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Energy-Water Nexus, the Clean Power Plan, and Integration of Water Resource Concerns into Energy Decision-Making

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NOTE

ENERGY-WATER NEXUS, THE CLEAN POWER PLAN, AND INTEGRATION OF WATER RESOURCE CONCERNS INTO ENERGY DECISION-MAKING

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Abstract

Energy regulation in the United States is now at a crossroads. The EPA has begun the process to officially repeal the Clean Power Plan and currently has no plan to replace it with new rulemaking to regulate carbon emissions from the U.S. energy sector. Even though the Clean Power Plan is more or less at its end, its regulatory structure stands as a model of the way decision-makers in the United States regulate the energy sector and the environment. Since the beginning of the modern environmental legal system, decision-makers have chosen to silo the system. Statutes and agencies focus on just one media or one issue. Tackling the climate crisis will inevitably require an integrationist model of lawmaking. The Clean Power Plan took the same problematic route as past regulation. While the Clean Power Plan rightfully addressed rising carbon levels, it failed to account for another growing problem associated with climate change: quickly depleting water resources. Although the consequences of the energy-water nexus are clear, U.S. decision-makers continue to ignore the need to integrate energy and water decision-making. Continuing to compartmentalize environmental problems, rather than addressing climate change impacts in a holistic manner, will not bring about the results that are desperately needed.

The tools needed to integrate decision-making exist throughout the three branches of government. Congress can and should step in to pass a new statute, which establishes a legal mandate on agencies to fully consider the implications of energy policy and energy regulation on water resources. The federal courts can read a legal requirement into the Clean Air Act or the Administrative Procedure Act that would require federal action in the energy sphere to account for impacts on water resources. Finally, the President can use his power to force federal agencies to consider water resources more thoroughly than in the past. While some of these mechanisms may be hard to envision given the current politcal atmosphere, implementation is necessary to ensure water and energy security in the face of a growing climate crisis.

Introduction[1]

The Clean Power Plan ("CPP") was heralded as a "historic and important step toward reducing carbon pollution from power plants that takes real action on climate change."[2] While the CPP is in the process of being repealed, it has revealed America's persistent failure to address the relation-

1. This Note is an expansion of a previously written blog post on the Michigan Journal of Environmental and Administrative Law's website. *See generally* Sarah Ladin, Blog Post, *The Water-Energy Nexus and the Clean Power Plan*, Mich. J. Envtl. & Admin. L. Online (Mar. 9, 2015), http://www.mjeal-online.org/the-water-energy-nexus-and-the-clean-power-plan/.

2. U.S. EPA, Fact Sheet: Overview of the Clean Power Plan: Cutting Carbon Pollution from Power Plants 1 (2015), https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/fs-cpp-overview.pdf.

ship between energy and water resources when it tries to regulate climate change. The CPP might have been a tremendous success for carbon emission reductions, but its potential impact on water resources was unknown and might even have been detrimental.

This Note will explore the energy-water nexus, specifically the relationship between water resources and energy production. It will then advocate for the pronouncement of a legal duty that requires agencies to take an integrated approach to the regulatory framework for both energy and water resources, an approach the CPP failed to take. Section II will provide a brief background on the disconnect between energy and water resources and regulations and decision-making in the United States. Section III will describe the CPP and how states' varying implementations of the Plan would have impacted water resources differently.

Finally, Section IV will propose three ways that a specific legal duty could be announced that would integrate regulatory decision-making in the energy and water sectors. First, Congress could enact a bill establishing a legal duty. Second, the federal courts could announce this legal duty by reading one into the language of the Clean Air Act or by finding that water considerations are relevant factor under § 706 of the Administrative Procedure Act. Finally, the President could impose a legal duty on agencies by issuing an executive order mandating that agencies provide an analysis of the water resource impacts in their Regulatory Impact Analyses for energy-policy decisions or requiring agencies to complete a Strategic Environmental Assessment.

I. Policy Failures: Discounting the Energy-Water Nexus

The energy and water sectors are inextricably linked. The energy-water nexus is the concept used to denote the connection between the two.[3] Water, specifically freshwater, is required to produce and use energy. It is necessary for mining coal, drilling for oil, refining gasoline, and generating and distributing electricity.[4] In particular, large amounts of water are used in the thermoelectric power generation process to cool the system, although only about three percent of that water is consumed.[5] Hydraulic fracturing, or "fracking," also uses large amounts of water in the process of extracting

3. *See generally* Carey King et al., *Coherence Between Water and Energy Policies*, 53 Nat. Resources J. 117 (2013) (discussing the global nexus between energy and water).

4. Karen Hussey & Jamie Pittock, *The Energy-Water Nexus: Managing the Links Between Energy and Water for a Sustainable Future*, Ecology & Soc'y 2012, at 2 (unnumbered).

5. *See* King et al., *supra* note 3, at 123. Thermoelectric power generation includes processes that use water to "turn turbines for hydropower, to produce steam for thermoelectric power, and to cool equipment by absorbing the waste heat produced by power generation with once-through or closed-loop cooling systems." *Water & Energy Efficiency by Sectors:*

natural gas from wells.[6] Each well can use between two and nine million gallons of water with only about half of that water being recovered and released.[7] Conversely, energy is required to produce clean, safe drinking water, and it is involved in the processes of pumping, transporting, treating, and distributing water.[8] In fact, running hot water in a household for five minutes uses the same amount of energy as turning on a 60W incandescent light bulb for 14 hours.[9] While the energy-water nexus is a well-documented phenomenon and an important issue in the United States, legislators and policy actors persistently fail to consider the nexus and its consequences in decision-making.

To fully understand the impact of failing to regulate the energy-water nexus appropriately, it is important to understand the real-life connection between energy and water resources in the United States. This Section will discuss U.S. nexus resources. Specifically, it will address the highly water dependent nature of the energy sector and the abundant water resources that must be properly managed, especially considering the dire climate situation. It will then provide a basic overview of the regulatory entities, the decision-makers, involved in energy and water regulation.

A. *U.S. Nexus Resources*

1. Energy Resources and the Connection to Water

The energy-water nexus is particularly relevant to the United States, which relies heavily on thermoelectric power generation for its energy needs.[10] In 2010, the energy sector surpassed the agricultural sector to become the U.S. economy's largest water user.[11] The average power plant in

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Thermoelectric Power, U.S. EPA, https://www3.epa.gov/region9/waterinfrastructure/thermoelectric.html (last updated Aug. 2, 2017).

6. Christopher A. Scott et al., *Policy and Institutional Dimensions of the Water-Energy Nexus*, 39 ENERGY POL'Y 6622, 6626 (2011).

7. *Id.*

8. Hussey & Pittock, *supra* note 4.

9. PETER GLEICK, FRAMING ENERGY, WATER, AND CLIMATE: CRITICAL LINKS 11 (2013), http://sites.nationalacademies.org/cs/groups/depssite/documents/webpage/deps_084161.pdf.

10. In 2016, coal power produced through a thermoelectric process represented approximately 30% of US energy generation. *What is U.S. Electricity Generation by Energy Source?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.cfm?id=427&t=3 (last updated Apr. 18, 2017). Nuclear power produced through thermoelectric power generation represented approximately 20% of nuclear power generated by the U.S. *Id.*

11. *See* Hussey & Pittock, *supra* note 4; *Source and Use of Freshwater in the United States*, U.S. GEOLOGICAL SURV., https://water.usgs.gov/edu/wateruse-diagrams.html (last updated Dec. 2, 2016).

the U.S. uses twenty-five gallons of water per kilowatt-hour generated.[12] Water use for thermoelectric power plants hit 195 billion gallons per day in 2000.[13] One estimate suggests that number increased to 104 trillion gallons in 2007.[14] While only about 2.5 percent of water used is consumed (i.e., not returned to the water system),[15] the cooling process has strong implications for water quality and detrimental impacts on both aquatic organisms that are caught up in the plants' pumps and on the ecosystem into which the spent, heated cooling water is discharged.[16]

Thermoelectric power generation requires a power plant to take in water to cool the generation system.[17] These withdrawals alter natural flow rates, including changes in "stream velocity, channel depth and width, turbidity, sediment and nutrient transport characteristics, dissolved oxygen concentrations, and seasonal and diel temperature patterns."[18] Then, the plant discharges the water used in the cooling process back into the waterbody at a higher temperature,[19] thereby raising the temperature of the waterbody.[20] "These physical changes can have ecological impacts, such as a reduction of riparian vegetation that affects the availability of fish habitat and prey."[21] Additionally, the alteration in temperature caused by the discharges has "the ability to affect the distribution, growth rates, survival, migration patterns, egg maturation and incubation success, competitive ability, and resistance to parasites, diseases, and pollutants of aquatic organisms."[22]

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12. Benjamin K. Sovacool, *Running on Empty: The Electricity-Water Nexus and the U.S. Electric Utility Sector*, 30 ENERGY L.J. 11, 13 (2009).

13. *Id.*

14. *Id.*

15. P. TORCELLINI ET AL., CONSUMPTIVE WATER USE FOR U.S. POWER PRODUCTION iv (Nat'l Renewable Energy Lab., Tech. Report No. TP-550-33905, 2003).

16. Robin Kundis Craig, *The Clean Water Act, Climate Change and Energy Production: A Call for Principled Flexibility Regarding "Existing Uses*," 4 GEO. WASH. J. ENERGY & ENVTL. L. 26, 33 (2013).

17. *Id.*

18. NAT'L OCEANIC & ATMOSPHERIC ADMIN. (NOAA), NMFS-NE-209, IMPACTS TO MARINE FISHERIES HABITAT FROM NONFISHING ACTIVITIES IN THE NORTHEASTERN UNITED STATES 223 (2008), https://www.nefsc.noaa.gov/publications/tm/tm209/tm209.pdf.

19. SIERRA CLUB, GIANT FISH BLENDERS: HOW POWER PLANTS KILL FISH & DAMAGE OUR WATERWAYS (AND WHAT CAN BE DONE TO STOP THEM) 5 (2011), https://vault.sierraclub.org/pressroom/media/2011/2011-08-fish-blenders.pdf.

20. NOAA, *supra* note 18, at 229.

21. *Id.* at 223 (citation omitted).

22. *Id.* at 229 (citation omitted).

2. Water Resources and the Connection to Energy

The U.S. is also home to some of the largest and cleanest water resources in the world. The Great Lakes account for one-fifth of the world's freshwater,[23] and the Great Lakes-St. Lawrence River drainage basin is the largest surface water system in the world.[24] This drainage basin provides water for ten percent of the U.S. population and twenty-five percent of the Canadian population.[25] Additionally, the Colorado River basin provides water to an additional forty million Americans, and the Apalachicola-Chattahoochee-Flint River basin serves 3.52 million people in Alabama, Florida, and Georgia through public water suppliers.[26]

Even with such abundant freshwater resources, drought has taken root throughout the U.S. While the drought in the West played a prominent role in the media over the last several years, the Great Plains and Northeast also saw, and continue to see, drier and warmer weather patterns, resulting in droughts.[27] There have also been significant droughts in the Southeast where many nuclear reactors, which require large volumes of water for energy production, are located.[28] Roughly 26.2% of the contiguous U.S. was classified as experiencing moderate to exceptional drought by the end of October 2015.[29] In 2017, Northern California fought raging and deadly wildfires, a problem which was exacerbated by years of drought and the hottest summer on record.[30]

As water scarcity grows, the need for energy is also increasing. The energy-water nexus requires that as energy generation increases, water con-

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23. HEALING OUR WATERS: GREAT LAKES COAL., GREAT LAKES RESTORATION & THE THREAT OF GLOBAL WARMING 3 (2008).

24. GREAT LAKES COMM'N & U.S. ARMY CORPS OF ENG'RS, DETROIT DIST., LIVING WITH THE LAKES 6 (1999).

25. *See id.*

26. BUREAU OF RECLAMATION, U.S. DEP'T OF THE INTERIOR, COLORADO RIVER BASIN WATER SUPPLY AND DEMAND 3 (2012); STEPHEN J. LAWRENCE, U.S. GEOLOGICAL SURVEY, WATER USE IN THE APALACHICOLA-CHATTAHOOCHEE-FLINT RIVER BASIN, ALABAMA, FLORIDA, AND GEORGIA, 2010, AND WATER-USE TRENDS, 1985-2010 44 (2016).

27. *See Drought: September 2017*, NOAA NAT'L CTRS. FOR ENVTL. INFO. (Oct. 16, 2017), https://www.ncdc.noaa.gov/sotc/drought/201709; *Drought: October 2015*, NOAA NAT'L CTRS. FOR ENVTL. INFO. (Nov. 12, 2015), https://www.ncdc.noaa.gov/sotc/drought/201510#national-overview.

28. *See* GLEICK, *supra* note 9, at 7.

29. *Drought: October 2015*, *supra* note 27.

30. *See* Rebecca Lindsey, *Climate Conditions Behind Deadly October 2017 Wildfires in California*, NOAA (Oct. 11, 2017), https://www.climate.gov/news-features/event-tracker/climate-conditions-behind-deadly-october-2017-wildfires-california; James Rainey, *Drought and Heat, Worsened by Humans, Help Fuel California Fires*, NBC NEWS (Oct. 10, 2017, 10:43 PM), https://www.nbcnews.com/news/us-news/drought-heat-worsened-humans-help-fuel-california-fires-n809571.

sumption must also increase. Yet, there is a decreasing supply of freshwater available for the water-intensive generation that the U.S. relies upon.[31] It has, therefore, become more important than ever that water resources be used in a sustainable manner, and energy needs must be satisfied with water resource concerns in mind. But despite the increasingly apparent need to couple regulation of the two sectors, energy and water issues are rarely integrated in policy.

B. *U.S. Decision-makers and the Need to Integrate Decision-making*

The United States' long history of compartmentalizing complex environmental and energy issues has become a hindrance for regulating with the energy-water nexus in mind. This compartmentalization can be seen in the isolated mandates of federal executive agencies. Congress established the Department of Energy in 1977 to advance "the national, economic, and energy security of the United States."[32] The Department of Energy is responsible for various aspects of U.S. energy policy and regulation, particularly relating to scientific and technological innovation.[33] President Nixon established the Environmental Protection Agency ("EPA") through an Executive Order, "Reorganization Plan No. 3 of 1970,"[34] "to protect human health and the environment."[35] In President Nixon's statement to Congress regarding the Reorganization Plan, he noted that "[m]any agency missions . . . are designed primarily along media lines: air, water, and land. Yet, the sources of air, water, and land pollution are interrelated and often interchangeable."[36] Thus, the EPA was established, in part, to more comprehensively handle the interrelatedness of environmental issues. Further, energy transmission and the electricity grid are regulated by the Federal Energy Regulatory Commission ("FERC"), and nuclear power plants are primarily

31. *See* ROBERT W. ADLER ET AL., MODERN WATER LAW 505 (2013).

32. 42 U.S.C. § 7131 (2016); *Laws DOE Administers*, U.S. DEP'T OF ENERGY, http://www.energy.gov/gc/laws-doe-administers-0 (last visited Dec. 4, 2017).

33. *About Us: Our Mission*, U.S. DEP'T OF ENERGY, https://energy.gov/about-us (last visited Dec. 4, 2017).

34. Reorganization Plan No. 3 of 1970, 3 C.F.R. § 199 (1970), *reprinted in* 5 U.S.C. app. 5 at 202-07 (2011).

35. *About EPA*, U.S. EPA, http://www.epa.gov/aboutepa (last updated Aug. 21, 2017).

36. Richard Nixon, *Special Message from the President About Reorganization Plans to Establish the Environmental Protection Agency and the National Oceanic and Atmospheric Administration*, THE AM. PRESIDENCY PROJECT (July 9, 1970), http://www.presidency.ucsb.edu/ws/index.php?pid=2575. Environmental "media" refers to "soil, water, air, . . . plants . . . animals, or any other parts of the environment that can contain contaminants." *Glossary of Terms*, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, https://www.atsdr.cdc.gov/glossary.html (last updated Jan. 26, 2016) (parentheticals omitted).

regulated by the Nuclear Regulatory Commission ("NRC"), both of which are independent agencies that fall outside of either the Department of Energy or the EPA's jurisdiction, are not bound by the President's executive orders, and have the power to promulgate their own regulations.[37]

Unfortunately, the division of responsibility for energy policy and environmental policy (and therefore, water policy) between the different executive agencies means that policy and regulatory decision-making in either sector does not necessarily account for the other. This entirely disregards the energy-water nexus, which calls for an integrated mode of decision-making that would result in the most effective and sustainable long-term policies to ensure energy and water security in the future.

The tradition of compartmentalizing environmental law can also be seen in the way Congress has structured the environmental legal realm, siloing environmental issues into separate statutes and therefore separate regulatory systems. The EPA is given authority to regulate air quality under the Clean Air Act and to regulate water quality under the Clean Water Act.[38] So, even where the EPA might be able to address energy issues under Section 111(d) of the Clean Air Act, the focus will be solely on how the energy sector affects air, not how changes in energy generation affects water, and so the agency does not necessarily consider water resources.

The separation of legal authority by media has resulted in a lack of coordination where environmental problems affect multiple media. There is no requirement that the EPA, or any other agency, promulgate regulations in a manner that purposefully creates benefits for all aspects of the environment. Therefore, the law does not necessarily require the EPA to consider benefit or harm to water resources when promulgating regulations to curb air pollution under the Clean Air Act.

It is essential that legislators and regulators consider the effect of energy policies and regulations on water resources. Some commentators argue that an integrationist approach is needed for environmental law to ade-

37. *What FERC Does*, U.S. FED. ENERGY REG. COMM'N, https://www.ferc.gov/about/ferc-does.asp (last updated May 24, 2016); *About NRC*, U.S. NUCLEAR REG. COMM'N, https://www.nrc.gov/about-nrc.html (last updated Aug. 24, 2017). The Federal Energy Regulatory Commission "regulates interstate transmission of electricity, natural gas, and oil" and plays a role in the transportation of oil through pipelines and the licensing of hydroelectric projects. U.S. FED. ENERGY REG. COMM'N, *supra*. The Nuclear Regulatory Commission is charged with "protecting people and the environment" in regulating commercial nuclear power plants nuclear material, and uranium mining. U.S. NUCLEAR REG. COMM'N, *supra*.

38. 42 U.S.C. § 7601 (2012) (providing the EPA the authority to prescribe regulations pursuant to the Clean Air Act); 33 U.S.C. § 1361 (2012) (providing the EPA the authority to prescribe regulations pursuant to the Clean Water Act).

quately address environmental issues today.[39] Environmental law must address the "complexity and multidimensionality of ecological and social systems and subsystems" in a "holistic, synthesized or coordinated way."[40] Responses to environmental problems should be formulated and implemented through "interconnected, coordinated or collective action by multiple institutions, jurisdictions, [and] agencies . . . in society."[41] The integrationist model can be expanded beyond just requiring coordination between environmental laws. It may also require coordination between environmental law, water law, and energy law. Here, an integrationist approach should be used as the means to ensure that energy decision-making incorporates water concerns.

II. The Clean Power Plan: Failing to Address the Nexus

The CPP was a prime example of how U.S. decision-makers have failed to account for the energy-water nexus. Although the CPP would have led to dramatic reductions in carbon emissions from the energy sector, it failed to account for water resources entirely. Given the increasing stress that climate change is placing on U.S. water resources, the CPP ought to have emphasized strategies that would have maximized the benefits for both carbon emissions reduction and water resources. This Section will describe the CPP's basic structure, its usefulness as a model of failing U.S. regulation, and the impact that various state choices under the CPP would have had on water resources as a lesson for future legislative efforts.

A. *The Clean Power Plan*

In June of 2014, the Obama Administration set out to regulate the energy sector and transition away from carbon intensive production processes, particularly coal-fired power plants. The EPA published a new proposed rule that would set "state-specific rate-based goals for carbon dioxide emissions from the power sector, as well as guidelines for states to follow in developing plans to achieve the state-specific goals."[42] The Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units Rule, commonly referred to as "The Clean Power Plan," sought to reduce carbon dioxide ("CO_2") emissions into the atmosphere

39. *E.g.*, Craig Anthony Arnold, *Fourth-Generation Environmental Law: Integrationist and Multimodal*, 35 Wm. & Mary Envtl. L. & Pol'y Rev. 771 (2011).

40. *Id.* at 795.

41. *Id.* at 796.

42. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34,829, 34,830 (proposed June 18, 2014) (to be codified at 40 C.F.R. pt. 60).

from existing fossil fuel power plants as a means of mitigating the U.S.'s impact on climate change.[43] The Final Rule was published in October of 2015 and would have become effective on December 22, 2015.[44] While the CPP was inherently an environmental law that sought to curb air pollution, it was also fell into the realm of energy law because it would have had strong impacts on the energy sector.

The final version, promulgated under the authority of Section 111(d) of the Clean Air Act, was intended to protect "human health and the environment by reducing CO_2 emissions from fossil fuel-fired power plants."[45] The CPP set carbon dioxide emissions reduction targets for each state, which could be met in a variety of ways.[46] In setting these targets, the EPA determined that the "best system of emissions reduction" would be made up of three "building blocks": (1) use of control technology to make existing coal-fired plants more efficient; (2) a switch from high emitting fossil fuel plants, like coal-based plants, to lower emitting plants, like natural gas-fired plants; and (3) an increase in use of zero-emitting renewable sources of energy, like wind and solar.[47] This created a "tool-box" of choices for states to meet their CO_2 emissions reduction targets and created flexibility for states in implementing these mandates.[48]

B. *The Clean Power Plan as a Model*

On October 9, 2017, the Trump Administration announced that it would repeal the CPP but has not yet put forward a replacement.[49] The proposed rulemaking calls for the repeal of the CPP based on a change in the EPA's legal interpretation of Section 111(d), under which the CPP exceeds the EPA's regulatory authority under the Clean Air Act.[50] Since April of 2017, the litigation surrounding the CPP in the Court of Appeals for the

43. *Id.* at 34,832.

44. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,662 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60). Full required reductions would not have to be met until 2022. *Id.* at 64,667.

45. *Id.* at 64,663-64.

46. *Id.* at 64,664.

47. U.S. EPA, FACT SHEET: COMPONENTS OF THE CLEAN POWER PLAN 2-3 (2015), https://archive.epa.gov/epa/sites/production/files/2015-08/documents/fs-cpp-state-goals.pdf.

48. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. at 64,703.

49. *E.g.*, Lisa Friedman & Brad Plumer, *E.P.A. Announces Repeal of Major Obama-Era Carbon Emissions Rule*, N.Y. TIMES (Oct. 9, 2017), https://www.nytimes.com/2017/10/09/climate/clean-power-plan.html.

50. Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 82 Fed. Reg. 48,035, 48,036 (proposed Oct. 16, 2017) (to be codified at 40 C.F.R. pt. 60).

D.C. Circuit has been held in abeyance, allowing the federal courts to sidestep deciding any of the legal issues.[51] But, the repeal bases its legal interpretation on one of the primary arguments advanced by the challenging states and industry groups: the CPP exceeds the EPA's authority because it regulates "beyond the fence-line" of a power plant and requires "power generators to change their energy portfolios through generation-shifting" (i.e., shifting away from coal production toward natural gas and renewable generation).[52]

The announcement signals that the CPP will continue to fall further into regulatory purgatory as the repeal goes through the notice and comment period. The Administrative Procedure Act required procedures will take several years. There will be further litigation from environmental groups before and after the final rule goes into effect, and Congress may even finally step in. Although the CPP is all but dead, it may be an important lesson for future administrations or for Congress. The CPP's framework is still useful because it exemplifies the American model of siloing various media, rather than integrating its decision-making in order to account for impacts on different resources.

C. *State Energy Mixes and the Impact on Water Resources*

While the CPP likely could have led to decreased water withdrawals and reduced consumption from coal-fired plants, it is unclear whether the CPP itself and the choices the states would have made in meeting the goals of the CPP would have had an overall net benefit for water resources in the U.S. in terms of withdrawals, consumption, and quality.

States were given the option to choose between two types of plans: (1) an "emission standards plan" that set source-specific requirements within the state so that all affected power plants would meet the state's emissions target or (2) a "state measures plan" that enabled the state to use a mixture of measures to implement the CPP, including renewable energy standards

51. Order, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Apr. 28, 2017). However, the D.C. Circuit has not yet granted an indefinite abeyance; instead, the court granted, and has continued to grant, 60-day abeyances, which requires the EPA to file a status report every 30 days. *Id.* at 2.

52. For more information on industry and West Virginia's "beyond the fence-line argument," *see* Opening Brief of Petitioners on Core Legal Issues, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Apr. 22, 2016), https://www.edf.org/sites/default/files/content/petitioners_opening_brief_pt._1_final_0.pdf; Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 82 Fed. Reg. at 48,037.

and residential energy efficiency programs.[53] States also had the option to use an emissions trading scheme[54] to meet their targets: an option that would have allowed states involved with the Regional Greenhouse Gas Initiative in the Northeast to comply with the CPP.[55] The range of options previously available to the states is what created uncertainty about the CPP's impact on water resources. The CPP was promulgated under the Clean Air Act with a focus on the positive impacts it would have on air pollution and climate change.[56] It was not promulgated with the potential effects on water resources in mind.

Under an emissions standards plan, a state would have continued to rely on water-intensive energy sources into the future.[57] While making power plants more energy-efficient would help reduce some demand on water resources, adding carbon capture and sequestration technology would make plants even more water intensive.[58] The CPP explicitly stated that it expected coal to remain a leading source of electricity generation, providing about 27% of future generation.[59] Although coal would have continued to be a large portion of the U.S. energy sector even under the CPP, this would have been a significant decrease from 39% in 2014.[60]

Similarly, states that would have met their targets through an emissions trading system by focusing on emissions reductions from existing plants

53. U.S. EPA, FACT SHEET: THE CLEAN POWER PLAN: THE ROLE OF STATES 2–3 (2015), https://archive.epa.gov/epa/sites/production/files/2015-08/documents/fs-cpp-states-decide.pdf.

54. An emissions trading scheme sets an emissions goal, "a limit on the overall amount of pollution that sources are allowed to emit into the environment," which is generally lower than the current amount of emissions. *How Do Emissions Trading Programs Work?*, U.S. EPA, https://www.epa.gov/emissions-trading-resources/how-do-emissions-trading-programs-work (last visited Dec. 4, 2017). The scheme then allows for sources to "trade" emissions allowances. If a source emits less than its prescribed allowance, it can essentially sell the right to emit the rest of its allowance to another source who then would be allowed to emit greater amounts than it was originally granted under the scheme. *Id.*

55. *See* Gerald B. Silverman, *Most RGGI States on Track to Power Plan Targets*, BLOOMBERG NEWS (Aug. 14, 2015), http://www.bna.com/rggi-states-track-n17179934724/.

56. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,663 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

57. *See* U.S. EPA, *supra* note 53, at 3 (providing that an emission standards plan involves ensuring that affected power plans meet their performance requirement).

58. Andrew Maddocks, Robert Samuel Young & Paul Reig, *The Clean Power Plan: What's Water Got to Do With It?*, WORLD RESOURCE INST.: BLOG (Sept. 8, 2015), http://www.wri.org/blog/2015/09/clean-power-plan-whats-water-got-do-it.

59. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. at 64,665.

60. *Annual Dataset at Electricity Data Browser*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/electricity/data/browser (last visited Nov. 24, 2017).

rather than by changing their energy sources, while reducing the level of carbon emissions, would continue to use the same types of energy sources. Thus, those states would have continued using processes that had a substantial impact on water resources. For these states, it was unlikely that the CPP, or similar legislation, would benefit water resources. Thermoelectric generation, particularly coal power, is cheap and already established but requires large amounts of water withdrawals to mine, process, and convert primary fuels into electricity and for cooling.[61]

Under the "state measures plan" option, states would have had a variety of energy options to choose from, including coal, natural gas, nuclear energy, and hydroelectric power. Each of these options imposes different effects on water resources.

Beginning with natural gas, many environmental groups voiced the concern that the CPP would incentivize states to switch to natural gas.[62] Natural gas has been growing in popularity in recent years and was likely to continue growing under the CPP for two reasons. First, it is an incredibly cost-effective means of decreasing carbon emissions.[63] Natural gas power plants are cleaner in terms of their carbon emissions.[64] Each of the different kinds of coal emits above 200 pounds of CO_2 per million Btu of energy while natural gas emits only 117 pounds of carbon per million Btu.[65] Second, it is an option that decreases reliance on foreign energy sources because natural gas can be found in large quantities within the U.S.[66] In 2014, natural gas accounted for 27% of U.S. electricity generation,[67] and the EPA

61. ADLER ET AL., *supra* note 31, at 503.

62. *See* FOOD & WATER WATCH, INCENTIVIZING FRACKING: THE EPA'S "CLEAN POWER PLAN" 1 (2014) https://www.foodandwaterwatch.org/sites/default/files/incentivizing_fracking_ib_aug_2014.pdf; Gayathri Vaidyanathan, *Fracking Can Contaminate Drinking Water*, SCI. AM. (Apr. 4, 2016), http://www.scientificamerican.com/article/fracking-can-contaminate-drinking-water/ ("[T]he Obama administration's climate change policy . . . is based on replacing many coal-fired power plants with facilities that burn cleaner natural gas.").

63. FOOD & WATER WATCH, *supra* note 62, at 1.

64. *How Much Carbon Dioxide is Produced When Different Fuels are Burned?*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11 (last updated June 8, 2017).

65. *Id.*

66. *See* Jason Furman & Gene Sperling, *Reducing America's Dependence on Foreign Oil as a Strategy to Increase Economic Growth and Reduce Economic Vulnerability*, THE WHITE HOUSE: BLOG (Aug. 29, 2013, 5:51 PM), https://obamawhitehouse.archives.gov/blog/2013/08/29/reducing-america-s-dependence-foreign-oil-strategy-increase-economic-growth-and-redu; Megan Slack, *Our Dependence on Foreign Oil is Declining*, THE WHITE HOUSE: BLOG (Mar. 1, 2012, 11:02 AM), https://obamawhitehouse.archives.gov/blog/2012/03/01/our-dependence-foreign-oil-declining (describing the United States' "vast natural gas reserves" as a key component of energy price reduction).

67. U.S. ENERGY INFO. ADMIN., *supra* note 60.

estimated that natural gas would overtake coal as the leading source of electricity if the CPP had been implemented.[68] Many natural gas plants also use a thermoelectric process and, thus, have similar impacts on water resources as coal-fired plants.[69]

The more pressing problem for water resources arises in connection with extraction of natural gas, rather than with the process of electricity generation. Over 60% of natural gas is produced through fracking, which requires large amounts of water and threatens drinking water supplies by leaking pollutants into water resources.[70] Each well requires millions of gallons of water and can impact the quality of the groundwater, streams, rivers, and lakes that receive the discharge wastewater.[71] Importantly, fracking not only requires large withdrawals, like thermoelectric power generation, but is also a highly consumptive process.[72] Most of the water extracted cannot be returned to the water-body, so large quantities of water are removed from the natural water cycle and disposed elsewhere.[73]

Nuclear power generation also likely would have seen an increase under the CPP because it produces almost no carbon emissions, making it an attractive option for states trying to meet reduction goals.[74] However, like natural gas and coal, nuclear power is produced through a similar thermoelectric process.[75] It, therefore, has the same disadvantages for water resources as those energy sources.[76] Additionally, nuclear power generation coolant discharges contain pollutants, like heavy metals and salts, which may end up in groundwater.[77]

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68. *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,665 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60) (projecting coal and natural gas remain leading electricity generation sources under the Plan, with coal at 27% and natural gas at 33%).

69. Craig, *supra* note 16, at 33.

70. Food & Water Watch, *supra* note 62, at 1.

71. Scott et al., *supra* note 6, at 6626.

72. Amy Hardberger, *Powering the Tap Dry: Regulatory Alternatives for the Energy-Water Nexus*, 84 U. Colo. L. Rev. 529, 546 (2013).

73. *Id.*

74. S.M. Rashad & F.H. Hammad, *Nuclear Power and the Environment: Comparative Assessment of Environmental and Health Impacts of Electricity-Generating Systems*, 65 Applied Energy 211, 218 (2000).

75. Craig, *supra* note 16, at 33.

76. *See supra* Section II.A.i.

77. *Plant Sites with Licensed Radioactive Material in Groundwater*, U.S. Nuclear Reg. Comm'n, https://www.nrc.gov/reactors/operating/ops-experience/tritium/sites-grndwtr-contam.html (last updated Sept. 11, 2017).

Further, uranium, the fuel source used in nuclear power plants, is often mined through the *in situ* mining process.[78] This process injects large quantities of an aqueous solution into the underground aquifer, dissolving the uranium and creating a mixture. The mixture is then brought to the surface so the uranium can be removed.[79] This mining process, jointly licensed by the NRC and the EPA, can have substantial groundwater quality impacts. The process consumes approximately one-half to three percent more water than it injects.[80] However, environmental groups and other intervenors have argued that, although this seems like a small percentage, in practice it amounts to millions of gallons being removed and consumed from aquifers each year at sites that have been in operation for many years.[81] Further, *in situ* mining has generated concerns over the amount of wastewater created, containing heavy metals, chemicals, and radionuclides, which are reinjected into the ground during the mining process and may contaminate the groundwater in the aquifer when the operation is complete.[82]

Hydroelectric power is also an intriguing option for states to meet their CO_2 emissions reduction mandates because there are almost no greenhouse gas emissions at the point of generation. But hydroelectric poses numerous problems for water resources.[83] Operation of dams can cause problems for fish and other wildlife due to low dissolved oxygen. Dams can also result in increased dissolved minerals and nutrients, which have impacts for drinking

78. *See generally In Situ Recovery Facilities*, U.S. Nuclear Reg. Comm'n, https://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities.html (last updated Nov. 7, 2016).

79. *Powertech USA, Inc.* (Dewey-Burdock In Situ Uranium Recovery Facility), LBP-15-16, 81 NRC 618, 627 n.3 (2015).

80. *Powertech USA, Inc.* (Dewey-Burdock In Situ Uranium Recovery Facility), LBP-10-16, 72 NRC 361, 379 (2010).

81. Ranchers & Neighbors Protecting Our Water & Powder River Basin Resource Council, Potential Impact to Groundwater from In Situ Leach Mining of Uranium 18 (2009), http://www.powderriverbasin.org/assets/Uploads/files/uranium-mining/PRBRCUraniumPresentation.pdf [hereinafter Powder River, In Situ Mining Presentation] (citing removal of 40 million gallons of water from the aquifer at the Smith Highland Operation per year).

82. *Id.* at 19; *see also* Initial Opening Brief for Petitioners Nat. Res. Def. Council & Powder River Basin Res. Council at 3-5, 24, NRDC v. NRC, No. 16-1298 (D.C. Cir. Dec. 19, 2016) (challenging the conclusions of the NRC's adjudicatory bodies that the *in situ* mining project "posed little risk to surrounding groundwater"). It is important to note that NRC regulations do require that all *in situ* mining sites be completely restored before the operation is fully decommissioned. 10 C.F.R. pt. 40, App. A, Criteria 5.5(b)(5) (Add. 127). However, environmental groups point out that no mining site has been restored back to the original condition as of yet. *E.g.*, Powder River, In Situ Mining Presentation, *supra* note 81, at 23, 25.

83. King et al., *supra* note 3, at 129.

water quality.[84] Hydropower also results in an elevated level of water consumption because large volumes of water evaporate from the surface of reservoirs behind dams.[85]

Fortunately, the CPP also created an incentive for states to increase their use of renewable energy sources that have a much smaller impact on water resources. Wind and photovoltaic panel solar power require minimal water for electricity generation.[86] Further, many states might have tried to increase efforts at residential energy efficiency and conservation measures.[87] The energy-water nexus dictates that any reduction in energy usage will save water.

As explored above, the mix of tools states could have chosen under the CPP would have had different impacts on water resources. A state that chose to meet the Plan's requirements through (1) control technologies to reduce emissions, (2) trading schemes, or (3) increased natural gas, nuclear, or hydro-electric power as a replacement for traditional fossil fuels would not have experienced the same positive water resource benefits that states implementing renewable energy strategies, like wind and solar, would have experienced.

In 2014, a study was done in Texas to determine the impact the CPP would have on water consumption in the state, and the results were positive.[88] Texas has often been used as a case study in the energy-water nexus because it is the largest generator of consumer electricity in the country.[89] It faces great variability in its water resources and is subject to intense weather conditions, ranging from droughts to hurricanes.[90] The state also has the second largest economy and population, and recent projections sug-

84. Craig, *supra* note 16, at 32.

85. King et al., *supra* note 3, at 129-30.

86. Concentrating solar power designs use a thermoelectric process and raise the same water resource concerns as fossil fuel plants, but dry-cooling technologies can be used to mitigate water issues. *Id.* at 131.

87. U.S. EPA, Fact Sheet: Energy Efficiency in the Clean Power Plan 1 (2015), https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/fs-cpp-ee.pdf. Demand side efforts were originally included as a fourth building block that states could use to meet their CPP reduction goals, but the final rule removed that provision out of concern that its inclusion would go beyond the EPA's regulatory authority. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,778 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

88. Paul Faeth, CNA Analysis & Solutions, The Impacts of EPA's Clean Power Plan on Electricity Generation and Water Use in Texas ii (2014).

89. *See* Hussey & Pittock, *supra* note 4, at 3.

90. *Id.*

gest that unmet water needs are going to result in losses in personal income in all sectors of the economy.[91]

In the context of the CPP, Texas was an important case study because of its past, present, and future energy trends. In 2005, thermoelectric power generation was the greatest source of water withdrawals in Texas, accounting for forty percent of water withdrawals in the state,[92] but recently, Texas has seen a rapid expansion in its renewable energy generation, particularly through expansion of wind power generation.[93] The state actually exceeded its renewable energy goals sixteen years early.[94]

The study examined the potential impact the CPP would have had on water consumption in Texas by modeling the predicted water consumption in 2029 based on consumption rates in 2012 and comparing that to predicted consumption in 2029 assuming the CPP was implemented.[95] It found that, while water consumption was predicted to decline by five percent without the CPP, under the CPP, Texas's water consumption would decrease by more than twenty-one percent by 2029.[96] This study shows that, with the right mix of implementation tools, the CPP, or a similar legislative measure, could benefit water resources. Of course, not every state would focus so heavily on wind (or solar) power, and instead, some would choose the easier, more cost-effective options, like switching to natural gas or relying on control technology to enhance energy-efficiency of existing plants.[97]

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91. Benjamin Sovacool & Ajith Rao, *Managing the Electricity-Water Nexus in China, France, India and the United States*, *in* CLIMATE, ENERGY & WATER 155, 163 (Jamie Pittock, Karen Hussey & Stephen Dovers eds., 2015).

92. FAETH, *supra* note 88, at 1.

93. Texas currently leads the U.S. in wind generated power. *Texas: State Profile and Energy Estimates*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/state/?sid=TX (last updated Jan. 19, 2017). It accounted for nearly 23% of power generation for the Electric Reliability Council of Texas (the entity that operates the electric grid in Texas) during the first quarter of 2017, the highest percentage yet. Benjamin Storrow, *The Rise of Wind Power in Texas*, SCI. AM. (Apr. 14, 2017), https://www.scientificamerican.com/article/the-rise-of-wind-power-in-texas/.

94. AM. COUNCIL ON RENEWABLE ENERGY, *Renewable Energy in Texas*, *in* RENEWABLE ENERGY IN THE 50 STATES: SOUTHEASTERN REGION 28, 28 (2014).

95. FAETH, *supra* note 88, at 5-7, 16.

96. *Id.* at 20.

97. *See* Keith Kohl, *Why Natural Gas Will Help the Clean Power Plan*, ENERGY & CAPITAL (Oct. 2, 2015, 3:53 PM), http://www.energyandcapital.com/articles/why-natural-gas-will-help-the-clean-power-plan/5130 ("[N]atural gas will inevitably play a huge role in the clean energy movement.").

III. Integrating of Energy and Water Decision-Making

While the CPP showed some effort by legislators to integrate environmental law and energy law, there remains a need for energy law and policy to account for water considerations. From the analysis of the states' potential options under the CPP, it appears the Plan's impact on water resources was largely overlooked in the formation of the rule, squandering an opportunity for integration of water considerations into energy decision-making. A stronger emphasis on renewable energy and energy efficiency could have resulted in deep reductions in carbon emissions, fulfilling the objective of the CPP as well as resulting in water withdrawals dropping by 97% and water consumption declining by 85% by 2050.[98]

The CPP left a gap in American water and energy policy, and it is clear that the Trump Administration will only widen the hole now that the EPA has proposed the CPP's repeal.[99] Even if, at best, the EPA does put forward another energy regulation in the future, it is unlikely that rule would account for the energy-water nexus in regulating carbon emissions. A legal duty to consider both energy and water when making policy decisions could fill this gap and respond to the energy-water nexus accordingly.

At present, however, no legal duty specifically requires agencies to consider the impact on water resources when agencies make energy decisions. There are several ways that such a duty might be established. First, Congress could enact a law directing the EPA and other agencies to specifically address water resource impacts when making decisions related to energy policy. Second, the federal courts could read such a duty into the Clean Air Act's language or establish a requirement to consider water resources

98. Union of Concerned Scientists, Water-Smart Power: Executive Summary 6 (2013).

99. *Supra* Section III.B. Additionally, the EPA has put out an Advance Notice of Proposed Rulemaking ("ANPRM") about a potential future proposal to reduce greenhouse gas emissions from existing plants. State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, 82 Fed. Reg. 61,507 (Dec. 28, 2017). This ANPRM simply provides an opportunity for public comment on topics relevant to promulgating a new rule. *Electric Utility Generating Units: Advance Notice of Proposed Rulemaking on State Guidelines for Greenhouse Gas Emissions from Existing Sources*, U.S. EPA, https://www.epa.gov/stationary-sources-air-pollution/electric-utility-generating-units-advance-notice-proposed (last updated Dec. 28, 2017). But, as environmental groups argued in their response to the EPA's most recent request to continue the CPP litigation abeyance, the ANPRM "does not commit EPA even to proposing any replacement rule at all" and "states that EPA merely 'continues to consider the possibility of replacing certain aspects of the CPP.'" Public Health and Environmental Organizations' Response to EPA's Request to Hold Case in Abeyance at 4 & n.5, West Virginia V. EPA, No. 15-1363 (D.C. Cir. Jan. 17, 2018) (*quoting* State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, 82 Fed. Reg. at 61,509).

through the Administrative Procedure Act. Third, the President could create such a requirement as head of the executive branch.

A. *A Congressionally Mandated Legal Duty to Consider Water Resources*

While there have been trade-offs between water and energy security, there have also been important attempts to integrate decision-making and find links between the sectors. This subsection will explore some of the ways the statutory scheme already tries to incorporate the energy-water nexus and the work that several agencies have undertaken to take a more integrated approach to energy regulation. It also describes the research the Department of Energy has conducted in this sphere. It then details the several minor attempts Congress has made to integrate energy and water decision-making at the agency level. Finally, it explains why these failed bills fell short of providing a legal duty to consider water resources in energy decision-making and what a successful bill might contain.

1. Current Statutes and Agency Action

As noted, some statutory authority allows the EPA and Department of Energy to address some of the issues of the energy-water nexus. The Clean Air Act grants the EPA authority to set emissions standards for existing power plants under Section 111(d).[100] Although this provision does not require the EPA to consider water in promulgating their regulations, it does allow some regulation of the energy sector to provide environmental and health benefits.

Under the Clean Air Act and Clean Water Act, the EPA has been directed to consider some impacts on water from the energy sector. Importantly, though, these directives focus almost entirely on water quality, not the impact on quantity or allocation. The Clean Air Act includes the Great Waters Provision.[101] This provision requires the EPA to "identify and assess the extent of atmospheric deposition of air pollutants in Great Waters," such as the Great Lakes and the Chesapeake Bay.[102] The EPA has worked to take a multimedia approach through coordination of programs under the Clean Air Act and Clean Water Act to ensure that regulations promulgated

100. 42 U.S.C. § 7411(d) (2012).

101. *Id.* § 7412(m).

102. Office of Air Quality Planning and Standards, U.S. EPA, EPA-453/R-00-005, Deposition of Air Pollutants to the Great Waters i (2000), https://clu-in.org/download/contaminantfocus/mercury/Deposition-of-Air-Pollutants-to-the-Great-Waters.pdf.

to curb air pollution will also prevent water quality problems that result from deposition of air pollutants.[103]

The Clean Water Act also has several provisions that impact the energy sector: (1) Section 404 permits requirements for energy facility siting; (2) Section 402 permits requirements for pollutant discharges, including from power plants; and (3) Section 316 permits regulations for cooling water intake by thermoelectric power plants.[104] Again, like the Great Waters Provision, the Clean Water Act provisions, for the most part, regulate the energy sector to ensure that water *quality* is not degraded, rather than addressing issues relating to water *quantity*, like consumption rates, and the energy sector's high demand for water resources.

In the past decade, great strides have been made by the Department of Energy to understand the energy-water nexus and begin to address the problems associated with it. Under the Energy Policy Act of 2005, the Department of Energy was directed to study the interconnection between water and energy and "identify actions that could be taken to ensure the optimal management and efficient use of both energy and water, in a way that ensures adequate supplies."[105] In 2014, the Department of Energy published a report entitled "The Water-Energy Nexus: Challenges and Opportunities," which recognized that the availability and predictability of water resources could deeply impact the energy sector and highlighted the challenges that exist for integrating energy and water decision-making.[106] The report also identified opportunities "for policy harmonization between the energy and water spheres."[107] These opportunities include continued development of technology that can make the electric power sector less water-intensive and more energy-efficient, increased understanding of how fracking impacts water resources, and continued use of programs that focus on promotion of residential energy and water efficient technology, like the Energy Star Program.[108]

The Department of Energy's report is a major step toward recognizing the interconnection between the energy and water sectors. It attempts to

103. *Id.*

104. *See* Craig, *supra* note 16 (providing an in-depth discussion of the Clean Water Act's regulation of energy production).

105. Andrea West Wortzel, *Energy Versus Water: The Growing Role of Water in Controlling Energy Decisions*, 48 U. RICH. L. REV. 1051, 1051 (2014); *see also* 42 U.S.C. § 16319 (2012).

106. One major challenge cited is the complexity and fragmentation of the decision-making landscape for water and energy policy due to the multijurisdictional nature of water management and the fragmentation of responsibility for water resources. *See* U.S. DEP'T OF ENERGY, THE WATER-ENERGY NEXUS 51–87 (2014), https://energy.gov/sites/prod/files/2014/06/f16/Water%20Energy%20Nexus%20Report%20June%202014.pdf.

107. *Id.* at 86.

108. *Id.* at 86-87.

explain why there is a disconnect between energy and water decision-making and how co-benefits can be created. Unfortunately, the report focuses on the need to develop technology and reduce the information gap, rather than on formulating energy policy and regulations that account for their impact on water resources. It does not address a legal mechanism that would require decision-makers to create benefits for both the energy sector and water sector through regulations promulgated.

2. Congressional Failures and the Need for a Legal Mandate

Over the past six years, several House and Senate bills have been introduced that, if enacted, would have required agencies to take the important first step towards integration by researching the energy-water nexus. In 2009, Representative Bart Gordon introduced The Energy and Water Research Integration Act ("the "Gordon Bill").[109] This bill directed the Secretary of Energy to identify the Department of Energy's research, development, and demonstration programs and projects where it would be appropriate to integrate water considerations.[110] Additionally, it directed the Secretary to focus on advancing energy and energy-efficiency technology that would allow the sector to minimize water withdrawals, limit consumption, and increase water use efficiency.[111]

Further, the Department of Energy was to consider how climate change would affect water supplies and energy generation and develop a Strategic Plan for creating different technological advancements to reach climate, energy, and water benchmarks.[112] Importantly, the bill also required that the Department work with other federal agencies conducting related programs, although no agencies were specifically named.[113] Finally, the bill called on the Department of Energy to establish an Energy-Water Architecture Council that would "promote and enable improved energy and water resource data collection, reporting, and technological innovation" and make recommendations on best practices for utilizing information on water and

109. Energy and Water Research Integration Act, H.R. 3598, 111th Cong. (as passed by House, Dec. 1, 2009).

110. *Id.* § 2(a).

111. *Id.*

112. *Id.* § 2(b).

113. *Id.* § 2(b)(3) ("[T]he Secretary shall, where appropriate, work collaboratively with other Federal agencies operating related programs. . . .").

energy use.[114] This bill was passed by the House but never made it out of the Senate Committee on Energy and Natural Resources.[115]

In 2011, Senator Jeff Bingaman introduced The Energy and Water Integration Act (the "Bingaman Bill"), which directed the Secretary of Energy, in consultation with the Secretary of the Interior and the Administrator of the EPA, to work with the National Academy of Sciences to analyze the impact of the energy sector on water resources.[116] The bill also directed the Secretary of the Interior to conduct a study on water storage, water reclamation projects, and desalination options.[117] This bill was similar to the Gordon Bill in its goals but differentiated itself in significant ways. It imposed a duty on other agencies to be involved with the process of better understanding the energy-water nexus. It also emphasized both sides of the energy-water nexus by requiring studies not only regarding water use by the energy sector but also energy use by the water sector.[118] Unfortunately, this bill also ultimately died in the Senate Committee on Energy and Natural Resources.[119]

The House would try twice more to keep this type of bill alive. In 2012, and again in 2014, Representative Eddie Bernice Johnson introduced The Energy and Water Research Integration Act.[120] Both bills were very similar to the Gordon Bill. The 2014 version was different in that it required the Department of Energy, in collaboration with unspecified other federal agencies, to establish an Energy-Water Subcommittee of the Energy Advisory Board that would have similar duties to the Energy-Water Architecture Council.[121] Neither bill managed to leave the House committee.[122]

While each of these bills failed to become law, they demonstrate growing recognition that the energy-water nexus and its impacts must be better understood. The Bingaman Bill also emphasized the need for inter-agency

114. *Id.* § 3(a).

115. H.R. 3598, 111th Cong. (2009), https://www.congress.gov/bill/111th-congress/house-bill/3598/all-actions?overview=closed#tabs.

116. Energy and Water Integration Act, S.1343, 112th Cong. § 3 (2011).

117. *Id.* §§ 11(a), 5(b)(1), 6(a).

118. *Id.* §§ 5(b)(1), 7 (requiring studies regarding water usage), 4(a) (requiring the Secretary of the Department of Energy to consult with the Secretary of the Interior and the Administrator of the EPA).

119. S.1343, 112th Cong. (2011), https://www.congress.gov/bill/112th-congress/senate-bill/1343/all-actions?overview=closed#tabs.

120. Energy and Water Research Integration Act, H.R. 5827, 112th Cong. (2012); Energy and Water Research Integration Act, H.R. 5189, 113th Cong. (2014).

121. H.R. 5189 § 3.

122. H.R. 5827, 112th Cong. (2012), https://www.congress.gov/bill/112th-congress/house-bill/5827/all-actions?q=%7B%22search%22%3A%5B%22hr+5827%22%5D%7D&r=3; H.R. 5189, 113th Cong. (2014), https://www.congress.gov/bill/113th-congress/house-bill/5189/all-actions?q=%7B%22search%22%3A%5B%22hr+5189%22%5D%7D&r=2.

collaboration and the need for EPA and the Department of the Interior, in particular, to play a role and have a legal duty to consider the nexus. These bills, if enacted, would have placed a legal requirement on the federal government to better understand the nexus, a necessary first step toward integration of water and energy concerns in policy and regulatory decision-making. However, each bill fell short by not requiring an important next step. None of the bills placed a specific legal duty on the agencies to account for water considerations in decision-making, which will be necessary for decision-making to adequately address the issues associated with the energy-water nexus. Congress can and should pass legislation codifying an integrationist model of environmental lawmaking. It should require agencies to consider environmental impacts holistically, rather than focusing on a single fragment or component of a much larger climate issue.

Successful legislation ought to be directed at agencies other than the Department of Energy, which sets the regulatory policy for various energy production facilities. While the Department of Energy has made huge strides by releasing research on the energy-water nexus, the Department's jurisdictional reach is only so far. Other agencies must be involved. It is the EPA that is primarily responsible for regulating greenhouse gas emissions and permitting discharges into the nation's water. The NRC plays a significant role in the environmental compliance of nuclear plants. FERC takes the lead in licensing for hydroelectric dams, and the Department of Transportation has a part to play in permitting onshore and offshore pipelines. For legislation to truly integrate energy and water decision-making, Congress must call upon each of these federal agencies, as well as others, to specifically consider how their regulatory decisions can maximize water resources.

B. *A Judicially Interpreted Legal Duty to Consider Water Resources*

While Congress might be the most appropriate body to construct a legal duty to consider water resources in energy decision-making, the federal courts could also have a role to play. In particular, there are two statutory schemes into which the courts might read such a legal duty: the Clean Air Act, under Section 111, and the Administrative Procedure Act, under Section 706. Given the right lawsuit, the federal courts might be willing to read these statutes in a manner that would require agencies, particularly the EPA, to consider what impacts energy regulation will have on water resources.

1. Cost Consideration as a Model for Water Consideration

A recent case, *Michigan v. EPA*, provides a template for a judicially derived legal duty. There, the U.S. Supreme Court held that the EPA is required to consider costs when promulgating certain rules under the Clean Air Act, even where cost is not explicitly mentioned. The Court looked at whether it was reasonable for the EPA to refuse to consider cost when making a decision to regulate emissions of hazardous air pollutants from stationary sources under the Clean Air Act.[123] The Clean Air Act directs the EPA to regulate air pollutants from power plants when it finds regulation to be "appropriate and necessary."[124] The Court held that the EPA interpreted the statute unreasonably when it "deemed cost irrelevant to the decision to regulate power plants"[125] because, "[r]ead naturally in the present context, the phrase 'appropriate and necessary' requires at least some attention to cost."[126] The Supreme Court, thus, read into the Clean Air Act a legal duty for the EPA to consider cost in setting its regulations.

Another requirement might be read into Section 111(a)(1) of the Clean Air Act. That section sets out the definition of "standard of performance," which includes a requirement that the EPA consider two specific things.[127] Standard of performance is defined as a

> standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.[128]

The first consideration is the cost of achieving reductions. The EPA conducts a cost-benefit analysis to show that they have considered cost when regulating. For the CPP, the EPA conducted a Regulatory Impact Analysis, which included a comparison of costs and benefits.[129] The second requirement is that the EPA must consider nonair "environmental impact and energy requirements" in setting its standards of performance.[130] Both

123. Michigan v. EPA, 135 S.Ct. 2699, 2711 (2015).
124. 42 U.S.C. § 7412(n)(1)(A) (2012).
125. *Michigan*, 135 S.Ct. at 2712.
126. *Id.* at 2707.
127. 42 U.S.C. § 7411(a)(1).
128. *Id.*
129. U.S. EPA, EPA-452/R-15-003, Regulatory Impact Analysis for the Clean Power Plan Final Rule 8-1 (2015), https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf.
130. 42 U.S.C. § 7411(a)(1).

considerations could encompass consideration of the impact on water and provide a legal justification for requiring the EPA to conduct a "water-impact analysis" for regulations like the CPP. Just as the Supreme Court read a legal requirement that the EPA must consider cost into the Clean Air Act, even where cost considerations are not explicitly required, it could apply similar reasoning under this section of the Clean Air Act as well.

The Court could read another legal duty into the Act, one which specifically requires the EPA to consider water impacts when it regulates energy sources to curb air pollution. Under such a requirement, the EPA would have to conduct a "water-impact analysis" that would provide information to the EPA and the public regarding how any new regulation affects water resources. It would determine the positive and negative consequences of the regulation on water, including how it would affect withdrawal and consumption rates and any effects on water quality. Such an analysis would answer questions that are important for effective policy integration of the energy sector and water sector and would help the EPA understand where regulations could create co-benefits for water and air.

Consideration of "environmental impacts" includes consideration of how the determined standards of performance impact water resources. The question becomes whether a system truly qualifies as the "best" if it allows states to continue to rely on unsustainable and water-intensive thermoelectric power generation, like coal, nuclear and natural gas, and the process of fracking, in a time of intense drought and water scarcity. There has been such an extensive amount of academic research on the environmental impacts on water resources from thermoelectric generation and fracking, as well as on the energy-water nexus, that it would be irrational for the EPA to ignore this information and not consider water resource impacts in promulgating regulations that relate to the energy sector.[131] In considering energy requirements, the energy-water nexus clearly shows that energy inherently requires water resources, and energy security requires sufficient water resources in the long-term. Thus, states must begin to move away from water-intensive processes and energy sources. With the growing consensus that the energy-water nexus and its associated issues must be dealt with, in the same way that "appropriate and necessary" naturally includes consideration of costs, "environmental impact and energy requirements" naturally should be interpreted to include a legal requirement for consideration of water resource impacts and require a "water-impact analysis" from the EPA.

The CPP's potential impact on water resources was uncertain, but the impact would have varied based on the tools the states could have chosen to use in complying with the CPP. Had the EPA conducted a water-impact

131. *See supra* Section III.C.

analysis, it may have found that it was inappropriate to allow the states as much flexibility as it did because of the consequences for water resources. Some of the tools available to states for meeting their goals, like natural gas, nuclear power, and hydroelectric power, do not provide benefits to and may even have adverse consequences for water resources in the U.S. Emphasizing alternative tools like wind and solar power or disincentivizing natural gas would have resulted in significant climate change mitigation and air quality improvements, while also reducing the mounting stress on water resources.

Reading a legal duty into the Clean Air Act is just one way that the courts could impose a legal requirement on the EPA and other agencies to consider water resource impacts when making energy-policy decisions and promulgating energy regulations under the Clean Air Act.

2. The Arbitrary and Capricious Standard

The Administrative Procedure Act requires that a reviewing court "hold unlawful and set aside agency action, findings, and conclusions found to be—(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."[132] The Supreme Court held that an "agency must examine the relevant data," and a decision must be "based on a consideration of the relevant factors."[133] Under the arbitrary and capricious standard, "not only must an agency's decreed result be within the scope of its lawful authority, but the process by which it reaches that result must be logical and rational."[134] "[A]n agency rule would be arbitrary and capricious if the agency . . . entirely failed to consider an important aspect of the problem."[135] While this standard is highly deferential, and not intended to allow a court to substitute its own judgment for the judgment of the agency, the court will require the agency to provide evidence from the record of its decision-making.[136] An agency must consider all relevant factors, as well as pertinent alternatives.[137] This standard could also be used as a legal mechanism for the federal courts to announce a legal duty that requires agencies to consider water resource impacts in promulgating regulations that affect the energy sector.

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132. 5 U.S.C. § 706 (2012).

133. Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983).

134. Allentown Mack Sales & Serv., Inc. v. Nat'l Labor Relations Bd., 522 U.S. 359, 374 (1998).

135. *State Farm*, 463 U.S. at 43.

136. *Id.* at 43-44.

137. *Id.* at 48.

Based on the nexus between energy resources and water resources, it would seem natural for an agency to consider water resources in its rulemakings relating to the energy sector. As discussed, the impact on water resources is highly relevant to energy decision-making. What energy source is being used and what type of energy generation process is involved can have deep and differing impacts on water withdrawals, water consumption, water quality, and the aquatic ecosystem. These impacts have been acknowledged by the federal government in numerous ways: by the Department of Energy in its energy-water nexus report, by Congress through the many bills that have been introduced, and by the EPA through regulations promulgated under the Clean Water Act. The Government Accountability Office even released a series of reports on the energy-water nexus, beginning in 2009, which culminated in a 2012 report that recommended a coordinated federal approach for managing energy and water tradeoffs.[138] The federal government, and specifically, the agencies involved in regulating the energy sector, clearly understand that their regulatory choices have different tradeoffs for the water sector, and the importance of considering these resources because of their interconnection. As such, it would be irrational to allow an agency to simply ignore that impact on water when setting out regulations that incentivize or discourage certain types of energy sources and generation processes.

Water is an "important aspect of the problem" that the EPA has entirely failed to consider in setting out the CPP. It is neither "logical" nor "rational" for the agency's decision-making process to be completely void of any discussion of water resources. The agency should have considered alternative regulations that would curb air pollution and benefit human health, while also having the best possible impact on water resources in the long-term. If a challenge were brought to an action regulating the energy sector, a reviewing court could find that the agency's decision was arbitrary and capricious if water resource considerations were not considered and thereby announce a new legal duty to consider water resources.

C. *A Presidential Directive Creating a Legal Duty to Consider Water Resources*

Outside of action by Congress or the courts to create a legal duty to consider water resources, the President could step in to mandate integration of energy and water decision-making via executive order.

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138. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-12-880, ENERGY-WATER NEXUS: COORDINATED APPROACH NEEDED TO BETTER MANAGE ENERGY AND WATER TRADEOFFS (2012).

The National Environmental Policy Act ("NEPA")[139] requires all federal agencies to conduct an Environmental Impact Assessment ("EIA") when undertaking a major federal action that significantly affects the environment.[140] These impact assessments determine the likely environmental impacts from the proposed action and all alternative courses of actions.[141] EIAs are required at the "project level" for actions like permit or license application decisions, adoption of federal land management actions, and construction of publicly owned facilities like highways.[142] In 2011, President Obama issued Executive Order 13,563: "Improving Regulation and Regulatory Review."[143] This Executive Order required agencies to perform a Regulatory Impact Analysis ("RIA") to "quantify anticipated present and future benefits and costs as accurately as possible."[144] The RIA must include, to name a few key elements, a description of the need for the regulatory action, a definition of the baseline, descriptions of the regulatory alternatives, identification of the consequences of those alternatives, quantification and monetization of the benefits and costs where possible, and an evaluation costs and benefits that cannot be monetized.[145] The RIA is a tool that, like the EIA, can be used to integrate an assessment of environmental impacts at the regulatory and policy level and has been used by the EPA in developing its national air pollution regulations, including the CPP.[146]

While an agency is required to include adverse environmental impacts of a regulatory action,[147] there are no explicit requirements established for certain types of regulatory actions. For example, there is no specific requirement that air pollution regulations for the energy sector include some discussion of the adverse and or beneficial water consequences. One way that the energy-water nexus could be incorporated into agency decision-making is by establishing a legal requirement by executive order that an agency setting forth regulations that impact the energy sector include a section on

139. National Environmental Policy Act, 42 U.S.C. §§ 4321–4370h (2015).

140. Balt. Gas & Elec. Co. v. Nat. Res. Def. Council, 462 U.S. 87, 97 (1983).

141. *Summary of the National Environmental Policy Act*, U.S. EPA, http://www.epa.gov/laws-regulations/summary-national-environmental-policy-act (last updated Aug. 24, 2017).

142. *What is the National Environmental Policy Act*, U.S. EPA, http://www.epa.gov/nepa/what-national-environmental-policy-act (last updated Jan. 24, 2017).

143. *See generally* Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

144. Office of Info. & Reg. Affairs (OIRA), Reg. Impact Analysis: A Primer 2 (2011), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf.

145. *See generally id.*

146. *See Regulatory Impact Analyses for Air Pollution Regulations*, U.S. EPA, https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/regulatory-impact-analyses-air-pollution (last updated Nov. 1, 2017); U.S. EPA, *supra* note 129.

147. OIRA, *supra* note 144, at 7-8.

water resource impacts, both in terms of quantity and quality, in the RIA already required for the regulatory action. The President, as the head of the executive branch, could mandate that such analysis be included in the RIA for every energy regulatory action.

There are, however, problems with using the RIA to analyze water resources, including the emphasis placed on monetization of benefits and costs. Attempting to monetize the impacts may be difficult in this context because of the long-term nature of the problems associated with the energy-water nexus and the uncertainty associated with climate change impacts on water resources and the energy sector in general.

Another regulatory tool currently in existence, but not used by U.S. agencies, that appears to require water-impact analysis by agencies is a Strategic Environmental Assessment ("SEA").[148] Like an EIA required under NEPA, an SEA is a "process which identifies and evaluates the significant environmental and sustainability implications of particular plans, programmes and policies."[149] However, instead of focusing on a particular project, a SEA "typically involves the setting of an overarching environmental vision and objectives for a particular region and activities within that region"[150] and "extends the aims and principles of EIA to the higher levels of decision-making."[151] These are often designed in order to determine the environmental impacts of policies with reference to "long-term objectives that reflect the principles of ecological sustainable development" and are useful for application to policies and regulations that deal with "complex socio-ecological systems."[152] SEAs could be used in conjunction with the RIA as a required element that must be included by the agency. Alternatively, it could be used as its own requirement, separate from an RIA, to more closely scrutinize the environmental impacts and emphasize the importance of accounting for environmental considerations. In the same way that the President mandated use of the RIA, he could direct the agencies to include a SEA as well to more easily assess long-term environmental consequences.

148. *See* Hussey & Pittock, *supra* note 4, at 3.

149. Robin Warner, Strategic Environmental Assessment (SEA) and its Application to Marine Areas Beyond National Jurisdiction (ABNJ) 1, http://www.un.org/depts/los/biodiversity/prepcom_files/Warner_Strategic_Environmental_Assessment_PrepCom2.pdf (citations omitted).

150. *Id.*

151. Hussein Abaza et al., U.N. Envtl. Programme, *Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach* 86 (2004), https://unep.ch/etu/publications/textONUbr.pdf.

152. Hussey & Pittock, *supra* note 4, at 3.

Conclusion

In establishing the EPA, President Nixon wanted to create an agency that could more comprehensively deal with the complexity and interconnectivity of environmental problems. The goal was to create an overarching agency that could be granted statutory authority over environmental problems and understand how the laws and regulations fit together to create a healthier and safer environment for the American people. In doing so, the EPA could very easily take on the "integrationist approach" and ensure that all environmental laws fit together to maximally benefit the environment and fill legal gaps.

The EPA also possesses some authority over facilities in the energy sector to ensure their activities do not harm the environment. In recent years, this authority has been used to mitigate climate change and to reduce the United States' "historic climate debt" by setting emissions standards for the energy sector and incentivizing renewable energy and non-traditional fossil fuel sources with less of an effect on air pollution.[153] It is an honorable goal, and policy is needed to take on carbon emissions and climate change. "[Y]et in the rush to transition to a renewable economy, policy makers [have] paid little heed to the potential water consequences."[154]

The benefit to society of reducing greenhouse gas emissions to mitigate climate change will be limited if production of alternative energy sources exacerbates water shortages.[155] It is important that the EPA and the rest of the federal government remember that climate change is a complex problem and fixing one problem by exacerbating another problem is not going to provide a global solution. At a time where climate change is, arguably, the primary problem to be fixed, incremental solutions are going to have to occur, but they must only be implemented with reference to the larger picture. While there have been some positive studies that suggest the CPP would have had a beneficial impact on water resources,[156] it is still inherently problematic that the EPA did not address the impact its regulations would have on water resources at all. The CPP is unquestionably a historic

153. "Climate debt" is the idea that some nations, particularly those that are wealthy and industrialized, bear a greater responsibility for the climate crisis because they caused the majority of the damage through their industrial activities. Climate debt is about who is going to pay to fix the crisis that has been created, and some even suggest that industrialized countries, like the United States, ought to pay reparations to poorer nations who will bear the brunt of the consequences from climate change. Naomi Klein, *Climate Rage*, Rolling Stone (Nov. 12, 2009), http://www.rollingstone.com/politics/news/climate-rage-20091112.

154. Roberta Mann, *Like Water for Energy: The Water-Energy Nexus Through the Lens of Tax Policy*, 82 U. Colo. L. Rev. 505, 508 (2011) (citation omitted).

155. *Id.* at 508.

156. *See generally* Faeth, *supra* note 88.

piece of legislation and could have been a "climate game changer,"[157] but it also would have continued the tradition of compartmentalizing environmental problems that has so often been a fault of the American environmental law system.

The options described in this Note provide ways that agencies could be legally obligated to account for water resource considerations in their energy regulation decision-making. A congressional mandate for integration of energy and water resource decision-making would be a relatively uncontroversial, and therefore more ideal, way to establish a legal requirement upon agencies. The announcement of a duty to complete a water-impact analysis under the Clean Air Act by the judiciary, either by reading it into the language or via the Administrative Procedure Act, would allow for judicial oversight to ensure that water considerations are accounted for in a logical and rational way during the decision-making process. The use of RIAs and SEAs to require water-impact analysis prior to agency regulatory action could be important tools in bringing environmental law and energy law together and addressing the concerns posed by the energy-water nexus. The SEAs create transparency and ensure that agencies at least know what impacts their regulations might have, even if they are not bound to change their policy decisions because of adverse consequences for water resources. These mechanisms for integration have merit and could help to ensure that water and energy tradeoffs that come from regulations are fully understood and addressed by the agency before a final decision is made regarding either sector. In this way, the U.S. can ensure water and energy security in the long-term.

157. *The Clean Power Plan: A Climate Game Changer*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/our-work/global-warming/reduce-emissions/what-is-the-clean-power-plan#.V2CxBZMrJPM (last visited Dec. 5, 2017).