoid the difficulties of extra-territorial enforcement, traditional international and maritime law principles, and comity from becoming a barrier to enforcement in the United States or other courts.208

While an international MARPOL court as the exclusive forum for MARPOL violations would be the most effective and efficient solution to the problem of MARPOL legitimacy and actual enforcement power associated with MARPOL,209 it would be unlikely to garner the support of United States. The United States is unlikely to ratify and sign any amendments to MARPOL that would attempt to remove jurisdiction from its courts.210

The United States has traditionally been skeptical of international treaties and even more skeptical of treaties that involve international courts that could subject the country or its citizens to jurisdiction and possible prosecution.211 Any proposal for an International MARPOL court would not subject the United States as a sovereign nation to jurisdiction in this court. It will still be difficult, however, to convince the United States Congress to join an international MARPOL court, which would have jurisdiction over U.S. citizens and corporations for environmental crimes committed on the high seas, even if all concerns of due process are answered in the court’s charter.212

Because an international MARPOL court is not practical, a different solution is needed to deal with MARPOL violations. Any solution will have to focus on increasing compliance by ships in their daily operations and increasing the incentives to comply.213

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208. See id. (stressing the importance of improved intergovernmental enforcement in enforcement of MARPOL).
209. See id. (noting that this option circumvents the problem of voluntary compliance).
211. See e.g., Leila Nadya Sadat, The Nurembourg Paradox, 58 AM. J. COMP. L. 151 (Winter 2010) (discussing and comparing the reasons for the French adoption of the International Criminal Court Treaty with the United States’ failure to adopt and join the International Criminal Court).
212. See Becker, supra note 207, at 638–39 (noting that an international tribunal “would only be effective upon the consent of MARPOL nations,” which likely prize sovereignty too much to make such a tribunal politically feasible).
213. See id. at 641–42 (stressing the importance of publicity, education, and directives on ships about the need to protect the seas from illegal oil dumping).
B. Who is the Proper Party to Prosecute?

In most of the cases discussed, the defendant is the ship owner that has violated provisions of MARPOL. These ship owners have the deepest pockets and the ability to pay high settlements or damages as well as front potentially expensive litigation costs. Some have suggested, however, that the prosecution of ship owners unfairly prejudices a company or individual for the acts of the crew and often the chief engineer. Therefore, they argue that prosecutions should focus on the chief engineer or the specific individuals responsible for the illegal discharge or ORB violation.

In addition to Linsin’s proposal to focus prosecutions on chief engineers instead of ship owners, Kehoe has argued that the United States Courts should use the illegal discharges from outside the United States jurisdiction when sentencing those liable for MARPOL violations within United States jurisdictions. He argues that this will increase the deterrent effect. Increased punishment that may be applied for an ORB violation will reduce the incentive for chief engineers to try to cut costs by illegal discharges regardless of any explicit company policy to abide by all provisions and requirements of MARPOL.


215. See Craig H. Allen, Proving Corporate Criminal Liability for Negligence in Vessel Management and Operations: An Allision-Oil Spill Case Study, 10 LOY. MAR. L.J. 269, 270 (2010) (noting that corporate fines are often dismissed as an inconsequential penalty because of their small size compared to the scope of a company’s business).

216. See Grasso & Linsin, supra note 139, at 10–11 (noting that companies can be held accountable for the actions of rogue employees simply because of mere inattention).

217. See Grasso & Linsin, supra note 139, at 8 (arguing that the focus on companies resulting from whistleblower charges distorts incentives and causes internal compliance systems to atrophy); Cf. Justice Rakoff, A Conversation with Judge Rakoff (Mar. 1, 2013) (on file with WASHINGTON & LEE JOURNAL OF ENERGY, CLIMATE, AND THE ENVIRONMENT) (suggesting that for securities law violations, it is not the company that committed the crime but the individual, so holding individuals liable for violations will have a stronger deterrent effect).

218. See Kehoe, supra note 2, at 25 (arguing that the extraterritorial oil dumping was a predicate fact to prosecution of the ORB offense, thus constituting offense conduct justifying heightened penalties under the Sentencing Guidelines).

219. See id. at 40–42 (arguing that United States v. Abrogar undermined “the significant deterrent effect that the risk of jail time can have on engineers who violate MARPOL and APPS” and that such imprisonment is fair given engineers’ knowledge of the risks of noncompliance).

220. See id. at 40–41 (arguing that engineers make a variety of choices, including one to falsify record books, for which independent punishment is an appropriate deterrent).
Linsin, Grasso, and Kehoe all make valid points. If a ship owner or charterer has a strict policy regarding compliance with MARPOL but the ship’s engineer acts independently, holding the owner or the charterer liable for refusal to comply with MARPOL or mere willful ignorance of the actions of their engineering crew is problematic. Additionally, there is a strong argument that if stopping MARPOL violations is the goal and stricter enforcement is the means by which that is best accomplished, then harsher sentencing for willful violations of MARPOL may be a legitimate sanction.

The argument that the chief engineer ought to be held ultimately liable, however, does not account for actual facts in many, if not most, cases. Chief engineers are under constant pressure to reduce costs from the ship owner or the charter party and while the costs of compliance with MARPOL are very low, this pressure to reduce costs will force an engineer to find savings in any form available.

Chief engineers are also in a particularly vulnerable position. George Chalos of Chalos & Co. discusses the case of Ioannis Mylonakis, a chief engineer aboard the M/T Georgios. Mylonakis was prosecuted along with the ship owners for MARPOL violations; however, unlike the

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221. See id. at 41 (arguing that penalizing charterers for the actions of the chief engineer or vessel crew is not an effective deterrent); see also Grasso & Linsin, supra note 139, at 10 (arguing for more efficient prosecutorial procedures in order to hold the most culpable people responsible for MARPOL violations).

222. See Kehoe, supra note 2, at 42 (“[T]here are statutes in addition to APPS with Guideline provisions that can be used to authorize jail time sentences against chief engineers and other supervisory crew members who pollute the world’s oceans with oily wastes.”).

223. See COST SAVINGS, supra note 5, at 4 (“Savings derived by not complying with the IMO’s regulations leads to lower operating costs that can be used to derive an unfair advantage in the notoriously competitive ship charter market.”)

224. See Kehoe, supra note 2, at 41–42 (describing the economic pressures facing chief engineers from corporate ship-owners); Andrew W. Homer, Red Sky at Morning: The Horizon for Corporations, Crew Members, and Corporate Officers as the United States Continues to Aggressive Criminal Prosecution of Intentional Pollution from Ships, 32 TUL. MAR. L.J. 149, 167 (Winter 2007) (describing the pressures and responsibilities of the master and chief engineer on ships).

ship owners, Mylonakis was acquitted.\(^{226}\) Mylonakis sued the ship owner, Styga, for malicious prosecution.\(^{227}\) Mylonakis alleged that Styga supplied false information to the government in their plea agreement that led to his indictment.\(^{228}\) On December 4, 2012, the District Court for the Southern District of Texas granted summary judgment in favor of Styga on Mylonakis’ malicious prosecution claim.\(^{229}\) This case displays the distinct position of vulnerability that a chief engineer faces when both the ship owner and the chief engineer are prosecuted for MARPOL violations.\(^{230}\) A chief engineer is susceptible to prison sentences, unlike the corporate ship owner,\(^{231}\) and the chief engineer is unlikely to have the same representation that the ship owner does in order to defend their interests.\(^{232}\)

Chief engineers are under enormous pressure from the ship owners to keep daily operation costs down and are particularly vulnerable when MARPOL violations are prosecuted.\(^{233}\) The ultimate responsibility in maritime shipping situations ought to rest on the person or entity that has ultimate authority.

Due to low enforcement and low penalties for violations there are currently few incentives for compliance with MARPOL.\(^{234}\) One solution to increase MARPOL compliance would be to not only find the company

\(^{226}\) See Mylonakis v. M/T Georgios, 909 F. Supp. 2d 691, 703 (S.D. Tex. 2012) (noting that Mylonakis was acquitted, whereas the ship’s owners entered into a guilty plea agreement).

\(^{227}\) See id. at 699 (describing Mylonakis’s claims against Styga, including the claim for malicious prosecution).

\(^{228}\) See id. at 702–03 (describing the events that lead to Mylonakis’ indictment).

\(^{229}\) See id. at 740–41 (ruling that Mylonakis had raised no genuine issues of material fact to support a malicious prosecution claim).

\(^{230}\) See Chalos 2012, supra note 225 (describing the position of the company and the engineer relative to the lawsuit).

\(^{231}\) See Kehoe, supra note 2, at 31–39 (identifying the statutes that allow prosecution of individuals for MARPOL violations); see Rakoff, supra note 216 and accompanying text (discussing penalties against the individuals engaging in criminal action).

\(^{232}\) See Giuseppe Bottiglieri Shipping Co. S.P.A. v. United States, 843 F. Supp. 2d 1241, 1244–46 (S.D. Ala. 2012) (noting that while the corporate ship owner haggled with the Coast Guard over terms for the ship’s release from port, the chief engineer was charged with making false statements).

\(^{233}\) See Cost Savings, supra note 5, at 4 (explaining ship company’s motivations to fail to comply with dumping regulations in order to save money); see Chalos 2012, supra note 225 (explaining a chief engineer’s lawsuit after being falsely accused of oil dumping for which his employer was responsible).

liable for MARPOL violations but also find the individual owner or control person of the company liable on a theory similar to corporate veil piercing if the limited liability company was formed to defraud or if no evidence of fraud on an individual liability theory similar to the one in United States v. Park.235 By prosecuting the company as a corporation and the company executive as an individual there will be an added deterrent effect through high monetary fines against the corporation and potential prison and individual monetary fines against the control person.236

It would also be useful to utilize chief engineers and ship captains as witnesses and sources in these prosecutions by granting immunity to any chief engineer or captain that provides evidence to the proper authorities regarding MARPOL violations.237 By utilizing chief engineers and control persons, prosecutors will have more access to company policies, both explicit and implicit.238 The number of whistleblowers available to provide evidence increases prosecutions.239 A focused increase in the number of available whistleblowers and witnesses to MARPOL violations will create a culture of MARPOL compliance within the industry and foster ship owners’ use of inter-corporate regulation in order to avoid MARPOL liability.240

235. See Larry S. Kane, How Can We Stop Corporate Environmental Pollution?: Corporate Officer Liability, 26 NEW ENG. L. REV. 293, 303 (Fall 1991) (quoting United States v. Park, 421 U.S. 658 (1975)) (noting Park’s holding that “a corporate agent, through whose act, default, or omission the corporation committed a crime, was himself guilty individually of that crime”); see also Douglas S. Brooks & Thomas C. Frongillo, Environmental Prosecutions: Criminal Liability Without Mens Rea and Exposure Under the Responsible Corporate Officer Doctrine, 79 DEF. COUNS. J. 12, 16 (Jan. 2012) (“Thus, the key component of the Park decision . . . has been specifically adopted in the environmental law area, is the imposition of criminal liability on corporate officials who fail to prevent the harm at issue, regardless of their direct involvement in bringing about such harm.”).

236. In order for this argument to be one hundred percent effective a change in personal jurisdiction jurisprudence under the Fifth and Fourteenth Amendment for maritime cases is required. For an in depth discussion of how the courts see personal jurisdiction in maritime cases see generally, Steven R. Swanson, Fifth Amendment Due Process, Foreign Shipowners and International Law, 36 TUL. MAR. L.J. 123 (Winter 2011) (arguing that courts should reconsider Fourth Amendment jurisprudence to look at the nature of the shipping business and benefits to the owners vessel of doing business in the United States to show that a vessel owner or charterer has personally availed himself of doing business in the United States and the courts should recognize that Fifth and Fourth Amendment due process standards are not necessarily the same).

237. See Kaine, supra note 235, at 315–16 (describing a hypothetical that illustrates the relationship between a corporate officer and the agent executing the illegal act).

238. See id. (noting that agents often have access to explicit and implicit corporate policies).

239. See Grasso & Linsin, supra note 139, at 8 (describing incentives for whistleblowers who witness wrongdoing to report illegal oil dumping to authorities at U.S. ports).

240. See id. at 10–11 (explaining the overall goal of MARPOL compliance).
In addition to relying on more whistleblowers, prosecutors ought to increase the penalties they are seeking against the ship owners and charter holders. Kehoe has argued against this view. In support of his argument that current damage awards against companies, especially smaller companies, are sufficient, he cites the $4.9 million judgment awarded against Ionia Management. The evidence that the judgments have had a positive effect on compliance and deterrence, however shows a different picture. In a 2003 OECD report on MARPOL and enforcement, the OECD argues specifically that even though the cost of compliance with MARPOL is only two percent of daily operational costs and in the United States the penalties awarded have been significant, compliance has not significantly increased because the risk of being caught combined with the cost of a successful prosecution still does not outweigh the cost savings of non-compliance.

Increasing the possible financial penalty against a corporation will also increase the award a whistleblower may be eligible to receive. Therefore, detection of violations by the proper authorities and deterrence from non-compliance with MARPOL will both be increased at the same time.

The maritime industry may contend that an increase in the size of penalties for MARPOL violations will both negatively impact the global maritime industry and directly injure the United States maritime industry, particularly major port cities. Yet, compliance with MARPOL is a relatively low percentage of daily operational costs. Even though the compliance costs are low, “the level of noncompliance with MARPOL

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241. See Cost Savings, supra note 5, at 4 (outlining the financial benefits charter holders receive by ignoring MARPOL violations that go unpunished).

242. See Kehoe, supra note 2, at 41 (noting that “the level of noncompliance with MARPOL remains unacceptably high” notwithstanding the already stiff penalties sought by the Justice Department in MARPOL prosecutions).

243. See id. at 41 (“[A]fter a jury conviction and a court imposed fine of $4.9 million dollars in the Ionia case, the court prohibited the defendant’s vessels from returning to U.S. ports until the corporate operator had installed certain pollution prevention equipment on board all of its vessels.”).

244. See Cost Savings, supra note 5, at 44, 49–50 (comparing the operating costs to fines and other costs associated with noncompliance).

245. See 33 U.S.C. § 1908(a) (allowing courts to award whistleblowers up to half the nominal value of a MARPOL fine).

246. See Rutzel, supra note 150, at 35 (indicating that further punishment increases compliance through individual and general deterrence).

247. See id. at 36 (discussing the negative impacts that whistleblowing may have on a corporation financially).

248. See Cost Savings, supra note 5, at 44 (“Environmental compliance costs represent approximately 1–2% of the total fixed costs (capital and operating costs) of the respective vessels chosen in this simulation.”).
remains unacceptably high, especially among operators of general cargo vessels that tend to have tighter operating budgets and earn low freight rates, leading to a greater temptation to cut all costs that do not directly endanger navigation. A two percent daily operating cost increase is unlikely to derail and injure the maritime shipping industry. Moreover, the United States economy is one of the largest in the world, and will not see an end to the transatlantic shipping into its ports due to increased enforcement and penalties for MARPOL violations when the cost of compliance is only a minimal increase in daily operational costs.

If the goal of MARPOL violation penalties is to deter discharges of oil and other waste into the oceans, then the penalties must necessarily have that effect. When the risk of prosecution and the cost of violation are low, there is no deterrent effect. In order for deterrence to work, the risk of prosecution and the cost of the penalty must both be prohibitively high. Otherwise companies will continue to focus on their balance sheets and look to save that two percent a day. As the OECD report indicates, the cost of compliance is negligible, yet, compliance is still a problem. This increase in penalties must cause the maritime shipping industry to ask, “to comply or not comply?”

C. The Whistleblower’s Role in Increasing United States Enforcement

To increase effective enforcement of MARPOL in the United States an increase in detection through increased use and possibly change of

249. Kehoe, supra note 2, at 41.
250. See COST SAVINGS, supra note 5, at 44 (describing the minimal impact of overall environmental cost compliance).
252. See COST SAVINGS, supra note 5, at 44 (showing daily compliance costs as a proportion of operating costs).
253. See MARPOL 73/78, supra note 26, at 62 (“Recognizing also the need to improve further the prevention and control of marine pollution from ships, particularly oil tankers . . . .”).
254. See COST SAVINGS, supra note 5, at 47 (noting that some operators believe that MARPOL violations are worthwhile because of the low probability of being caught).
255. See id. at 49 (arguing that where fines are low, operators can simply consider this the cost of doing business).
256. See id. at 45 (discussing the financial incentives for operators in tight markets).
257. See id. at 44 (discussing the limited impact of compliance).
the whistleblower award provision in the APPS is necessary. While increased use of various technological means should not be discounted, low flying planes with infrared detectors and unmanned drones are all expensive tools that require a significant investment by the United States government both in equipment and in man-hours. This is not the case for whistleblowers.

The United States can increase incentives for whistleblowers by reducing the risks they may undertake by coming forward to the Coast Guard or other individuals. One way to reduce these risks is to change the whistleblower provisions in the APPS to remove the discretion that the courts have in criminal cases and that the Secretary of Defense or Administrator of the EPA has in civil cases relating to awards. By making whistleblower awards mandatory, the whistleblower will no longer fear coming forward, due to the possibility of losing his or her job, losing weeks of work while he or she is sequestered for trial proceedings, and losing the possibility of future employment without receiving compensation for the risks they have undertaken. All of these events may still happen, but a significant whistleblower award as provided for in APPS allows a potential whistleblower to take these risks without necessarily affecting his or her ability to provide for him or herself and his or her family.

Increasing the use of the whistleblowers as part of an enforcement strategy is the best approach for a variety of reasons. While external monitoring through airplanes or drones may yield good results, it is not as economically efficient or feasible as rewarding those with inside knowledge


259. See Kehoe, supra note 2, at 7 (indicating that Coast Guard cutters and airplanes equipped with forward looking infrared radar are effective means of patrolling the coast line at night).

260. See Jenny Lee, Note, Corporate Corruption & The New Gold Mine, 77 BROOK. L. REV. 303, 317 (Fall 2011) (“Due to its inherent risks, whistleblowing, to some extent, should be incentivized through regulatory policies that encourage individuals to break the code of silence in corrupt organizations.”).

261. See 33 U.S.C. § 1908(a) (“In the discretion of the court, an amount equal to not more than ½ of such fine may be paid to the person giving information leading to conviction.”).

262. See Anderson v. United States, 2012 WL 6087283, *1 (N.D. Cal. Dec. 6, 2012) (dismissing the case for lack of subject matter jurisdiction, leaving the plaintiff, a whistleblower, without any sort of compensation despite the risks he had taken).
of the inner workings of the ship on a day-to-day basis. Additionally, potential witnesses and whistleblowers are on every ship, whereas it would be nearly impossible for any other detection method, without significant costs both in equipment and man power on a day to day basis, to cover the entire territorial waters of the United States and every ship therein.

The Coast Guard's ability to detect violations of MARPOL expands with increased penalties, increased whistleblower awards, and with a corresponding increase in guarantees that whistleblowers will receive an award. These policies will raise the risk and the cost of non-compliance, creating an environment where compliance is no longer a question.

**D. Arguments in Favor of Extra-Territorial Enforcement**

Prosecutors should be allowed to pursue prosecutions for violations that occur outside the United States territorial waters. While it has been the case that the law of the flag doctrine has limited prosecution efforts to ORB violations, the United States is not necessarily bound to the law of the flag in every situation.

The law of the flag is not an absolute rule, but rather a conditional rule. The law of the flag doctrine may be ignored if public policy outweighs the competing policy governing the law of the flag or if a foreign registration and incorporation of a ship and its owner are a mere façade to

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263. See Rutzel, supra note 150, at 34 (“Whistleblowing leads to increased compliance, either voluntary or enforced, without demanding additional public funds for supervision, detection, and evidence gathering.”).

264. See Gullo, supra note 56, at 144 (“APPS’s whistle-blower provision provides DOJ with a cooperating witness (albeit a witness with a monetary incentive to testify) that it can use as either pretrial leverage or as live testimony at trial.”); see also Chalos & Parker, supra note 6, at 232 (“However, the government’s most effective ‘secret weapon’ in the war against MARPOL violations is the use of ‘whistleblowers,’ most of whom are current or former crewmembers.”).

265. See Grasso & Linsin, Furthering Compliance, supra note 258, at 18 (stating that open reporting systems to anonymously disclose violations are among the most effective means of detecting MARPOL violations).

266. See Grasso & Linsin, supra note 139, at 8 (“[P]rosecutions [of MARPOL violations] are now yielding higher penalties, jail time and the banning of ships from United States ports.”).

267. See Schoenbaum, supra note 8, at 75 (“Accordingly, Story declared that the admiralty and maritime jurisdiction of the United States is not limited either by the restraining statutes or the judicial prohibitions of England . . .”).

268. See id. (stating that admiralty and maritime jurisdiction is dependent on several factors).
avoid the laws of a specific nation. In these situations the substantive law of the United States may be applied.

The important policy goals of MARPOL, the protection of our oceans, weigh heavily in favor of extra-territorial enforcement. Therefore courts should allow prosecutions for any discharges that occur on the high seas or for actual discharges that occur and are not properly recorded in an ORB.

The United States should not seek to immediately prosecute MARPOL violations that occur outside of the United States’ territorial waters. In order to foster international cooperation and international relations, it is good policy to initially abide by the MARPOL referral provision, where cases are referred to the flag state initially. If a flag state, such as Liberia or the Bahamas, refuses or fails to prosecute violations of MARPOL and the Coast Guard or Department of Justice have provided clear evidence that a violation has occurred, then public policy in favor of protecting our oceans outweighs any concerns of comity and international law. Without the enforcement of MARPOL and legitimate penalties for failure to abide by MARPOL, the policy that our oceans deserve protection and the treaty seeking to provide that protection lose all meaning.

Moreover, when the Department of Justice has been given a case, it should be on the lookout for incorporation and registration that is a mere façade. If all indications are that the corporation is a shell, then the
United States should seek to prosecute and gain jurisdiction as the flag state when possible.²⁷⁷

Through novel legal arguments²⁷⁸ and expanding jurisdiction for MARPOL prosecutions,²⁷⁹ the Department of Justice will be able to enforce MARPOL more broadly and successfully prosecute more than mere ORB violations. Therefore, the policy goals behind MARPOL, to reduce the pollution and damage to our oceans, will be furthered.²⁸⁰

E. Increasing MARPOL’s Legitimacy as a Multi-National Treaty

Professor William Burke-White from the University of Pennsylvania School of Law argues that a major impediment to the legitimacy of large multinational treaties is the failure of enforcement by signatory nations.²⁸¹ MARPOL is subject to this problem.²⁸² Therefore, the legitimacy of MARPOL as a multinational treaty is in question.²⁸³

The United States can increase the legitimacy of MARPOL and help promote consistent enforcement of MARPOL by other signatories by continuing to aggressively prosecute MARPOL violations of U.S. flagged and foreign-flagged vessels that enter U.S. ports.²⁸⁴ The majority of ships that sail through the Gulf of Mexico are foreign-flagged.²⁸⁵ If the United

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²⁷⁷. See Shaun Gehan, Note, United States v. Royal Caribbean Cruises, Ltd.: Use of Federal “False Statements Act” To Extend Jurisdiction Over Polluting Incidents Into Territorial Seas of Foreign States, 7 OCEAN & COASTAL L.J. 167, 168–69 (2001) (“[A]pplications of domestic law are entirely consistent with the aims of the applicable international treaties and offer a viable means of protecting the marine environment, particularly when flag States themselves are hesitant to act.”).

²⁷⁸. See id. (arguing that domestic law can be applied to matters within the jurisdiction of another sovereign in order to effect the aims of conventional international law); see also Berg, supra note 6, at 277 (“Issues of international comity may be raised by the expanded enforcement jurisdiction.”).

²⁷⁹. See generally Berg, supra note 6 (discussing the DOJ’s efforts to expand US reach in MARPOL cases).

²⁸⁰. See MARPOL 78, supra note 22, at 1 (laying out the policy goals of MARPOL).

²⁸¹. See Burke-White, supra note 205 (discussing ways to improve treaty legitimacy).

²⁸². See COST SAVINGS, supra note 5, at 52 (noting that the absence of any of the specified enforcement factors “increases the facility with which substandard operators can breach international environmental regulations”).

²⁸³. See Burke-White, supra note 205 (discussing the importance of enforcement to treaty legitimacy).

²⁸⁴. See COST SAVINGS, supra note 5, at 6 (arguing that greater penalties are necessary).

²⁸⁵. See Brian Baker, Comment, Flags of Convenience and the Gulf Oil Spill: Problems and Proposed Solutions, 34 HOUS. J. INT’L L. 687, 713 n.184 (Summer 2012)
States prosecutes the foreign-flagged ships that have violated MARPOL, specifically targeting nations that have lax MARPOL enforcement, the world will take notice. This will potentially embarrass these nations that refuse to enforce MARPOL and lead these nations to begin devoting resources to MARPOL enforcement.

Additionally, if other nations do not increase their enforcement, the role of the United States with respect to ocean oil pollution may need to change to indicate the United States’ commitment to the protection of the world’s oceans and the importance of MARPOL as a multi-national treaty.

**F. Economic Practicalities of Consistent Enforcement**

This Note has advocated for stricter enforcement of MARPOL by all MARPOL parties. This Note has not yet addressed the costs related to investigation and enforcement of MARPOL. Investigating and monitoring of the oceans for violations of MARPOL is an expensive endeavor. It requires the use and maintenance of at least a small naval fleet as well as the prosecutorial resources of a well-funded government attorney’s office.

Many of the active flag states encourage ship owners to register their vessels in order to help that state’s economy. These flag states are not major economic power houses and do not have the resources to

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(looking at statistics to show the impact that foreign-flagging has on the U.S. and neighboring economies).

286. See George D. Gabel Jr., *Smother Seas Ahead: The Draft Guidelines as an International Solution to Modern-Day Piracy*, 81 TUL. L. REV. 1433, 1453 (June 2007) (stating that prosecution of criminal acts aboard foreign-flagged ships is necessary to protect the international maritime community).

287. See Andrew Rakestraw, *Open Oceans and Marine Debris: Solutions for the Ineffective Enforcement of MARPOL Annex V*, 35 HASTINGS INT’L & COMP. L. REV. 383, 404–08 (2012) (discussing lax and ineffective enforcement by other countries, which would necessitate more rigid action); *see also* Oona Hathaway & Scott J. Shapiro, *Outcasting: Enforcement in Domestic and International Law*, 121 YALE L.J. 252, 270–82 (Nov. 2011) (explaining enforcement generally and how it can be used to persuade others to act).

288. See Chalos & Parker, *supra* note 6, at 226 (discussing at several points the increased aggressiveness of the United States government in pursuing these violations).

289. See Garrett, *supra* note 141, at 1849–50 (explaining how violators are often foreign corporations, which are able to avoid detection, which makes investigation more difficult and expensive).

290. See Kehoe, *supra* note 2, at 7 (implying that Coast Guard cutters are necessary and effective at monitoring for MARPOL violations on the coastline).

291. See Baker, *supra* note 285, at 695–99 (discussing the advantages provided to ship-owners by flag of convenience states, and noting that in Liberia’s case, ship registration fees account for eight percent of the country’s GDP).

monitor the oceans, let alone have a navy of their own that would provide them with the tools to monitor violations of MARPOL effectively.  

With the modern proliferation of flags-of-convenience, the ability to enforce MARPOL by flag states is becoming increasingly suspect because of the high costs associated and the lack of wealth and resources that flag states have. Therefore, in order to increase MARPOL enforcement and reduce ocean pollution a solution to the high costs of enforcement is necessary. One solution is to create an international fund that is designed to help fund flag states that are less affluent build the means and have the means to properly investigate and prosecute MARPOL violations. Another solution would to provide the International Maritime Organization (IMO) with more power over enforcement within the high seas. Providing the IMO with a centralized enforcement power may receive similar objections to an international MARPOL court. If the IMO has a centralized prosecutorial power like INTERPOL and there is a way to fund the court proceedings while granting due process rights, this would be the ideal solution. Regardless of the solution that is adopted, a means by which enforcement can be easily carried out is necessary if the goals and aspirations of MARPOL are to be met.

V. Conclusion

The lofty goals of MARPOL and the APPS to eradicate ocean pollution are both admirable and necessary. Without strict enforcement of the entire treaty covering oil pollution, air pollution, hazardous wastes,
trash, and containers, these goals will not be met. Therefore, expanded enforcement and steeper penalties are required in order to protect our oceans as a natural resource of unbounded beauty, wonder and intrigue. The United States must continue enforcing and increase its enforcement of MARPOL in the future. There needs to be a concerted effort to seek higher penalties, increase whistleblower use, increase incentives for whistleblowers to come forward, and increase means of prosecution against foreign-flagged vessels. In addition, the United States should continue to act to foster enforcement abroad through either diplomatic means or embarrassing other nations into action.

299. See Cost Savings, supra note 5, at 4 (noting that despite most ships following MARPOL and APPS procedures, some fail to do so, which must be corrected).

300. See id. at 6 (explaining that penalties must be high enough to make breach of MARPOL regulations not worth the cost).