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Applying the Pennsylvania Environmental Rights Amendment
Meaningfully to Climate Disruption

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APPLYING THE PENNSYLVANIA ENVIRONMENTAL RIGHTS AMENDMENT MEANINGFULLY TO CLIMATE DISRUPTION

By
Robert B. McKinstry, Jr.* and John C. Dernbach**

ABSTRACT

The Pennsylvania Constitution contains a unique Environmental Rights Amendment (“ERA”) creating an individual right to “clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.” The ERA also includes a public trust element that makes “Pennsylvania's public natural resources . . . the common property of all the people, including generations yet to come.” It makes the Commonwealth the “trustee of these resources,” requiring it to “conserve and maintain them for the benefit of all the people.” Recent decisions by the Pennsylvania Supreme Court in *Robinson Township v. Commonwealth* and *Pennsylvania Environmental Defense Foundation v. Commonwealth* provide significant support for Pennsylvania regulation to address the threat of climate disruption posed by greenhouse gas (“GHG”) emissions to achieve net zero carbon emissions by the second half of the 21st century.

In light of the threats that climate disruption poses to Pennsylvania’s public natural resources, the text of the ERA and the principles articulated in those cases, we argue that a stable climate (a climate that has not been disrupted by anthropogenic emissions of GHGs) should be considered protected by the rights provided by the ERA, and the public trust and trustee duties it

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creates. We argue that this duty requires Pennsylvania to undertake measures to limit GHG emissions employing all regulatory measures up to the social cost of carbon, and that there are judicially recognizable standards to compel the Commonwealth to exercise its existing legislative authority to do. In light of existing legislative authority, the obligations imposed by the United Nations Framework Convention on Climate Change, the Paris Agreement and the federal Clean Air Act, we make the case that this regulatory program should take the form of an economy-wide cap-and-trade program providing for the auction of allowances with a reserve price based on the social cost of carbon and additional measures to prevent leakage.

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I. INTRODUCTION

In 1971, Pennsylvania voters overwhelmingly approved a nationally unique Environmental Rights Amendment (“ERA”) to the Pennsylvania Constitution, creating an individual right for all Pennsylvanians to “clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.” The Amendment further made “Pennsylvania's public natural resources . . . the common property of all the people, including generations yet to come,” and made the Commonwealth the “trustee of these resources,” requiring it to “conserve and maintain them for the benefit of all the people.”¹ Despite the Amendment’s strong and clear language, for nearly half a century the courts left the provision toothless, substituting a three-part balancing test for the text of the Amendment—a test completely divorced from the text that required little more than compliance with existing laws, and under which environmental advocates almost never won.² In *Robinson Township v. Commonwealth* (“*Robinson Township*”)³ and *Pennsylvania Environmental Defense Foundation v. Commonwealth* (“*PEDF*”)⁴, the Pennsylvania Supreme Court dramatically reversed this trend, for the first time striking down acts of the General Assembly that it found to violate the ERA. These decisions also confirmed that the Amendment created an enforceable individual right to

¹ PA. CONST. art. I, § 27

² *Payne v. Kassab*, 312 A.2d 86, 94 (Pa. Commw. Ct. 1973), aff’d 361 A.2d 263 (Pa. 1976), Commonwealth Court articulated the following test as a substitute for the text of Article I, § 27:

The court’s role must be to test the decision under review by a threefold standard: (1) Was there compliance with all applicable statutes and regulations relevant to the protection of the Commonwealth’s public natural resources? (2) Does the record demonstrate a reasonable effort to reduce the environmental incursion to a minimum? (3) Does the environmental harm which will result from the challenged decision or action so clearly outweigh the benefits to be derived therefrom that to proceed further would be an abuse of discretion?

The test bore no significant relationship to the text of Section 27. John C. Dernbach, *Taking the Pennsylvania Constitution Seriously When It Protects the Environment: Part II: Environmental Rights and Public Trust*, 104 DICK. L. REV. 97, 136-42 (1999). Over the fur decades when the *Payne* test was applied, parties invoking Article I, Section 27 almost never prevailed. John C. Dernbach & Marc Prokopchak, *Recognition of Environmental Rights for Pennsylvania Citizens: A Tribute to Chief Justice Castille*, 53 DUQ. L. REV. 335 (2015).

³ 83 A.3d 901 (Pa. 2013) (plurality).

⁴ 161 A.3d 911 (Pa. 2017).

environmental protection and that the Commonwealth had a judicially enforceable duty as a trustee to protect those rights and to conserve the corpus of the environmental trust.

The *PEDF* decision, in particular, provides significant support for Pennsylvania regulation that will address the threat of climate disruption posed by greenhouse gas ("GHG") emissions by putting a meaningful price on those emissions, while taking other complementary measures. In *PEDF*, the Court held that the Commonwealth's duty as a trustee under Article I, § 27 of the Pennsylvania Constitution governs the disposition of natural gas lease revenues from state forest and park lands. It therefore struck down acts of the General Assembly that it found inconsistent with that duty. That legislation transferred monies received from gas leasing of state lands—which the Court held to represent "capital" or the corpus of the constitutional trust—into the General Fund, where it could be spent for purposes other than the conservation and maintenance of public natural resources. Because climate disruption poses an existential threat to all of Pennsylvania's environmental trust resources, the *PEDF* decision can have significance with respect to the Commonwealth's duty to address climate disruption caused by GHG emissions and can support arguments for putting a meaningful price on those emissions, commensurate with the social cost of carbon. The decision also calls into question the General Assembly's ability to block regulations implementing programs for the protection of trust resources, including regulations addressing climate disruption. The decision's implications regarding use of revenues from allowances or fees on GHG emissions are less clear, but the better arguments would allow all or substantial portions of the revenues to be used for the General Fund, as long as the revenues derive from actions that preserve rather than deplete the corpus of the trust.

The *PEDF* decision and its application to climate disruption will likely have consequences beyond Pennsylvania's borders because it provides a judicially manageable approach to implementing an environmental constitutional amendment. The Pennsylvania Supreme Court is emerging as an intellectual leader in applying cogent historical and textual analysis to restore moribund state constitutional provisions to effect their original intent.⁵ Although more than a third of all state constitutions include provisions addressing concerns regarding resource conservation and pollution, the provisions have tended to be more symbolic than legally meaningful, in no small part because courts have been unwilling or unable to find a way to enforce them.⁶ Moreover, a great many countries have environmental rights provisions in their constitutions⁷ and many states apply a public trust doctrine similar to the standard incorporated into the Pennsylvania ERA.⁸ A judicial decision that actually enforces an environmental rights provision, and provides a judicially manageable standard for doing so, is likely to be influential in the many other states and countries with comparable provisions.⁹

Some countries expressly address climate change in their constitutions, and a growing number of courts have found a right to climate justice in other provisions of their constitutions.¹⁰

⁵ The jurisprudence extends beyond the *Robinson Township* and *PEDF* decisions giving meaning to the original intent of Article I, § 27. In *William Penn School District v. Pa. Dep't of Education*, No. 46 MAP 2015 (Pa. 2017) the Court interpreted the Education Clause in Article III, § 14 of the Pennsylvania Constitution to give meaning to its guarantee of "a through and efficient system of public education" in light of that clause's original intent. In the Court's fourth landmark decision in *League of Women Voters of Pa. v. Commonwealth*, No. 159 MM (Pa. 2018), *cert.* _____, Article I, § the Court interpreted the Free and Fair Elections Clause in Article I, § 5, of the Pennsylvania Constitution to give that clause its original meaning to invalidate the invidious practice of partisan gerrymandering. These clauses, like Article I, § 27, have counterparts in many other state and national constitutions.

⁶ Barton Thompson, *Constitutionalizing the Environment: The History and Future of Montana's Environmental Provisions*, 64 MONTANA L. R. 157, 158-9 (2003).

⁷ Erin Daly & James R. May, GLOBAL ENVIRONMENTAL CONSTITUTIONALISM (2014).

⁸ See, Barton Thompson, *The Public Trust Doctrine: A Conservative Reconstruction and Defense*, 15 SE ENV'T L. J. 47 (2007/2007).

⁹ John C. Dernbach, Kenneth T. Kristl, & James R. May, *Pennsylvania Environmental Defense Foundation v. Commonwealth of Pennsylvania: Recognition of Environmental Rights for Pennsylvania Citizens* 31-39, RUTGERS L. REV. (forthcoming 2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3137074.

¹⁰ *Id.* at 37-39.

These include both the Netherlands¹¹ and at least on District Court in the United States.¹² The *PEDF* analysis is thus directly relevant to nationally and internationally significant efforts to apply the public trust doctrine and related constitutional provisions compel government action to reduce greenhouse gas pollution and to prevent climate disruption. In light of the hostility of the current Administration to the issue of climate change, actions by the states to limit GHG emissions and to address the problem of climate disruption have become particularly significant. Although only a few states have a constitutional provision such as broadly protective as the ERA, up to a third have some sort of environmental provisions incorporated into their constitutions and many have public trust doctrines which are given a constitutional effect.¹³ Our Article adds to the analysis in the *PEDF* case by showing how a constitutional environmental provision can support a petition for rulemaking to limit GHG emissions and thereby limit climate disruption, and also support a regulatory agency's authority to subsequently adopt and implement such a rulemaking.

In order best to explain the implications of the *PEDF* decision for climate disruption, we first discuss Article I, § 27 and *Robinson Township* (Section II), and then analyze how *Robinson Township* was applied and extended in *PEDF* (Section III). Section IV discusses the threats that climate disruption poses to Pennsylvania's public natural resources. In light of those impacts and the principles articulated in *Robinson Township* and *PEDF*, we make the case that a stable

¹¹ *Urgenda Foundation/State of the Netherlands*, Rechtbank Den Haag [Hague District Court], 24 June 2015, C/09/456689, HA ZA 13-1396 (Neth.); See, Robert B. McKinstry, Jr., *Potential Implications for the United States of the Urgenda Foundation v. Netherlands Decision Holding That the UNFCCC and International Decisions Required Developed Nations to Reduce Emissions by 25 percent from 1990 Levels by 2020*, CLIMATE CHANGE, SUSTAINABLE DEVELOPMENT, AND ECOSYSTEMS COMMITTEE NEWSLETTER, vol. 19, No. 4 at 30 (ABA SEER July 2016), available at

https://www.americanbar.org/content/dam/aba/publications/nr_newsletters/ccsde/201607_ccsde.authcheckdam.pdf.

¹² *Juliana v. United States*, 217 F. Supp. 3d 1224 (D. Ore. 2017), petition for writ of mandamus denied sub nom., *United States v. United States District Court for the District of Oregon* (9th Cir. Mar. 7, 2018), No. 17-71692.

¹³ See Barton Thompson, *The Public Trust Doctrine*, *supra* note 8; Barton Thompson, *Constitutionalizing the Environment*, *supra* note 6.

climate (a climate that has not been disrupted by anthropogenic emissions of GHGs) should be considered protected by the rights provided by the first clause of Article I, § 27, and protected by the public trust and trustee duties created by the second and third clauses.

We then make the case in Section V that the Commonwealth's duty to prevent climate disruption requires that Pennsylvania undertake measures to limit GHG emissions employing all regulatory measures up to the social cost of carbon, and that there are judicially recognizable standards to compel the Commonwealth to exercise its existing legislative authority to do so. Section VI discusses the elements of a regulatory structure that can mitigate climate disruption and makes the case that this should take the form of an economy-wide cap-and-trade program with allowances that are auctioned with a reserve price based on the social cost of carbon and measures to prevent emissions "leakage." Section VII addresses issues relating to the prevention of leakage, distribution of allowances and the use of proceeds of an emissions auction. Finally, we address in Section VIII limitations on the General Assembly's power to block such a regulatory program.

II. THE ENVIRONMENTAL RIGHTS AMENDMENT AND *ROBINSON TOWNSHIP*

The Environmental Rights Amendment to the Pennsylvania Constitution was approved in 1971 by the voters by a margin of nearly four to one. It contains three clauses. The first creates individual rights to environmental attributes. The second creates additional rights by making Pennsylvania's public natural resources the property of all the people, including future generations. The third makes the Commonwealth and its constituent units trustees for the environment. Article I, § 27 provides:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come.

As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.¹⁴

Until the *Robinson Township* decision, no court had used the ERA to hold a statute or regulation unconstitutional. In that case, however, a plurality of the Pennsylvania Supreme Court used Article I, § 27 for precisely that purpose.

The legislation that was challenged in *Robinson Township* addressed the regulation of natural gas resources in the Commonwealth, particularly shale gas, and superseded the local governments' control over land use, as well as those governments' case-by-case consideration of the impacts of gas development on the natural environment. Chief Justice Castille's plurality opinion held that the legislative creation of uniform rules interfered with the municipalities' duties as trustees under Article I, § 27 and was therefore unconstitutional. In so doing, the plurality opinion discussed the ERA's history and purposes at length, and it enunciated a number of key legal principles that should govern the ERA's application.

The plurality in *Robinson Township* discussed at length Pennsylvania's long history of environmental abuse in connection with coal mining, deforestation, pollution, and wildlife eradication resulting from resource extraction. These abuses provided the impetus for the ERA's adoption. The opinion noted that the challenged law was written to encourage a gas extraction boom that posed the risk of causing similar environmental degradation. In striking down the portions of the law that limited the power of state subdivisions and agencies to exercise their obligation as trustees to prevent degradation, diminution, and depletion of constitutionally protected natural resources, the plurality opinion articulated the following key legal principles:

- The rights provided by the first and second clauses of the ERA represent fundamental, individual rights like free speech, freedom of religion and other

¹⁴ PA. CONST. art. I, § 27.

rights enumerated in Article I of the Pennsylvania Constitution and they should be interpreted as such.¹⁵

- The first clause “affirms a limitation on the state’s power to act contrary” to the people’s right to “clean air, pure water, and the preservation of the natural, scenic, historic, and esthetic values of the environment,” and “laws of the Commonwealth that unreasonably impair the right are unconstitutional.”¹⁶
- "The drafters seemingly signaled an intent that the concept of public natural resources would be flexible to capture the full array of resources implicating the public interest, as these may be defined by statute or at common law."¹⁷
- The public natural resources that are made the property of all the people by the second clause and the subject of the Commonwealth’s duty as a trustee include “not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property.”¹⁸ Thus, these resources and the Commonwealth’s duty as a trustee include the environmental rights created by the first clause (*i.e.* the "right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment"), which clearly implicate the public interest.¹⁹

¹⁵ *Robinson Township*, 83 A.3d at 953-54, 976.

¹⁶ *Id.* at 951.

¹⁷ *Id.* at 955.

¹⁸ *Robinson Township*, 83 A.3d at 955.

¹⁹ This is a necessary implication of the *Robinson Township* decision. The decision held that a state law purporting to protect private property rights in oil and gas was unconstitutional because it prevented municipalities from exercising their constitutional duties as trustees. Those constitutional duties required the municipalities to exercise their land use powers to protect the interest of current landowners and future generations against the adverse impacts of natural gas development on their “right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.”

- The constitutional rights created by the first and second clauses of the ERA include the right to enforce the duty of a trustee created by the third clause.²⁰
- The public trust provisions of the ERA are self-executing, in that they create constitutional duties binding on all three branches of government, and they can be applied and enforced by the judicial branch without further legislative action.²¹
- The Commonwealth's duties as a trustee should be governed by the established law applicable to trusts and trustees, including the legal principles articulated in the Restatement of Trusts.²² These trustee duties include prudence (exercising “such care and skill as a man of ordinary prudence would exercise in dealing with his own property.”), loyalty (managing the trust corpus “so as to accomplish the trust’s purposes for the benefit of the trust’s beneficiaries”), and impartiality (managing “the trust so as to give all of the beneficiaries due regard for their respective interests in light of the purposes of the trust”).²³

The plurality opinion, however, received votes from only three of the Court’s seven justices. Justice Baer supported the plurality’s decision on a separate basis—substantive due process. While the *Robinson Township* decision sketched a view of what Article I, § 27 could ultimately mean, it did not enshrine these principles as law.

III. THE DECISION IN *PEDF*

In *PEDF*, the Pennsylvania Supreme Court reaffirmed the *Robinson Township* principles and made them the applicable law of Article I, § 27. The plaintiff in *PEDF* challenged a series of legislative enactments that eliminated legal requirements that restricted the use of revenues

²⁰ *Id.* at 955.

²¹ *Id.* at 966-67.

²² *Id.* at 955-57.

²³ *Robinson Township*, 83 A.3d at 932-33 (citations omitted).

from leasing state forest and park lands for gas development to conservation purposes. The challenged legislation significantly changed the Oil and Gas Lease Fund, which is administered by the Department of Conservation and Natural Resources (“DCNR”). The Fund was created by a 1955 Act requiring “[a]ll rents and royalties from oil and gas leases of any” Commonwealth land to be deposited in the fund that was to be “exclusively used for conservation, recreation, dams, or flood control.”²⁴ The challenged legislation transferred much of the money that would have been deposited in the Lease Fund to the General Fund, where it could be used for any purpose authorized by the General Assembly. The challenged legislation also created a cap on revenues committed to DCNR under the Lease Fund, rather than requiring *all* moneys received from gas leasing to be used for conservation and maintenance of environmental trust resources.

The plaintiff challenged these enactments in Commonwealth Court as violative of the public trust clauses of Article I, § 27. The Commonwealth Court granted summary judgment to the Commonwealth, holding that there was no violation of the constitutional public trust. In reversing the Commonwealth Court, a majority of the Supreme Court reaffirmed the breadth of the *Robinson Township* decision and Article I, § 27 rights and duties, and it quoted extensively from *Robinson Township*. The Court held:

Because state parks and forests, including the oil and gas minerals therein, are part of the corpus of Pennsylvania’s environmental public trust, we hold that the Commonwealth, as trustee, must manage them according to the plain language of Section 27, which imposes fiduciary duties consistent with Pennsylvania trust law. We further find that the constitutional language controls how the Commonwealth may dispose of any proceeds generated from the sale of its public natural resources.²⁵

The Court's recitation of the facts suggests that the Court viewed the General Assembly's actions as looting a fund (the "Lease Fund") dedicated to conservation of the state forests and

²⁴ Oil and Gas Lease Fund Act, 71 P.S. § 1331.

²⁵ *PEDF*, 161 A.3d at 916.

parks, in order to fund a budget deficit in a way that would interfere with maintenance of those lands. The Supreme Court found this change significant because "DCNR had anticipated receiving the full amount of the rents and royalties to allow it to oversee the rapid expansion of drilling on state land when it decided to enter into the 2008 Leases."²⁶ The legislation further restricted the environmental purposes for which the now-limited revenues going in to the Lease Fund could be used.²⁷ The Court characterized the challenged actions as "transfers of capital."²⁸

The portions of the opinion of greatest significance for regulation of GHGs relate to the standard of review under Article I, § 27 and the contours of the ERA.²⁹ The court began by rejecting outright the three-part balancing test that had been used as a substitute for the text of the ERA, saying that the test "strips the constitutional provision of its meaning."³⁰ The Supreme Court then stated that the first two clauses of the ERA created rights that were "excepted out of the general powers of government" and that those rights, like all other rights articulated in Article I of the Pennsylvania Constitution "shall forever remain inviolate."³¹ It noted that the "public natural resources" that were made the property of the people included both the state forest and park lands and "the oil and gas themselves."³² The Court explained that the original draft of the second sentence of the ERA had provided that the property of the people (including future generations) extended to "'Pennsylvania's natural resources, including the air, waters, fish, wildlife, and the public lands and property of the Commonwealth . . .'" but was revised to remove the enumerated list and thereby discourage courts from limiting the scope of natural resources

²⁶ *Id.* at 922.

²⁷ *Id.*

²⁸ *Id.* at 924.

²⁹ *PEDF*, 161 A.3d at 930-36.

³⁰ *Id.* at 930.

³¹ *Id.* at 930-31 (*quoting Robinson Township*, 83 A.3d at 948, *quoting* PA. CONST. art. I, § 25).

³² *Id.* at 931.

covered" and therefore making those resources the property of all the people.³³ Thus, the list of public natural resources in the original draft of the second sentence represents a minimum list of the public natural resources protected by the ERA.

The Supreme Court then elaborated on the trustee duties created by the third clause of the ERA, adopting *Robinson Township's* interpretation of that clause as imposing upon the Commonwealth a fiduciary duty equivalent to that imposed upon trustees by existing trust law, with that duty extending to the public including future generations. The Court discussed the applicable duties imposed on trustees as set forth in the Restatement (Second) of Trusts, noting that these duties include the requirement that a trustee "manage the trust so as to give all of the beneficiaries due regard for their respective interests in light of the purposes of the trust."³⁴ The Court summarized the duties created by Article I, § 27, as follows:

Pennsylvania's environmental trust thus imposes two basic duties on the Commonwealth as the trustee. First, the Commonwealth has a duty to prohibit the degradation, diminution, and depletion of our public natural resources, whether these harms might result from direct state action or from the actions of private parties. Second, the Commonwealth must act affirmatively via legislative action to protect the environment. Although a trustee is empowered to exercise discretion with respect to the proper treatment of the corpus of the trust, that discretion is limited by the purpose of the trust and the trustee's fiduciary duties, and does not equate "to mere subjective judgment." The trustee may use the assets of the trust "only for purposes authorized by the trust or necessary for the preservation of the trust; other uses are beyond the scope of the discretion conferred, even where the trustee claims to be acting solely to advance other discrete interests of the beneficiaries."³⁵

³³ *Id.* In a footnote, the Court explained that the word "public" was added to modify "natural resources" to indicate that the public's rights and the trust obligations did not extend to "purely private property rights" but noted that the ERA's author and principal advocate opined that that this limitation did not apply to resources, such as those originally enumerated, that "involve a public interest." *Id.*, n.22 (*quoting* Pa. L. Journal, 154th General Assembly, No. 118, Reg. Sess., 2271-72 (1970) (statement by Rep. Kury)).

³⁴ *PEDF*, 161 A.3d at 933.

³⁵ *Id.* (internal citations omitted).

In a footnote, that Court expressly rejected the dissent's contention that its holding would cordon off hundreds of millions of dollars from other budgetary uses, noting that this question was never raised and was not before the Court.³⁶

Based on this line of reasoning, the Supreme Court held that if the trustee was disposing of the assets of the trust, it was bound to use the proceeds in ways necessary and appropriate for carrying out the purposes of the trust, which in the case of the ERA was the maintenance and conservation of public natural resources.³⁷ The Court rejected the plaintiff's argument that "all proceeds needed to remain in the corpus of the trust"; only "trust principal" needed to be retained. It held that the royalties arose from the sale of principal and needed to remain in the trust. The Court said it was less clear how to categorize other revenue streams from gas leasing, and that additional advocacy was required to determine whether those revenues constituted principal or income.³⁸

Reaffirming the plurality opinion in *Robinson Township*, the Court rejected an argument raised by the Republican caucus of the General Assembly that the public trust provisions of Article I, § 27 were not self-executing but required implementing legislation.³⁹ It also reaffirmed the *Robinson Township* plurality opinion "that the Commonwealth's obligations as trustee 'create a right in the people to seek to enforce the obligations.'"⁴⁰

Applying its explanation of Article I, § 27 to the legislation at issue, the Supreme Court concluded that in transferring royalties from a restricted fund to the unrestricted General Fund, the Commonwealth did not "contemplate, let alone reasonably exercise, its duties as the trustee

³⁶ *Id.* at n.25.

³⁷ *Id.* at 933-35.

³⁸ *PEDF*, 161 A.3d at 935-36.

³⁹ *Id.* at 936-37.

⁴⁰ *Id.* at 937.

of the environmental public trust created by the" ERA. The Court thus invalidated the provisions relating to the transfer of royalties,⁴¹ which meant that the prior statutory dedication of the Lease Fund resources to DCNR applied. The Court emphasized that its holding did not require that the revenues constituting the corpus of the trust be included in the restricted fund or even be dedicated to DCNR, as long as the funds were used for the purpose of the trust, *viz.*

"maintenance and conservation" of Article I, § 27 resources. The matter was remanded to the Commonwealth Court to make a determination with respect to other revenues (*i.e.* whether they were principal or income).

IV. ARTICLE I, §27 APPLIES TO CLIMATE DISRUPTION

Climate disruption is already adversely affecting Pennsylvania, and these adverse effects will increase over time. The severity of future impacts will depend to a great extent on what actions are taken to reduce greenhouse gas emissions and even remove carbon dioxide from the atmosphere. Yet under Article I, §27, the people have a right to a natural climate that is not disrupted by excessive concentrations of GHGs in the atmosphere. In addition, the Commonwealth has a commensurate duty to limit emissions to prevent climate disruption.

A. *The Impact of Climate Disruption on Pennsylvania*

The existing and projected adverse effects climate change on the nation and the world have been well documented and explained. Sources include the U.S. Environmental Protection Agency's 2009 finding under the Clean Air Act under the Clean Air Act that emissions of greenhouse gases from motor vehicles may reasonably be expected to endanger public health and welfare, which was upheld on judicial review.⁴² They also include multiple reports of the U.S.

⁴¹ *Id.* at 937-38.

⁴² "Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule," 74 Fed. Reg. 66,496, 66,514 (Dec. 15, 2009) ("Endangerment Finding"), *aff'd Coal. for*

Global Change Research Program, including its 2017 report;⁴³ multiple reports of the National Research Council (“NRC”) of Academy of Natural Sciences,⁴⁴ the reports of the Intergovernmental Panel on Climate Change,⁴⁵ numerous reports of other national academies of natural science,⁴⁶ and even judicial decisions.⁴⁷ State specific information also exists for Pennsylvania.

The Pennsylvania Climate Change Act requires the Department of Environmental Protection (DEP) to produce a report every three years on the actual and projected impacts of climate change on the state.⁴⁸ DEP’s 2015 report on the impacts of climate change in Pennsylvania⁴⁹ makes clear that the effects of climate disruption on Pennsylvania’s public natural resources are likely exceed the impacts of uncontrolled coal mining, deforestation, and industrial development that motivated Section 27’s adoption, as described in *Robinson Township* and *PEDF* at length.

The 2015 Pennsylvania report makes it clear that the GHGs in the atmosphere are already reaching that point that will cause an increase of temperature of 1.5°C from pre-industrial levels

Responsible Regulation, Inc. v. U.S. Env’tl. Prot. Agency, 684 F.3d 102 (D.C. Cir. 2012) (“*CRRF*”), *aff’d in part and rev’d in part on other grounds sub nom. Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014) (“*UARG*”).

⁴³ U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I (2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf. See also John C. Dernbach & Robert Altenburg, *Evolution of U.S. Climate Policy*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 84-87 (Michael B. Gerrard & Jody Freeman eds. 2014) (explaining authorizing legislation for U.S. Global Change Research Program and describing some earlier reports).

⁴⁴ NRC, *America’s climate choices: Advancing the Science of Climate Change* (2010), available at <http://www.ipcc.ch/report/ar5/wg1/>; NRC, *Climate stabilization targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (2011), available at <https://www.nap.edu/catalog/12877/climate-stabilization-targets-emissions-concentrations-and-impacts-over-decades-to>; NRC, *Abrupt impacts of climate change: Anticipating Surprises* (2013), available at <https://www.nap.edu/catalog/18373/abrupt-impacts-of-climate-change-anticipating-surprises>.

⁴⁵ IPCC, *Fifth Assessment Report (AR5)* (2014), available at <http://www.ipcc.ch/report/ar5/index.shtml>.

⁴⁶ See, e.g., Royal Society, *Climate Change: A Summary of the Science* (2010), available at <https://royalsociety.org/topics-policy/publications/2010/climate-change-summary-science/>.

⁴⁷ See, *CRRI*, *supra*, n. 42 *Green Mt. Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 295 (D. Vt. 2007).

⁴⁸ Pennsylvania Climate Change Act, 71 P.S. § 1361.3.

⁴⁹ James Shortle, *et al.*, *Pennsylvania Climate Impacts Assessment Update* (May 2015) (“*PA Climate Impacts*”). The report was required by the Pennsylvania Climate Change Act, 71 P.S. § 1361.3.

and will continue to rise to cause an increase much higher than 2°C above pre-industrial levels by mid-century. According to that report, “Pennsylvania has undergone a long-term warming of more than 1 °C (1.8°F) over the past 110 years.”⁵⁰ It also projects an increase of about 3°C (5.4°F) between 2000 and 2050, which means that the “current warming trend” is expected to continue at an accelerated rate.”⁵¹ As discussed below, it will be necessary to keep temperature increases below 2°C and desirable to keep them below 1.5°C to prevent serious climate disruption.⁵²

This warming is, and will continue to be, accompanied by a parallel trend in increasing precipitation.⁵³ “The corresponding annual precipitation increase is expected to be 8%, with a winter increase of 14%.”⁵⁴ The report does not say—and could not say—that warming and precipitation trends will stabilize in 2050. It appears more likely that, absent significant efforts to reduce greenhouse gas emissions, these trends will continue to accelerate after 2050.

Climate change, the report says, will increase air pollution:

Climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness. The linkage between climate change and air quality is most strongly established for ground-level ozone creation during summer, but there is some evidence that higher temperatures and higher precipitation will result in increased allergen (pollen and mold) levels as well.⁵⁵

Climate change will also likely increase water pollution:

Climate change can potentially also worsen water quality, affecting health through drinking water and through contact during outdoor recreation. The two primary mechanisms through which climate change could affect surface water quality are 1) increased pathogen loads due to increased surface runoff from

⁵⁰ *PA Climate Impacts*, *supra* note 49, at 6. “Changes in Pennsylvania’s temperature are reflected in other metrics, such as heating degree days (which have increased) and cooling degree days (which have decreased).” *Id.*

⁵¹ *Id.* at 7.

⁵² *See*, discussion at Section V.A., *infra*.

⁵³ *PA Climate Impacts*, *supra* note 49, at 6-7.

⁵⁴ *Id.* at 7.

⁵⁵ *Id.* at 11.

livestock farms, sewer overflows, and resuspension of pathogens in river sediments during heavy rainstorms, and 2) increased risk of harmful algal blooms in eutrophied lakes and reservoirs.⁵⁶

Although there may be some beneficial impacts from these changes, the *PA Climate Impacts Report* indicates that the adverse effects on Pennsylvania's public natural resources will dwarf any positive impacts. Higher temperatures will stress the dairy industry and require increased energy use. It will also cause forest types to change, lead to increased mortality in the forests, and interfere with regeneration.⁵⁷ Increased temperatures will increase the prevalence of vector-borne diseases.⁵⁸ Climate change will have "a severe, negative impact on winter recreation," so that "Pennsylvania's downhill ski and snowboard resorts are not expected to remain economically viable past mid-century."⁵⁹ Some areas will no longer be able to support trout.⁶⁰ Flood risks will increase throughout the Commonwealth.⁶¹ Moreover, sea level rise will affect the Delaware estuary, inundating some areas and causes an increase in salinity.⁶² Reports published since 2015 have determined that sea level rise due to melting glaciers will be more extensive, such that some parts of Tinicum National Wildlife Refuge and Philadelphia International Airport will be inundated before the end of the century.⁶³

⁵⁶ *Id.* In addition, "climate change will worsen the currently substandard water quality in the tidal freshwater region of the Delaware Estuary." *Id.* at 14.

⁵⁷ *PA Climate Impacts*, *supra* note 49, at 7-10.

⁵⁸ *Id.* at 11.

⁵⁹ *Id.*

⁶⁰ *Id.* at 12.

⁶¹ *Id.*

⁶² *Id.* at 14.

⁶³ A study published in 2018 based on 25 years of satellite data showed accelerated rates of sea level rise driven by the melting of the Greenland and Antarctic ice sheets and predicted that if these rates continue, sea levels would rise by 65 centimeters or 26 inches by 2100 compared to past estimate. R. S. Nerem, B. D. Beckley, J. T. Fasullo, B. D. Hamlington, D. Masters and G. T. Mitchum, *Climate-change-driven accelerated sea-level rise detected in the altimeter era*, 115 *Proceedings Nat'l Academy Sciences* 2022-2025 (Feb. 2018), available at <https://doi.org/10.1073/pnas.1717312115>. The last IPCC assessment estimated that sea levels could rise from between 44 cm and 74 cm, by 2100 so that this would approximately double sea level rise. John A. Church, Peter U. Clark et al. *Sea Level Change*, IPCC, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, Chapter 13, at 1182,

Nor will the impacts of climate disruption be evenly distributed. Low income and minority communities are likely to be more severely affected because of “lack of air conditioning, greater prevalence of pre-existing health conditions, location and condition of housing, inadequate access to transportation, relatively greater rates of under-insurance, and concentrations in strenuous occupations.”⁶⁴ In addition, because climate change will likely increase the price of water, food, and even energy, it will also disproportionately affect households with lower incomes.⁶⁵

Three additional points need to be made about this information, and they all suggest that these impacts will be greater than indicated in the Pennsylvania report, EPA’s Endangerment Finding, and other reports. Most obviously, perhaps, these analyses are mostly silent on impacts after 2050 or any other future date. There is no scientific reason to believe that warming will stabilize by those dates; indeed, in business as usual scenarios, warming continues after those dates.

Second, it is very likely that the impacts of climate disruption will increase over time, such that the very likely damages occurring after 2050 will be far greater than those discussed in the Pennsylvania report and other sources. Yet many cost-benefit analyses discount costs to future generations, thus reducing these calculated future costs to an insignificant number.⁶⁶

Table 13.5 (2013), *available at* <http://www.ipcc.ch/report/ar5/wg1/>. Because Tinicum marsh and the airport are located in tidal areas of the Delaware Estuary, significant portions would be inundated.

⁶⁴ Shelley Welton, *Clean Electrification*, 88 U. COLO. L. REV. 571, 627-28 (2017) (citing IPCC and other studies).

⁶⁵ *Id.* at 628.

⁶⁶ Many ethicists question whether the cost of future climate disruption affecting future unborn generations should be discounted at all. In one of the first assessments of the ethical implications of climate change, a group of ethicists noted:

Proponents of discounting in CBA urge that the value of future environmental benefits be determined in the same way that the market applies value to future events, that is by understanding the present value of future benefits. When such discounting occurs, benefits from climate change policy options that will accrue far in the future are given little present value. Such an approach makes current investors’ interests, not future generations’ welfare, the focus of concern (Banuri et al., 1996).

Third, the damage estimates in the Pennsylvania assessment and other reports tend not to account for the possibility of catastrophic climate disruption. For climate disruption, the probabilistic curve that plots plotting likelihood versus damage is unusual in that it has a very long tail, representing low probability catastrophic cost possibilities.⁶⁷ In markets, the risk of such catastrophic events suggests that, rather than discounting, we should pay a premium to prevent them, just as we pay a premium for riskier stocks over safer bonds.⁶⁸

B. Both the First and Second Clauses of Article I, § 27 Extend to the Natural Climate Unaffected by Climate Disruption

1. Scope of Article I, § 27

Although the climate is not expressly identified as protected in the ERA, its language and legislative history, as well as the reasoning of both *Robinson Township* and *PEDF*, all compel the conclusion that a climate free of human disruption is protected by Article I, Section 27.

The right to a natural climate unaffected by climate disruption is included within the first clause's protection of the people's right to "clean air, pure water, and to the preservation of the

Donald Brown, Nancy Tuana, Marilyn Averill, Paul Baer, Rubens Born, Carlos Eduardo Lessa Brandão, Robert Frodeman, Christiaan Hogenhuis, Thomas Heyd, John Lemons, Robert McKinstry, Mark Lutes, Benito Müller • José Domingos Gonzalez Miguez, Mohan Munasinghe, Maria Silvia Muylaert de Araujo, Carlos Nobre, Konrad Ott, Jouni Paavola, Christiano Pires de Campos, Luiz Pinuelli Rosa, Jon Rosales, Adam Rose, Edward Wells, & Laura Westra, *White Paper on the Ethical Dimensions of Climate Change*, The Pennsylvania State University Rock Ethics Institute (2006) at 29 ("Ethical White Paper"). These ethicists further concluded:

Because discounting benefits in CBA assumes only contemporary investor-individuals' interests count in determining worth, discounting techniques in CBA can violate interests of future generations to have a global climate system that has not been degraded by human activities. Since nations agreed in the adopting the UNFCCC to protect the interests of future generations, discounting benefits and harms in CBAs can violate the duty of nations to keep promises made in treaties.

Id. at 32. These concerns were more recently echoed by Pope Francis in his encyclical letter, which, without addressing discounting per se, condemned placing short term current interests ahead of the interest of future generations. ENCYCLICAL LETTER, *LAUDATO SI'* OF THE HOLY FATHER FRANCIS ON CARE FOR OUR COMMON HOME (2015), available at http://w2.vatican.va/content/dam/francesco/pdf/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si_en.pdf.

⁶⁷ See, *Climate Change 2013: The Physical Science Basis*, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Report on Climate Change (Cambridge, Mass.: Cambridge University Press, 2013), pp. 1114- 1119.

⁶⁸ See, Jerry Taylor, *The Conservative Case for a Carbon Tax*, (Niskanen Center, March 23, 2015), at 13-15, available at <http://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf>

natural, scenic, historic and esthetic values of the environment.” The Pennsylvania report indicates that a warming climate will adversely air quality, thus compromising the people’s right to clean air. The report also indicates that a warming climate will likely lead to greater water pollution, increased flooding, and sea level rise, thus compromising the people’s right to clean water.

The *Robinson Township* plurality “recognize[d] that, as a practical matter, air and water quality have relative rather than absolute attributes”⁶⁹ As is the case with most other conventional water and air pollutants, carbon dioxide is a naturally occurring substance necessary for life and the maintenance of the climate, and it is only when the concentration of the pollutant becomes too high that natural processes are disrupted.⁷⁰ When the ERA recognizes a right to “clean air,” it means, for carbon dioxide, levels necessary to support plant life and ecosystems, among other things. Similarly, “pure water” means water with levels of these substances that support the normal functioning of aquatic ecosystems, and that conserve and maintain public natural resources.

In addition, one of the critical natural and historic values of the environment is a stable climate. There can be little doubt that the relatively stable climate that has persisted since the end of the last Ice Age and facilitated the rise of civilization.⁷¹ As the reports described above indicate, a stable climate also prevents the incidence of vector-borne disease from increasing and protects winter recreation. The assessments discussed above also establish that climate

⁶⁹ *Robinson Township*, 83 A.3d at 953.

⁷⁰ For example, nitrogen compounds and phosphorus in water are necessary for supporting the plant life that supports the aquatic ecosystem, but when levels of these substances become too high eutrophication occurs and those ecosystems are disrupted. Likewise, chromium is a heavy metal essential to life that we include in vitamin pills, but at too high a level it becomes a poison.

⁷¹ See RICHARD ALLEY, *THE TWO-MILE TIME MACHINE: ICE CORES, ABRUPT CLIMATE CHANGE, AND OUR FUTURE* (Princeton University Press 2016). JAMES HANSEN, *STORMS OF MY GRANDCHILDREN: THE TRUTH ABOUT THE COMING CLIMATE CATASTROPHE AND OUR LAST CHANCE TO SAVE HUMANITY* 39-40 (2009).

disruption will impair scenic and esthetic values of the environment by causing dramatic changes in forests and agriculture and by reducing or eliminating key species like trout.

In addition, the right to a natural climate unaffected by human-caused climate disruption is included within the second clause's protection of the public's right to the conservation and maintenance of public natural resources. The *Robinson Township* plurality emphasized that the concept of public natural resources encompassed a wide range of values of the natural environment:

At present, the concept of public natural resources includes not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property.⁷²

The Court in *PEDF* and the *Robinson Township* plurality both cited the ERA's legislative history as supporting a broad construction of the public natural resources that are made the property of all the people. The *Robinson Township* plurality noted:

after members of the General Assembly expressed disquietude that the enumeration of resources would be interpreted “to limit, rather than expand, [the] basic concept” of public natural resources, Section 27 was amended and subsequently adopted in its existing, unrestricted, form. The drafters seemingly signaled an intent that the concept of public natural resources would be flexible to capture the full array of resources implicating the public interest, as these may be defined by statute or at common law.⁷³

The Court in *PEDF* explained that the removal of the specific list and its replacement with more general language was intended to “discourage courts from limiting the scope of natural resources covered.”⁷⁴

Climate is not a private resource. Rather, it represents the seasonal average ranges of temperature, precipitation and other atmospheric conditions in a particular area over a long

⁷² *Robinson Township*, 83 A.3d at 955; accord *PEDF*, 161 A.3d at 931.

⁷³ *Robinson Township*, 83 A.3d at 955 (citing 1970 Pa. Legislative Journal–House at 2271–75).

⁷⁴ *PEDF*, 161 A.3d at 931.

period of time. Climate determines the nature of wild and other naturally occurring vegetation, fish and other wildlife, the amount and quality of ground and surface water, the characteristics of soils, the flow and extent of streams, rivers and wetlands, air quality and most other characteristics of naturally occurring ecosystems and natural communities. These considerations all compel the conclusion that a stable climate not disrupted by the types of changes caused by human emissions of GHGs in the atmosphere should be understood as a public natural resource to which the people have a right and which the Commonwealth has a trustee's duty to conserve and maintain.⁷⁵

Under the express words of the ERA, the Commonwealth does not have a duty to “preserve” Pennsylvania’s climate unchanged. Indeed, it would be impossible for the Commonwealth to do so, given the international nature of the problem and the fact that many changes will occur because of the current levels of greenhouse gases in the atmosphere, which will cause profound changes in the future. However, as noted by the *Robinson Township* plurality, the constitutional provision uses the words “conserve and maintain,” rather than “preserve.” This means that “the duties to conserve and maintain are tempered by legitimate development tending to improve upon the lot of Pennsylvania’s citizenry, with the evident goal of promoting sustainable development.”⁷⁶ In further support of this proposition, the plurality cited the Montana Supreme Court’s holding that a constitutional provision that providing an “inalienable ... right to a clean and healthful environment” did “not protect merely against type[s]

⁷⁵ Cf. *In re Application of Maui Electric Co.*, __ P.3d __, 2017 WL 6390388 (Haw. 2017). The case involved a challenge by citizens to a power purchase agreement with a fossil-fuel-fired power plant. The Hawai‘i Constitution guarantees each person “the right to a clean and healthful environment, as defined by laws relating to environmental quality.” HAW. CONST. art. XI, § 9. The court held that the petitioners demonstrated “a threatened injury to the[ir] right to a clean and healthful environment from the effect of greenhouse gas emissions,” and thus had a right to a hearing on their claims. In other words, the right to a “clean and health environment” in Hawai‘i includes a right to be protected against human-caused climate change.

⁷⁶ *Robinson Township*, 83 A.3d at 958.

of environmental degradation ‘conclusively linked’ to ill health or physical endangerment and animal death, but could be invoked to provide anticipatory and preventative protection against unreasonable degradation of natural resources.”⁷⁷

Finally, the public trust rights under Article I, § 27 inhere in “all the people” including future generations. Thus, the virtual certainty that effects of climate disruption will be inequitably distributed and will have greater impacts on “generations yet to come” implicates Article I, § 27 even if only some people are adversely affected. As the *Robinson Township* plurality explained, disparate effects are “irreconcilable with the express command that the trustee will manage the corpus of the trust for the benefit of ‘all the people.’”⁷⁸ The Commonwealth’s obligation also derives from the trustee responsibility of impartiality. “Dealing impartially with all beneficiaries means that the trustee must treat all equitably in light of the purposes of the trust.”⁷⁹ For many reasons, then, the right to a natural climate unaffected by human-caused climate disruption is protected under both parts of Article I, § 27.

2. *Commonwealth Duties Concerning Climate Disruption*

The Commonwealth has several overall duties under Article I, § 27 concerning climate change. Under the first clause, the Commonwealth may not act contrary to the people’s right to a natural climate unaffected by climate disruption; “laws of the Commonwealth that unreasonably impair the right are unconstitutional.”⁸⁰ Under the second and third clauses, which the public trust provisions of Article I, § 27, the Commonwealth has two duties. One is to

⁷⁷ *Id.* at 953 (citing and quoting from *Montana Env’l Info. Ctr. v. Dep’t of Env’l Quality*, 296 Mont. 207, 988 P.2d 1236, 1249 (1999)).

⁷⁸ *Robinson Township*, 83 A.3d at 980.

⁷⁹ *Id.* at 959. Thus, legislative decisions under which “some properties and communities will carry much heavier environmental and habitability burdens than others” are inconsistent with the obligation that the trustee act for the benefit of “all the people.” *Id.* at 980 (using this argument to justify its decision that Section 3304 of Act 13 violates Article I, §27).

⁸⁰ *Robinson Township*, 83 A.3d at 951; *PEDF*, 161 A.3d at 931.

prohibit the degradation, diminution, and depletion” of a natural climate unaffected by human-caused climate disruption, whether harm to the climate results “from direct state action or from the actions of private parties.”⁸¹ The other is “to act affirmatively via legislative action” to conserve the natural climate and prevent undue disruption.⁸² A third duty, which stems from the duty of private trust law duty of prudence, is that the Commonwealth must analyze the effect of its decisions on the public’s right to be protected against climate change prior to making them.⁸³

The inclusion of a right to a natural climate not disrupted by GHG pollution has three additional consequences for the Commonwealth as it interprets and applies existing statutes, regulations, and other laws. These three additional consequences—in which Article I, § 27 plays more of a supporting role in the implementation of existing law, are based on cases decided before *Robinson Township* and *PEDF*.⁸⁴ The first of these involves the scope of the police power exercised by the state as well as local governments.⁸⁵ As a consequence of *PEDF*, state and local police power is constrained by a duty not to violate Article I, Section 27 and an obligation to properly implement their public trust responsibilities. These constraints and obligations apply to human-caused climate disruption. In addition, the Commonwealth has an obligation, when the meaning of a statute, regulation or other law is unclear, to interpret that law in a way that furthers constitutional rights.⁸⁶ As a result, the Commonwealth has an obligation to interpret ambiguous laws in a way that furthers the constitutional right of people to be protected against human-caused climate change. Finally, Pennsylvania courts have previously used Article I, § 27 to support the constitutionality of laws that have been challenged on other grounds,

⁸¹ *PEDF*, 161 A.3d at 933.

⁸² *PEDF*, 161 A.3d at 933.

⁸³ *Id.* at 937.

⁸⁴ Dernbach, *Taking the Pennsylvania Constitution Seriously When It Protects the Environment: Part II*, *supra* note 2, 104 DICK. L. REV. at 150-61.

⁸⁵ John C. Dernbach, *The Potential Meanings of a Constitutional Public Trust*, 45 ENVTL. L. 463, 515-16 (2015).

⁸⁶ *Id.* at 516-17.

including challenges to executive action based on claims that the action lacked sufficient statutory authorization.⁸⁷ It follows that legal challenges to Commonwealth actions to protect against climate disruption could be defended on the grounds that they are implementing Article I, § 27.

3. *Funk v. Wolf*

In *Funk v. Wolf*,⁸⁸ the plaintiffs asserted that the ERA imposed an affirmative duty on the Commonwealth to adopt and implement regulations to protect future generations from climate disruption, and that the court should grant mandamus requiring this. The Commonwealth Court, affirmed by the Supreme Court, avoided deciding that issue. However, in a footnote, the Commonwealth Court appears to have assumed that prevention of climate disruption falls within the scope of Article 1, §27's rights and duties and that the petitioners' rights could be asserted by the submission of a rulemaking petition to the Pennsylvania Environmental Quality Board ("EQB") seeking the adoption of a regulation under the Pennsylvania Air Pollution Control Act ("APCA") limiting GHG emissions. As we discuss further in this article, the APCA authorizes the adoption of a regulation establishing an economy-wide cap-and-trade program with allowances distributed by auction with a reserve price. The EQB's refusal to consider such a regulation or its adoption of an insufficiently protective regulation could then be subject to judicial review and overturned.

The plaintiffs in *Funk* had initially filed a petition with the EQB seeking the adoption of a regulation limiting GHG emissions to prevent undue climate disruption, without proposing a specific regulation or even a specific regulatory approach. Based on DEP's representation that it

⁸⁷ Dernbach, *Taking the Pennsylvania Constitution Seriously When It Protects the Environment: Part II*, *supra* note 2, at 158-61; see, *Eagle Environmental II, L.P. v. Com., DEP*, 584 Pa. 494 (2005).

⁸⁸ 144 A.3d 228 (Pa. Commw. Ct. 2016) *aff'd without opinion* 158 A.3d 642 (Pa. 2017).

was already responding to climate disruption, the EQB denied the petition. The plaintiffs failed to appeal, despite the fact that DEP's actions were largely token efforts.

Instead of appealing, the plaintiffs brought a mandamus action in the Commonwealth Court against the Commonwealth, the governor, DEP and other agencies. The complaint sought declaratory relief regarding the plaintiffs' rights and the Commonwealth's duties under the ERA. It further sought injunctive relief that would require the Commonwealth to conduct various studies and broad (but still, unspecified) action to conduct a variety of studies. The complaint also sought a court order requiring DEP to study and to prepare and implement

comprehensive regulations, in accordance with the current science, designed to account for embedded emissions and reduce carbon dioxide and other greenhouse gas emissions to safe levels and thereby reach the concentrations that must be achieved to satisfy [the Commonwealth defendants'] constitutional obligations as public trustees of the air and atmosphere.⁸⁹

The Commonwealth Court held that it had jurisdiction to hear the decision. In so holding, it reasoned, *inter alia*, that “we would have appellate jurisdiction over a final order of the EQB denying a rulemaking petition..., and a final order of the Environmental Hearing Board (EHB) denying an appeal of a DEP decision to not submit a rulemaking petition to the EQB....”⁹⁰ The Court also concluded that the plaintiffs had standing to bring the action.

However, the Commonwealth Court ultimately dismissed the action because there was not a sufficiently express mandatory duty to trigger the remedy of mandamus.⁹¹ The Court's decision was not premised upon an interpretation of Article I, §27, but on the narrow scope of the remedy of mandamus:

⁸⁹ *Funk*, 144 A.3d at 237-39.

⁹⁰ *Id.* at 243.

⁹¹ *Id.* at 144 A.3d at 248 (“The question posed, however, is not whether the ERA imposes mandatory duties in the general sense, but whether the ERA provides Petitioners with a clear right to the performance of the **specific acts** for which Petitioners requests a writ, and whether the performance of such acts by Respondents is mandatory in nature.”)

Mandamus is an extraordinary remedy “designed to compel the performance of a ministerial act or mandatory duty, as opposed to a discretionary act....” Mandamus cannot be used to direct the exercise of judgment or discretion in any particular way.... Nor will it issue to establish legal rights.... “We may issue a writ of mandamus only where the petitioner has a clear legal right to enforce the performance of a ministerial act or mandatory duty, the defendant has a corresponding duty to perform the act[,] and the petitioner has no other adequate or appropriate remedy....”⁹²

In this regard the Court found that the question presented in considering a writ of mandamus was not “whether the ERA imposes mandatory duties in the general sense, but whether the ERA provides. . . a clear right to the performance of the specific acts” requested and “whether the[ir] performance . . . is mandatory.”⁹³ The Court reasoned that the remedy of mandamus could not be invoked to expand the authority of executive agencies and that a judicially enforceable mandatory duty required legislation creating such a mandate, which the Court found lacking.⁹⁴

However, the Court’s reasoning was premised upon the application of the three-part balancing test in *Payne v. Kassab* that the Supreme Court rejected in *PEDF* because the test “strips the constitutional provision of its meaning.”⁹⁵ Although the Court’s ultimate decision was premised upon the scope of relief that could be awarded by a court under the narrow equitable writ of mandamus, that decision was also premised upon the unduly limited scope of the ERA expressly rejected by the Supreme Court in *PEDF*. Consequently, the Commonwealth Court in *Funk* appears to have overstated the discretion afforded to both the General Assembly and the executive branch and to have understated the scope of the duties imposed by the ERA and the role of the judicial branch in enforcing those duties. It did so by saying, in effect, that

⁹² *Funk*, 144 A.3d at 248 (citations omitted).

⁹³ *Id.*

⁹⁴ *Id.* at 248-250.

⁹⁵ *PEDF*, 161 A.3d at 930; *see, Funk*, 144 A.3d at 233-235

compliance with the ERA requires executive agencies only to follow the law prescribed by the General Assembly.⁹⁶

Even under the unduly circumscribed *Payne* test employed by the Commonwealth Court in *Funk*, that decision can be read to support the proposition that there is an enforceable duty to adopt a properly framed regulation to limit GHG emissions under the APCA and presented to the EQB in a petition setting forth the regulation in detail. The Commonwealth Court noted that “Respondents further acknowledge that the General Assembly, through the APCA, bestowed upon them a duty to promulgate and implement rules and regulations to reduce CO₂ and GHG emissions.”⁹⁷

Consequently, even in applying the unduly constrained test rejected by the Supreme Court in *PEDF*, the Commonwealth Court in *Funk* appears to have concluded that the ERA creates rights and general duties, that there are specific duties for the EQB to consider a petition with an attached rule, and there is a duty to adopt regulations addressing climate change under the APCA. The court rejected the challenge because there was the petition only asked the EQB to undertake a rulemaking, but did not propose a specific rule. The Commonwealth Court noted that had been a proposal for a specific rule to address GHG emissions, the Commonwealth Court would have had jurisdiction:

⁹⁶ See, e.g., *Funk*, 144 A.3d at 235 (“the balance between environmental and other societal concerns is primarily struck by the General Assembly, as the elected representatives of the people, through legislative action”), 248-51.

⁹⁷ *Funk*, 144 A.3d at 250. In a footnote, the Court elaborated on the source of this duty, noting that the Commonwealth’s

duties to this end derive, in part, from Section 5(a)(8) of the APCA, 35 P.S. § 4004(1), which requires the EQB to adopt rules and regulations to implement the federal Clean Air Act, 42 U.S.C. §§ 7401–7671q. The United States Supreme Court, in *Massachusetts v. Environmental Protection Agency*, 549 U.S. at 528–29, 127 S. Ct. 1438, had “little trouble” concluding that GHGs are “air pollutants” as defined by the Act and that the Environmental Protection Agency may regulate GHGs.

Id. at 250, n.17.

While we agree that we would have appellate jurisdiction over a final order of the EQB denying a rulemaking petition pursuant to Section 1920–A(h) of the Administrative Code of 1929, and a final order of the Environmental Hearing Board (EHB) denying an appeal of a DEP decision to not submit a rulemaking petition to the EQB pursuant to Section 4 of the Environmental Hearing Board Act, we would not have appellate jurisdiction over the instant matter.”⁹⁸

EQB regulations prescribe a process for filing such a petition with the EQB and the EQB’s consideration of the petition.⁹⁹ Following any denial of such a petition, a petitioner could bring an action for declaratory and injunctive relief.¹⁰⁰ Consequently, a petitioner could ask the EQB to promulgate a rulemaking to address greenhouse gases, and any denial of such a petition would be subject to judicial review. The Supreme Court’s analysis in *PEDF* only reinforces the conclusion that the Commonwealth’s duty to adopt such a regulation is both mandatory and judicially enforceable.

V. THE COMMONWEALTH’S DUTY TO PREVENT AND MITIGATE HUMAN-CAUSED CLIMATE DISRUPTION REQUIRES THAT PENNSYLVANIA UNDERTAKE MEASURES TO LIMIT GHG EMISSIONS BY EMPLOYING ALL REGULATORY AND OTHER MEASURES WITH A COST UP TO THE SOCIAL COST OF CARBON

Because a stable climate not disrupted by human caused GHG emissions is a right protected under the ERA’s first clause and a public natural resource for which the Commonwealth is a trustee, the ERA’s text directs that the Commonwealth shall “conserve and maintain” that stable climate for “all the people, including generations yet to come.” Neither the

⁹⁸ *Funk*, 144 A.3d at 243.

⁹⁹ 25 Pa. Code 23.1 *et seq.*

¹⁰⁰ See *The Marcellus Shale Coalition v. Department of Environmental Protection and Environmental Quality Board*, 2016 Pa. Commw. Unpub. LEXIS 830 *; 46 ELR 20179 (2016) (granting petition for review in part, in industry’s action for declaratory and injunctive relief with respect to newly proposed oil and gas regulations). There would be no adequate remedy requiring such a petitioner to wait for DEP to take some action that would be appealable to the Environmental Hearing Board. See *Arsenal Coal Company v. Commonwealth*, 505 Pa. 198, 208-211 (1984) (Commonwealth Court erred in declining to exercise equitable jurisdiction over industry’s petition to enjoin the Department of Environmental Resources from implementing or enforcing regulations promulgated by the EQB, where the internal administrative process would subject the industry to litigation and regulatory uncertainty). *A fortiori*, if there is no adequate remedy for an industry that must undertake litigation and experience regulatory uncertainty during a post-enforcement proceeding by the Department of Environmental Protection, there is no adequate remedy for a petitioner seeking a rulemaking to address GHG emissions that is never even promulgated in the first place.

text of the Amendment, standing alone, nor the law of trusts provides additional guidance regarding the concentrations of GHGs in the atmosphere that will conserve the climate, regarding the trajectory of emissions reductions necessary to avoid exceeding that concentration, or regarding Pennsylvania's responsibility *vis-à-vis* the rest of the world. Pennsylvania's contribution to GHG emissions exceeds that of most nations, and if states were counted as nations, in 2003, Pennsylvania would have ranked as the sixteenth highest emitter.¹⁰¹ Nevertheless, its actions alone will be insufficient to "conserve and maintain" the climate. Finally, the ERA does not tell us how Pennsylvania should exercise its duty to prevent climate disruption.

At a minimum, one might argue that the constitutional standard requires Pennsylvania to do as much as it can, using existing authority. One can look to other sources of authority defining what is required to "conserve and maintain" a stable climate, Pennsylvania's share of responsibility and the means that can be employed. Specifically, binding treaty law and other federal law define the temperature and concentration goals and Pennsylvania's share. As recognized by the *Funk* decision, the APCA provides available tools for limiting emissions. Those tools can be defined in a properly framed regulation presented by way of a petition to the EQB. The EQB's action on that petition can be subject to judicial review under the equitable writ of *certiorari* rather than *mandamus*. As further described below, whether framed as the "as much as it can" standard or a standard incorporating these other sources of authority, at a minimum the mechanism should include, a trading program that would result in emissions reductions that would occur if a charge equal to the social cost of carbon were imposed on those

¹⁰¹ Robert B. McKinstry, Jr., Adam Rose, & Coreen Ripp, *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania: Protecting the Environment and Promoting Fiscal Reform*, 14 WIDENER L. J. 205, 217 (2004) (citing Adam Rose *et al.* Ctr for Integrated Reg'l Assessment, Pa. State Univ., Greenhouse Gas Emissions Inventory for Pennsylvania Phase I Report 5, 12 tble.1 (2003)).

emissions, with a goal of achieving an 80% reduction by 2050 and carbon neutrality by the second half of the 21st century.

A. *The United Nations Framework Convention on Climate Change and the Federal Clean Air Act Provide Judicially Ascertainable Standards Governing the Extent of Reductions Required to Conserve and Maintain a Stable Climate and Pennsylvania's Relative Responsibility*

A judicially ascertainable standard for determining the emissions reductions required to conserve and maintain the climate is provided by an international treaty ratified by the United States, the United Nations Framework Convention on Climate Change (“UNFCCC”),¹⁰² the Paris Agreement¹⁰³ adopted pursuant to that Convention, and the body of internationally accepted scientific evidence endorsed by the nations of the world pursuant to the UNFCCC and the Paris Agreement. Pennsylvania’s share of the reductions is governed by the provisions of the federal Clean Air Act.¹⁰⁴ Under the Supremacy Clause of the United States Constitution, Pennsylvania is bound to interpret its constitution consistent with treaties, which, along with the United States Constitution and federal laws, constitute the “supreme Law of the Land” binding state courts.¹⁰⁵

¹⁰² UNFCCC, June 4, 1992, 1771 U.N.T.S. 107, *available at*

http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf.

¹⁰³ UNFCCC, *The Paris Agreement*, http://unfccc.int/paris_agreement/items/9485.php. Although President Trump announced his intent to withdraw the United States from the Paris Agreement, that announcement will be ineffective with respect to Pennsylvania’s interpretation of the ERA and likely ineffective with respect to federal law. No withdrawal can take effect until November 2020. In addition, the Paris Agreement merely interprets the UNFCCC, which remains binding law. Finally, the pertinent requirements of the UNFCCC as interpreted by the UNFCCC are likely now customary international law that will be binding on the United States and its states notwithstanding the United States’ withdrawal. *See*, McKinstry, Peterson & Chester, *Unlocking Willpower Part Two*, 47 E.L.R. at 10137-10138; *see also*, in Robert B. McKinstry, Jr., *What Really Happened? Implications of President Trump's Announcement on U.S. Withdrawal From the Paris Agreement and the Law of Unintended Consequences* (2017), *available at* https://response.ballardspahr.com/email_handler.aspx?sid=5427bed1-f563-45e1-8cb1-74758039dace&redirect=http%3a%2f%2fwww.ballardspahr.com%2f%7e%2fmedia%2fFiles%2fArticles%2fWhat_Really_Happened. It is important to note that even if the Paris Agreement’s definition of the intent of the UNFCCC to prevent “dangerous anthropogenic interference with the climate system” should not be considered binding law, the international scientific consensus reflected in the Paris Agreement can equally define the emissions reductions required to fulfill the Commonwealth’s duty as a trustee to conserve and maintain a stable climate.

¹⁰⁴ 42 U.S.C. §§ 7401–7671q.

¹⁰⁵ U.S. CONST. art. VI, cl.2. The *Charming Betsy* doctrine, requiring that federal law be construed consistent with the “law of nations,” should be equally binding with respect to the interpretation of state constitutional law. *Murray v. Schooner Charming Betsy*, 6 U.S. 64 (1804).

The objective of the UNFCCC is “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”¹⁰⁶ While the Convention does not further identify what that level is, the 2015 Paris Agreement does. In the run-up to the Paris conference, the Conference of the Parties translated the Framework Convention’s stabilization objective into a maximum permissible surface temperature increase. The most frequently stated goal was 2°C (or 3.6 degrees Fahrenheit) above preindustrial levels.¹⁰⁷ The Paris Agreement confirms that goal but recognizes that a lower temperature increase would be better. Reflecting the scientific consensus on the temperature rise at which serious climate disruption will occur, the Paris Agreement aims to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels.”¹⁰⁸ The parties also agreed “to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.”¹⁰⁹ Although President Trump has announced his intention to withdraw the U.S. from the Paris Agreement,¹¹⁰ the earliest date on which the United States can leave the agreement is November 4, 2020.¹¹¹ In addition, the Agreement merely interprets the intent of the UNFCCC, to which the United States remains a party, and remains an authoritative statement of what temperature increase the international community believes to be non-dangerous.

¹⁰⁶ UNFCCC, art. 2, *supra* note. 102.

¹⁰⁷ UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, *Report of the Conference of the Parties on its Sixteenth Session, Held in Cancun from 29 November to 10 December 2010*, Decision 1/CP.16

¶ 4, FCCC/CP/2010/7/Add.1 (Mar. 15, 2011), <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

¹⁰⁸ United Nations Framework Convention on Climate Change, *Conference of the Parties*, Decision 1/CP.21 (Adoption of the Paris Agreement), art. 2.1(a), U.N. Doc. FCCC/CP/2015/L.9/Rev.1 (2015), <https://unfccc.int/resource/docs/2015/cop21/eng/109r01.pdf>.

¹⁰⁹ United Nations Framework Convention on Climate Change, *Conference of the Parties*, Decision 1/CP.21 (Adoption of the Paris Agreement), art. 2.1(a), U.N. Doc. FCCC/CP/2015/L.9/Rev.1 (2015), <https://unfccc.int/resource/docs/2015/cop21/eng/109r01.pdf>.

¹¹⁰ White House, *Statement by President Trump on the Paris Climate Accord* (June 1, 2017), <https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/>.

¹¹¹ Brad Plumer, *The U.S. Won’t Actually Leave the Paris Climate Deal Anytime Soon*, N.Y. Times (June 7, 2017), <https://www.nytimes.com/2017/06/07/climate/trump-paris-climate-timeline.html>.

Also reflecting the scientific consensus of the nations of the world, the Paris Agreement further defines the emissions reductions required to keep temperatures below those thresholds by requiring that the Parties “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.”¹¹² If the world as a whole needs to reach a point where emissions of GHGs are no greater than their uptake by the second half of this century, Pennsylvania will also need to reach that point by that time. Therefore, at a minimum, Pennsylvania must develop an emissions reduction trajectory that reduces emissions to zero – *i.e.* resulting in the elimination all GHG emissions other than those geologically or biologically returned to sinks (*i.e.* sequestered) -- by the second half of the 21st century.

The UNFCCC requires that the developed nations (which include the United States and, hence, Pennsylvania) take the lead in reducing emissions, enacting policies to limit emissions and enhance carbon sinks. These policies are to be comprehensive and “cost-effective so as to ensure global benefits at the lowest possible cost . . . and comprise all economic sectors.”¹¹³ There is a scientific consensus, reflected in a growing number of state and local emissions reduction goals, that developed nations, including the United States and its states, need to reduce

¹¹² UNFCCC, *supra* note 102, art. 4, § 1.

¹¹³ UNFCCC, art. 3, § 1, art. 4, § 2(a) (requiring the United States and other developed country Parties to take the lead in achieving the necessary reductions); Paris Agreement, art. 4, § 4 (same); UNFCCC, art. 4, § 2(a) (calling for the adoption of “policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs”); UNFCCC, art. 3, § 2 (requiring each nation to consider impacts beyond those within its borders, considering “the specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change”); UNFCCC, art. 3, § 3 (requiring that the Parties “take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects,” providing that “[w]here there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be *cost-effective so as to ensure global benefits* at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors.” (emphasis added)).

their total economy-wide emissions by at least 80% from 1990 levels by 2050.¹¹⁴ Moreover, a growing number of studies, including a study by the World Bank, have concluded that this goal is achievable.¹¹⁵

The provisions of the federal Clean Air Act governing the obligations of states support the proposition that Pennsylvania should consider these treaty obligations in construing its obligations as a trustee under Article I, § 27. Section 115 of the federal Clean Air Act¹¹⁶ is triggered whenever EPA finds air pollution originating within a state cause[s] or contribute[s] to air pollution which may reasonably be anticipated to endanger health or welfare in a foreign country” that provides reciprocal rights to the United States. When that happens, EPA must require the state to submit an amendment to the “good neighbor” provision of its state implementation plan¹¹⁷ that will “prevent or eliminate the endangerment.”¹¹⁸ In its endangerment finding, EPA found that emissions of GHGs from motor vehicles within the United States endangers health and the environment in other nations.¹¹⁹ Virtually all other nations of the world are parties to the UNFCCC and the Paris Agreement, which provides the United States reciprocal rights with respect to the prevention and control of greenhouse gases.

¹¹⁴ CAL. EXEC. ORDERS S-3-05; B-30-15; CT EXEC. ORDER NO. 46 (2015); CO Exec. Order D 004 08 (2008); Mass. Gen. Laws ch. 21N, § 3(b)(4); MICH. EXEC. DIR. 2009-4; MINN. STAT. § 216H.02 (2015); N.J.S.A. 26:2C-37 (80% reduction from 2006 levels); NY EXEC. ORDER NO. 24 (2009); RI Gen. L. §42-6.2-2 (85%).

¹¹⁵ Marianne Fay *et al.*, International Bank for Reconstruction and Development/The World Bank, *Decarbonizing Development: Three Steps to a Zero-Carbon Future* (2015), available at <http://www.worldbank.org/content/dam/Worldbank/document/Climate/dd/decarbonizing-development-report.pdf>; Sustainable Development Solutions Network and the Institute for Sustainable Development and International Relations, *Pathways to Deep Decarbonization* (2014), available at http://unsdsn.org/wp-content/uploads/2014/09/DDPP_Digit_updated.pdf; see also John C. Dernbach, *Creating Legal Pathways to a Zero Carbon Future*, Widener University Commonwealth Law School Legal Studies Research Paper Series no. 15-24, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=.

Because the endpoint will be carbon neutrality, this will be required of Pennsylvania under any scenario.

¹¹⁶ 42 U.S.C. § 7415.

¹¹⁷ 42 U.S.C. § 7410(a)(2)(H)(ii).

¹¹⁸ *Id.* §7415(a),(b).

¹¹⁹ Endangerment Finding, *supra* note 42, 74 Fed. Reg. at 66,514. EPA made the finding in connection with its determination that this would, in turn, endanger health and welfare within the United States. Nevertheless, the foreign endangerment finding has been made and has withstood judicial review.

These facts trigger the obligation to reduce GHG emissions to prevent endangerment in other nations within the meaning of section 115.¹²⁰ Further, the Clean Air Act's good neighbor provision requires that each state implementation plan include "adequate provisions . . .insuring compliance with the requirements of sections [126] and [115] of this title (relating to interstate and international air pollution)." ¹²¹ Although EPA has not issued a SIP call under section 115, the predicates triggering the mandatory obligation to issue a SIP call and, in turn, Pennsylvania's obligations under the Clean Air Act's good neighbor provision exist. These create an obligation for Pennsylvania, as a fiduciary under the ERA, to take action to reduce emissions to prevent endangerment of foreign nations from GHG pollution consistent with the good neighbor provision.

B. Pennsylvania's Obligation as a Trustee Should Require that GHG Emissions Be Limited to the Extent Consistent with the Social Cost of Carbon

A regulatory program that is designed to take all measures reasonably necessary to conserve the corpus of the environmental trust resource – the climate and the public environmental resources it supports- - for the benefit of the trust's beneficiaries - - current and future generations, will most closely hew to the intent and text of the ERA as interpreted in *PEDF* and the *Robinson Township* plurality. As explained further below, this can be best accomplished by putting a price on emissions of GHGs at least equal to the cost of the future damage to the trust resources that can be avoided by taking all measures up to that price (*i.e.* the "social price of carbon") and by recovering the value of that emissions price as income for the beneficiaries of the trust. We will therefore explain below the derivation of this "social cost of

¹²⁰ See, *Her Majesty the Queen in Right of Ontario v. Environmental Prot. Agency*, 912 F.2d 1525, 20 ELR 21354 (D.C. Cir. 1990); see also, Robert B. McKinstry, Jr., Thomas D. Peterson & Steven Chester, *Unlocking Willpower Part Two*, *supra* note 42:

¹²¹ 42 U.S.C. §7410(a)(2)(D)(ii).

carbon” and its relevance to Pennsylvania’s constitutional obligations as a trustee under the ERA.

1. The Relationship of the Social Cost of Carbon to Pennsylvania’s Obligations as a Trustee

In economic theory, the impacts of climate disruption represent “externalities” of the emissions of GHGs that are not reflected in the market price of the products whose manufacture produces those emissions. Under that theory, those who emit GHGs are appropriating the resources they damage without paying for the damage. Principles of economic efficiency, as well as equity, require that those responsible for the damage pay for it and that the damage be reflected in the price of the goods whose manufacture will cause the damage. If the cost of reducing a ton of emissions is less than the cost of the damages avoided, the emitter will reduce the emissions, creating a net increase in social welfare; the market will therefore favor activities that do not emit the GHGs that cause the damage.¹²² The “social cost of carbon” is a measure of the future estimated cost or damage of resulting from the emission of a metric ton of carbon today; imposing that cost on carbon emissions today will shift economic activity to other activities that not result in that cost or damage.

There have been a number of efforts to calculate this “social cost of carbon.” Because a series of Executive Orders required that federal agencies prepare cost-benefit analyses to assess the impact of regulatory actions, the United States convened an interagency task force to determine this “social cost of carbon,” producing reports in 2010 and 2016.¹²³ Based on updated

¹²² See, McKinstry, Rose, & Ripp, *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania*, *supra*, note 101, at 214-221; *see also*, Samuel A. Newell, Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Tony Lee, *Pricing Carbon into NYISO’s Wholesale Energy Market to Support New York’s Decarbonization Goals* (The Brattle Group August 10, 2017), at 3, *available at* https://www.energymarketers.com/Documents/Brattle_study_carbon_pricing.pdf.

¹²³ See, Executive Order 12866 (requiring agencies, to the extent permitted by law, “to assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or

data on the damages caused by climate disruption, the 2016 report calculated a variety of values representing the average and high cost of GHG emissions for different time periods and at different discount rates. As action is delayed, the social cost of carbon increases because the damage is both greater and more imminent and discounted less. The 2016 report calculated that the average social cost of carbon in 2020 (using a discount rate of 3%) is \$42/ton, but that the 95th percentile (high) cost would be \$123/ton.¹²⁴ In 2015, these figures increase to \$69/ton and \$212/ton. These costs represent the marginal cost of avoiding future damage and they do not include the damage that will already occur as a result of past emissions.

Federal agencies, states and federal courts have relied upon the social cost of carbon in determining which measures should be employed to prevent GHG emissions. Prior to 2017, federal agencies routinely relied upon the social cost of carbon developed by the expert panel in cost-benefit analyses. The Seventh Circuit specifically approved the use of that social cost of carbon in promulgating energy efficiency regulations in *Zero Zone v. Department of Energy*.¹²⁵ Both Illinois and New York relied upon the federally determined social cost of carbon in the

adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs”); Interagency Working Group on Social Cost of Carbon, United States Government, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (Feb. 2010), available at https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/scc_tsd_2010.pdf; Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (August 2016) (“2016 SCC”), available at https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf; Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, *Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide* (August 2016), available at https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf. President Trump has issued an Executive Order directing the withdrawal of the social cost of carbon guidance. See EO 13783 of March 28, 2017, *Presidential Order on Promoting Energy Independence and Economic Growth*, 82 Fed. Reg. 16093 (March 31, 2017). However, that Order has no binding legal effect standing alone and there are cogent reasons to believe that, if it were applied, that application would not withstand judicial review. The guidance represented the peer-reviewed consensus of a group of scientific and economic experts. The conclusions can no more be undone by unilateral executive fiat than can the conclusions of any other expert report.

¹²⁴ 2016 SCC at 4, Table ES-1.

¹²⁵ *Zero Zone v. Department of Energy*, 832 F.3d 654 (7th Cir. 2016).

development of zero emissions credit (“ZEC”) programs to “encourage the preservation of the environmental values or attributes of zero-emissions nuclear-powered electric generating facilities for the benefit of the electric system, its customers and environment.”¹²⁶ These programs provide assurances that the electricity generators will receive value equivalent to the avoided cost of carbon emissions calculated using federal social cost of carbon.¹²⁷ District Courts have rejected challenges to both state programs raising a variety of grounds.¹²⁸

Although President Trump has issued an Administrative Order withdrawing the social price of carbon,¹²⁹ that action should not preclude this state reliance on the expert determination reflected in the derivation of that metric. It is also doubtful that the President can reverse the determination of a panel of scientific experts by administrative fiat, particularly where regulations based on the scientific determination have been upheld on judicial review and the derivation of the metric is consistent with principles of international law.¹³⁰

The social cost of carbon has several implications with respect to the Commonwealth’s duties as a trustee under the reasoning of *Robinson Township* and *PEDF*. First, allowing emissions to continue unabated will increase the damage to the corpus of the trust. If a price is

¹²⁶ *Coalition for Competitive Electricity v. Zibelman*, 2017 WL 3172866, *3, Dkt. No. 16-CV-8164 (S.D.N.Y. July 25, 2017), *appeal filed* (2d Cir. August 25, 2017) (quoting CES Order, App’x E, at 1) (“*CCE v Zibelman*”).

¹²⁷ Specifically, “the price of each ZEC is the social cost of carbon less the generator’s putative value of avoided greenhouse gas emissions less the amount of the forecast energy price.” *Id.* at *4.

¹²⁸ *Village of Old Mill Creek v Star*, 2017 WL 3008289, Dkt. No. 17 CV 1163 and 1164 (N.D. IL July 14, 2017) (upholding Illinois program); *CCE v. Zibelman*, *supra* note 126 (upholding New York program). Although both programs are under appeal, the use of the federal social cost of carbon is not an issue in those appeals.

¹²⁹ See EO 13783 of March 28, 2017, Presidential Order on Promoting Energy Independence and Economic Growth, 82 Fed. Reg. 16093 (March 31, 2017).

¹³⁰ The action is reminiscent of apocryphal story King Canute’s attempt to hold back the tides cited in *Diamond v. Chakrabarty*, 447 U.S. 303 (1980). The Regulatory Impact Statement supporting EPA’s proposal to withdraw the Clean Power Plan, uses a much lower social cost of carbon based on a limitation of consideration of damages to those that will occur only within the United States. This appears to be directly contrary to the UNFCCC’s principle applicable to all parties set forth in Article 3, section 3 directing that rules “should be cost-effective so as to ensure global benefits at the lowest possible cost.” In other words, cost-effectiveness should consider global benefits in the form of reduced global damages rather than limiting that consideration to the benefits accruing to an individual nation or, in the case of Pennsylvania, state.

put on the emissions equal to the social cost of carbon, or emitters are otherwise required to implement all emissions reductions up to that cost, the damage to the corpus of the trust will be avoided consistent with the duty to “conserve and maintain” the trust corpus. Second, the social cost of carbon provides a way of measuring the cost of damage from climate change, including damage to public natural resources, by state actions allowing emissions of GHG without any charge at all. Third, the Commonwealth’s duty to “act affirmatively via legislative action to protect the environment” suggests that the state could, and probably should, use a mechanism like the social cost of carbon to constrain the emissions of GHGs that harm public natural resources. This result seems compelled by the text of the ERA and the trustee’s duty of prudence as found by the Supreme Court in *PEDF*.¹³¹

While the social cost of carbon is based on the marginal cost of greenhouse gas emissions based on global damages, the ERA relates to the public natural resources of the Commonwealth of Pennsylvania. The most relevant public natural resource, the stable climate not disrupted by human GHG pollution, is both a global resource and a Pennsylvania public resource. If a cost is put on GHG emissions, as contemplated by the derivation of the social cost of carbon, parties will implement all control measures less than the social cost of carbon, so that this cost represents the cost that should be imposed to prevent “unreasonable degradation of natural resources.”¹³² A lower cost will be insufficient to conserve the global resource, and if the global

¹³¹ *PEDF*, 161 A.3d at 932 (quoting *In re Mendenhall*, 398 A.2d 951, 953 (Pa. 1979) (quoting Restatement (Second) of Trusts § 174).); see also *id.* at 938 (invalidating transfer of funds because it violated the duty of prudence and to use trust assets in accordance with the trust purposes). Whether the Commonwealth’s failure as a trustee to preserve the corpus of the trust resources after damage may have created liability for damage is beyond the scope of this article.

¹³² *Robinson Township*, 83 A.3d at 953 (citing and quoting from *Montana Env’tl Info. Ctr. v. Dep’t of Env’tl Quality*, 296 Mont. 207, 988 P.2d 1236, 1249 (1999)).

climate is disrupted, Pennsylvania's climate will be equally disrupted.¹³³ Because GHGs are global pollutants, if Pennsylvania does not implement all measures costing less than the social cost of carbon, but uses some lesser value based on the damage within Pennsylvania itself, the global climate will be disrupted, and Pennsylvania trust resources will neither be conserved nor maintained.

There is a second legal reason for employing a measure based on the marginal global cost associated with a ton of GHGs. The UNFCCC's requires that developed nations implement policies and measures to deal with climate change that "should be cost-effective so as to ensure global benefits at the lowest possible cost"¹³⁴ should also govern the interpretation of the ERA. In this case, the "global benefits" are the avoided global damages, in other words the costs that are measured by the social cost of carbon. For this reason, the social cost of carbon appears to be the best measure to determine both the scope of measures required under the ERA to prevent unreasonable degradation of those resources and the value of the undisrupted climate resource.

2. Support for a Meaningful Price on GHG Emissions

The APCA authorizes the EQB to adopt a regulation putting a price on GHG emissions commensurate with the social cost of carbon. The PEDF decision provides additional support for such a regulation under two overlapping rationales. First, there is a significant argument that allowing private parties to emit GHGs is the equivalent of allowing them to appropriate ecosystem services with respect to which the Commonwealth has a fiduciary duty to assure that the beneficiaries of the trust obtain a fair price. Allowing the use of these resources without requiring payment would arguably "loot the public trust fund" in an even more egregious way

¹³³ An argument premised on the proposition that one should ignore the global marginal cost of the emissions of a ton of GHGs in calculating the social cost of carbon, would be the equivalent of arguing that one should ignore global demand and cost considerations in valuing the price of oil.

¹³⁴ UNFCCC, art. 3, § 3 *supra* note 102 (emphasis added).

that the General Assembly's looting in *PEDF*. Second, putting a price on emissions commensurate with the social cost of carbon is necessary to prevent harm sufficiently to maintain and conserve the ERA trust resources. Both rationales would support either the imposition of a fee or capping emissions and auctioning allowances with a reserve price that is adequate both (1) to assure the conservation of the trust resources by limiting the risk to those resources and (2) to compensate the Commonwealth for the damage to public resources that will occur. In either case, the required price would be at least as great as the social cost of carbon, which, as discussed above, is based on the marginal cost of the future damage avoided by each ton of carbon dioxide emitted.

Putting a price on carbon consistent with the social cost of carbon under each of the foregoing rationales is arguably mandated by the fiduciary duties cited by the Supreme Court in *PEDF*. These duties include the duty of prudence that "requires a trustee to 'exercise such care and skill as a man of ordinary prudence would exercise in dealing with his own property.'"¹³⁵ Putting this price on carbon emissions is also consistent with the text of the ERA, which directs the Commonwealth, as trustee, to "conserve and maintain" the trust corpus in furtherance of the people's enumerated rights. Requiring polluters to purchase at auction their right to pollute the air, subject to a reserve price equal to the avoided damage as represented by the social cost of carbon, is more consistent with the Commonwealth's duties as a trustee for its natural resources than allowing those polluters to appropriate those public resources free of charge and, as a result, depleting the corpus of the trust.

¹³⁵ *PEDF*, 161 A.3d at 932 (quoting *In re Mendenhall*, 398 A.2d 951, 953 (Pa. 1979) (quoting Restatement (Second) of Trusts § 174.)); *see also id.* at 938 (invalidating transfer of funds because it violated the duty of prudence and the duty to use trust assets in accordance with the trust purposes).

VI. A REGULATORY STRUCTURE AUTHORIZED BY EXISTING LAW THAT CAN ACHIEVE CARBON NEUTRALITY BY THE SECOND HALF OF THE CENTURY AND IMPOSE THE SOCIAL COST OF CARBON ON GHG EMISSIONS

In order to support a petition to the EQB seeking the promulgation of regulations limiting GHG emissions pursuant to the APCA,¹³⁶ as suggested by *Funk v. Wolf*,¹³⁷ the petition must include a proposed regulation or regulatory structure consistent with existing statutory authority that could support a court order compelling its adoption should the EQB fail to act and that could withstand judicial review if adopted by the EQB. To accomplish this, the structure should satisfy the following criteria:

- First, as discussed above, the regulatory structure should result in the reduction of emissions sufficient to achieve net carbon neutrality by the second half of the century, if not earlier.
- Second, as also discussed above, the regulatory structure should either impose a cost on emissions equal to the social cost of carbon or require all emissions reduction measures less than that cost. The structure could start with a lower cost that grows steadily over time, creating consistency with other programs, generating a predictable framework for investment decisions and facilitating a transition from free emissions to emissions that incur a cost.
- Third, as also discussed above, the structure should generate income for the beneficiaries of the trust without impairing the trust's principal.
- Fourth, as discussed below, the regulatory structure should result in actual emissions reductions and not result in the transfer of emissions to other unregulated economic sectors, states or nations through the process of leakage.

¹³⁶ 35 P.S. §§ 4001 *et seq.*

¹³⁷ 144 A.3d 228, 243 (Pa. Cmwlth. 2016) *aff'd without opinion* 158 A.3d 642 (Pa. 2017).

- Finally, as suggested in *Funk*, the regulatory structure should be authorized by existing law, or it should be authorized by law that can be implemented administratively without further legislation.¹³⁸

For the reasons discussed below, although other measures may be warranted to reduce the cost and effectiveness of a program, at a minimum, these criteria both support and arguably require the adoption of a regulation establishing an economy-wide cap-and-trade program with an auction with a reserve price of the sort established pursuant to the California Global Warming Solutions Act.¹³⁹ The regulation should also prevent intersectoral “leakage” as well as leakage to other states and nations. The requirements of the ERA support distribution of the tradable allowances for such a program by way of an auction with a reserve price set at the social cost of carbon, except in instances where the award of free allowances or low-cost allowances may be warranted to prevent leakage. The prevention of leakage and efficiency will be best promoted if this program allows interstate and international trading with jurisdictions with similar programs.

Existing Pennsylvania statutes authorize both the regulation of GHG emissions and participation in regional trading programs, such as the Regional Greenhouse Gas Initiative (“RGGI”) or the California-Quebec-Ontario trading program. “RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO₂ emissions from the power sector.”¹⁴⁰ (New Jersey is preparing to rejoin RGGI and Virginia has proposed regulations that

¹³⁸ This assumes that the General Assembly remains unwilling to enact new legislation and that it will be necessary to induce or judicially compel administrative action. The State of New York has been proceeding to implement its program for reducing GHGs administratively, using executive authority. *See, Thrun v. Cuomo*, 976 N.Y.S.2d 320 (N.Y. App. Div. 2013) (dismissing claims against New York Governor’s action on jurisdictional grounds, limiting claims to challenges to regulations); *CCE v Zibelman*, *supra*, note 126.

¹³⁹ CAL. HEALTH & SAF. CODE § 38500, *et seq.*; *see also*, Cal. Code Regs., tit. 17, §§ 95801-96022

¹⁴⁰ The Regional Greenhouse Gas Initiative, Welcome, <https://www.rggi.org/> (last visited Mar. 6, 2018).

would allow trading with RGGI states.¹⁴¹) The nine-state RGGI program has put a descending cap on GHG emissions from the power sector, provides for trading of allowances, and distributes the bulk of allowances through an auction with a reserve price.¹⁴² The California-Quebec-Ontario program creates an economy-wide cap and trade program that covers all major GHG emission sources and further requires that distributors of fossil fuels and electricity importers surrender allowances equal to the emissions created by combustion of the fuels or generation of the imported electricity.¹⁴³ That program also distributes most allowances by auction with a reserve price.¹⁴⁴ If a rulemaking petition implementing the existing Pennsylvania authority by way of a reasonably specific rule that would facilitate trading in these programs were presented to the EQB, the EQB would have a judicially enforceable constitutional duty to adopt that regulation.

A. *An Effective Regulatory Program Will Require Economy-Wide Coverage Under a Cap-and-Trade Program with Additional Measures to Prevent Leakage*

There are many regulatory models that may be employed to achieve GHG emissions reduction using existing Pennsylvania law. These include a cap-and-trade program with a variety of mechanisms to distribute allowances, an emissions tax, and traditional command-and-control techniques (such as technology-based emissions standards and permits that establish permit limits based on technology or other criteria). Not all of these mechanisms are authorized

¹⁴¹ The State has published a proposed regulation that mirrors the RGGI program and would allow trading even without Virginia joining RGGI. 9VAC5-140. Regulation for Emissions Trading Programs (adding 9VAC5-140-6010 through 9VAC5-140-6430), 34 VA. Reg. 924 (Jan. 8, 2018). *See also*, Darrell Proctor, *Virginia Moves to Join RGGI Carbon-trading Market*, POWER (Nov. 15, 2017), <http://www.powermag.com/virginia-moves-to-join-rggi-carbon-trading-market/>.

¹⁴² The Regional Greenhouse Gas Initiative, Elements of RGGI, <https://www.rggi.org/program-overview-and-design/elements> (last visited Mar. 6, 2018).

¹⁴³ California Air Resources Board, California Cap-and-Trade Program: Facts About The Linked Cap-and-Trade Programs (2017), https://www.arb.ca.gov/cc/capandtrade/linkage/linkage_fact_sheet.pdf.

¹⁴⁴ California Air Resources Board, Reserve Sale Information, <https://www.arb.ca.gov/cc/capandtrade/reservesale/reservesale.htm> (last visited Mar. 6, 2018).

by current law. Although of mix other authorized mechanisms can and should be employed as part of an effective program, none can achieve what will be required to meet the constitutional objectives without an economy-wide cap-and-trade program with an auction and reserve price.

An economy-wide GHG emissions tax set at the social price of carbon and coupled with the leakage prevention measures discussed below could equally satisfy the constitutional prerequisites. However, a tax requires additional legislative action. By contrast, as also discussed below, a cap-and-trade program with an auction and a reserve price can be established by regulation under the existing authority of the APCA and Article I, §27 without the need for further legislation. A cap-and-trade program with an auction and reserve price would also be equally or more effective in reducing GHG emissions as a tax and would also recover income for the beneficiaries of the constitutional trust.¹⁴⁵

Emissions reductions can also be achieved using traditional command-and-control approaches. Typically, these approaches rely upon emissions limitations based on emissions reductions that are deemed achievable using a certain technology. This was the technique used to derive the emissions reduction goals for the Clean Power Plan.¹⁴⁶

Although elements of a command-and-control program (such as permits and emissions monitoring) will be required for any effective program, sole reliance on this typical command

¹⁴⁵ A cap-and-trade program with an auction differs from a tax only in one respect--with a tax, the market determines the extent of emissions reductions, and with the cap-and-trade program, the market determines the amount that is recovered. The cap-and-trade program with an auction combines the two approaches and best assures emissions reductions. This is because a cap is often initially set too leniently and neither recovers sufficient income nor assures reductions that can be achieved cost-effectively. The California Court of Appeal held that California's GHG allowance auction with a reserve price is not a tax. *California Chamber of Commerce v. State Air Resources Bd.*, 10 Cal. App. 5th 604, 614, 216 Cal. Rptr. 3d 694, 700 (2017) ("These twin aspects of the auction system, voluntary participation and purchase of a specific thing of value, preclude a finding that the auction system has the hallmarks of a tax.").

¹⁴⁶ Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,661 (Oct. 23, 2015) (codified at 40 C.F.R. Part 60). *See also, Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule*, 82 Fed. Reg. 48,035 (Oct. 16, 2017).

and control approach will not achieve the constitutional objectives for a number of reasons.¹⁴⁷ First, emissions limits based on what a given technology can achieve rather than the emissions reduction goal – *i.e.* the pathway necessary to achieve carbon neutrality by the second half of this century—are unrelated to the ultimate goal and will often fail to achieve it. By contrast, setting a declining cap based on the trajectory deemed appropriate to achieve the emissions reduction will result in certain reductions. Second, the determination of a technology-based limit is based on an *ex ante* estimate of emissions reduction costs and available technologies and usually results in a lower degree of emissions reduction than can actually be achieved at a given cost.¹⁴⁸ Third, as discussed below, it would be more difficult and perhaps impossible to prevent leakage¹⁴⁹ using a technology-based command-and-control approach. Fourth, the process of reviewing technologies and developing standards is time and energy intensive and the standards are unlikely to be put in place within a time frame necessary to achieve the necessary reductions. Fifth, although technology-based standards are intended to be technology forcing, hard caps coupled with an increasing reserve price would better inform the market in advance and would be more likely to drive the necessary capital investment. Sixth, a command-and-control approach would not generate income for the beneficiaries of the constitutional trust.

This does not mean that command-and-control approaches would not be helpful to address situations where the market does not function efficiently. California employs a number of supplemental measures to address these situations. For example, imposing a price on fuel

¹⁴⁷ See, *Unlocking Willpower*, *supra* note 42, 47 E.L.R. at 10139-41 (discussing why a technology-based approach such as applied in the Clean Power Plan is unlikely to result in the reductions necessary to achieve the objectives of the Paris Agreement).

¹⁴⁸ In virtually all cases, emissions reductions have been achieved at a significantly lower cost than originally estimated. This means that a cap-and-trade program with a reserve price set at the social cost of carbon will likely result in more emissions reductions than might be achieved by attempting to determine what technologies could be employed at the social cost of carbon and establishing emissions limits based on those technologies.

¹⁴⁹ The concept of leakage is discussed in the following section.

based on the GHG emissions from its combustion will not produce emissions reductions if manufacturers do not make lower emissions vehicles available, or if suppliers do not make low carbon fuels available, or if homebuyers do not consider utility costs in deciding whether to purchase energy efficiency measures in their new homes or granite countertops. Therefore, supporting measures, such as fleet emissions limits, fuel content requirements, and building codes requiring energy efficiency, all reduce the cost of emissions reductions and can achieve greater emissions reductions when coupled with a cap-and-trade program. California includes measures such as these to support its auction, cap-and-trade program. However, without the uniform ceiling created by the cap, and without the uniform price floor created by the reserve price, those measures alone will not achieve the emissions reductions within the time necessary to conserve and maintain a stable climate.

B. The Significance of Leakage

Both constitutional and practical policy considerations call for the implementation of a policy program that prevents or at least minimizes the phenomenon of “leakage.” Leakage refers to increases in emissions in unregulated sectors or unregulated jurisdictions that are caused by the relocation of emissions-generating activity producing emissions away from the sector or jurisdiction where the emissions are regulated. Leakage can occur as a result of a business shifting some or all of its production to another state or nations. Leakage may also occur between sectors. If the result of regulation is an increase of emissions in other sectors, in other states, or in other nations, at least some of the damage to the natural resources will occur in any case.

1. Types of Leakage

Interstate leakage occurs in the electricity sector, where electrons flow readily across state boundaries and where generation units are called upon to supply electricity to the grid in

order of price. For example, if Pennsylvania puts a price on carbon but West Virginia does not, then generation units in West Virginia would not include an emissions price in their bids, and therefore they would be able to submit lower bids. This would move the West Virginia units up in the order in which they are called. In some cases, this might result in a West Virginia coal-fired plant being called upon before a combined cycle natural gas plant in Pennsylvania, which has only about 40% of the emissions of the coal-fired plant. In that case, even though Pennsylvania coal-fired plants would operate less frequently, some of the emissions reductions would be offset by increased emissions as a result of coal-fired plants in West Virginia operating more frequently. This type of leakage also occurs in command-and-control regimes. If Pennsylvania requires the installation and operation of carbon capture and sequestration control equipment on its fossil-fired plants and West Virginia does not, the dispatch of electricity would also shift to West Virginia. To prevent this type of interstate leakage, in EPA's Cross-State Air Pollution Rule implementing the Clean Air Act's Good Neighbor provision for conventional pollutants, EPA based its allowance caps and state budgets on models using a uniform allowance price. In essence, this created a program imposing a uniform price across state boundaries to prevent leakage.¹⁵⁰ Similar mechanisms to put a uniform price on emissions will be required for programs requiring GHG emissions reductions in the electricity sector.

Leakage has been a significant problem for the RGGI cap-and-trade program, which is limited to the electricity sector. Although the RGGI program has achieved significant emissions reductions, a portion of those reductions have resulted from the shifting of dispatch to higher

¹⁵⁰ In the Cross-State Air Pollution Rule, EPA created state budgets based on air quality needs and the cost of "highly cost effective reductions," and it imposed uniform costs to prevent leakage. The Supreme Court recognized the problem of leakage and approved this approach to dealing with it in *EPA v. EME Homer City Generation, L.P.*, 572 U.S. ____ (2014).

emitting fossil fuel-fired facilities in Pennsylvania and other states.¹⁵¹ This leakage not only limits the effectiveness of the RGGI program to reduce overall emissions, but also depresses RGGI allowance prices. Allowance prices are so depressed by this leakage that New York needed to adopt a mechanism requiring electricity distribution companies to buy zero emission credits (“ZECS”) based on the social cost of carbon in order to prevent the premature closure of non-emitting nuclear units.¹⁵²

Interstate and international leakage may occur in other industries, although not as readily as in the electricity industry. In the case of electricity generation, shifting dispatch of electricity units from one state to another based on price occurs immediately. However, products in other industries are not as readily fungible, and leakage may lead to the closing of a plant or moving production. The difference in industry structure may necessitate different leakage control mechanisms, as discussed in the next subsection.

Finally, if emissions control requirements are imposed or an emission price is imposed on the electricity sector but not on other sectors, then the other sectors may switch from electricity use to the use of fossil fuels. For example, if a price is put on emissions from the electricity sector but not on the transportation sector, electric cars and plug-in hybrids will be more expensive compared to vehicles with internal combustion engines, deterring the emissions reductions that would occur as a result of electrification of the transportation sector. This can also occur in the area of building heating and cooling. If a price is put on emissions from the electricity industry but not heating oil or natural gas, switching to electric heating and away from

¹⁵¹ Sue Wing & Marek Kolodziej, *The Regional Greenhouse Gas Initiative: Emission Leakage and the Effectiveness of Interstate Border Adjustments*, RPP-2008-03 Regulatory Policy Program Mossavar-Rahmani Center for Business and Government John F. Kennedy School of Government (2008), available at https://sites.hks.harvard.edu/m-rcbg/rpp/Working%20papers/RPP_2008_03_SueWing.pdf.

¹⁵² *CCE v Zibelman*, *supra* note 126.

the direct use of fossil fuels will be deterred, even using mechanisms increasing efficiency and decreasing overall emissions, such as ground source geothermal.

2. *Mechanisms to Prevent Leakage*

The regulatory mechanisms employed by California pursuant to the Global Warming Solutions Act reflect consideration of each of these forms of leakage. To prevent intersectoral leakage, California has created an economy-wide cap-and-trade program applicable to GHG emissions from the electricity sector; emissions from other major air pollution sources; the import of electricity; and the sale of natural gas, heating oil and gasoline.¹⁵³ Interstate leakage in the electricity sector is controlled by requiring that importers of electricity surrender allowances equal to the GHG emissions resulting from the electricity generation.¹⁵⁴ Interstate and international leakage from sectors vulnerable to international and interstate competition is prevented by awarding allowances to those industries rather than requiring the allowances to be purchased at auction.¹⁵⁵

The RGGI states attempt to eliminate leakage among the participating states through the creation of a uniform trading program, so that generators in the nine states will face similar costs and cannot benefit by switching dispatch or investment to other RGGI states. Nevertheless, leakage has occurred as dispatch is switched to other nearby states that do not regulate GHG emissions or put a price on those emissions. For RGGI, as would be the case for Pennsylvania, it is impractical to require the surrender of allowances for imported electricity, as can occur in California.

¹⁵³ CAL. CODE REGS. Tit. 17, § 9511 (covered entities); *see generally*, California Global Warming Solutions Act, CAL. HEALTH & SAF. CODE § 38500 et seq.; CAL. CODE REGS., tit. 17, §§ 95801-96022.

¹⁵⁴ CAL. CODE REGS. Tit. 17, §§ 9511(b), 95852.

¹⁵⁵ *Id.* at § 95891.

PJM Interconnection, L.L.C. (“PJM”), the regional transmission organization that oversees the dispatch and transmission of electricity in Pennsylvania and several RGGI states,¹⁵⁶ as well as NYISO and ISO-New England, are currently exploring mechanisms to prevent leakage and the market distortions caused by some states’ failure to put an adequate price on GHG emissions. The mechanisms include border adjustments made by way of “carbon adders” that are placed on bids from fossil fuel-fired units in states without regulation or other border charges. NYISO commissioned a study (“NYISO study”) “to explore whether and how New York State environmental policies limited carbon may be pursued within the existing wholesale market structure.”¹⁵⁷ The NYISO study explained how, for the purpose of deciding the order in which generation units would be “dispatched” or called upon, border adjustments could assign a price or “carbon adder” that would be added to imports based on the generator’s emissions and the price within New York and exports would receive a credit based on the emissions charges.¹⁵⁸ PJM, which involves multiple states, has gone further, and described a mechanism that would create subregions to prevent leakage across regulated and unregulated regions by way of a two-stage process.¹⁵⁹

¹⁵⁶ The interconnection itself is known as the Pennsylvania-New Jersey-Maryland Interconnection. PJM includes Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. Maryland and Delaware currently participate in RGGI, New Jersey has announced an intention to rejoin RGGI and Virginia is developing a cap-and-trade program that will mirror the RGGI program and allow trading.

In regions where electric utilities were restructured such that generation was deregulated (*i.e.* became competitive, regional transmission organizations (“RTOs”) and independent service operators (“ISOs”) manage wholesale electricity transmission, deciding which generation units should be dispatched. In other regions, the electricity transmission and generation are handled by traditional vertically integrated utilities. Congressional Research Service, Federal Power Act (FPA) and Electricity Markets, CRS Report R44783 (March 10, 2017).

¹⁵⁷ Samuel A. Newell, Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Tony Lee, *Pricing Carbon into NYISO’s Wholesale Energy Market to Support New York’s Decarbonization Goals* (The Brattle Group August 10, 2017), at 1, available at https://www.energymarketers.com/Documents/Brattle_study_carbon_pricing.pdf.

¹⁵⁸ NYISO Study at 23-26.

¹⁵⁹ PJM, *Advancing Zero Emissions Objectives through PJM’s Energy Markets: A Review of Carbon-Pricing Frameworks* (August 23, 2017), available at <http://pjm.com/~media/library/reports-notice/special-reports/20170502-advancing-zero-emission-objectives-through-pjms-energy-markets.ashx>. These leakage

Notably, the various mechanisms for limiting interstate and intersectoral leakage cannot operate effectively without a cap-and-trade program that imposes a uniform price on emissions. Therefore, at a minimum, an effective program will require such a cap-and-trade program with the opportunity to trade with other similar programs.¹⁶⁰

C. Authority to Regulate Greenhouse Gas Emissions Under the Pennsylvania Air Pollution Control Act

In the *Funk* decision, the Commonwealth Court held that in order to support a mandatory duty to act to obtain judicial relief requiring regulatory action to limit GHG emissions in the absence of a legislative mandate, there must also be existing legislative authority. The court's decision was based on well-founded separation of powers concerns.¹⁶¹ As also noted in *Funk*, and explained in greater detail below, regulation of GHG emissions is authorized under the APCA.¹⁶² This statute governs the air pollution control program in Pennsylvania, and also authorizes the type of cap-and-trade program described above. The APCA authorizes the EQB to adopt regulations pursuant to authority provided in the APCA, and the EQB has adopted regulations governing the submission of petitions seeking the adoption of regulations.¹⁶³ The APCA further authorizes DEP to administer air regulatory programs, including regulations adopted by the EQB.

prevention mechanisms may be subject to claims that they are unconstitutional under the dormant commerce clause or that they are preempted by the Federal Power Act. Similar arguments were raised and rejected by District Courts in the challenges to the Illinois and New York ZEC programs, although both decisions are under appeal. *See, Village of Old Mill Creek v. Star*, *supra* note 128 (Illinois); *CCE. Zibelman*, *supra* note 126 (New York).

¹⁶⁰ The State of Washington Department of Ecology has adopted a Clean Air Rule, which creates a different type of program that requires annual percentage GHG emissions reductions and allows the use of tradeable emissions allowances from other states to satisfy the emissions reduction obligation. Chapter 173-442 WAC. This regulation has been suspended because of a decision partially invalidating it. Regardless, this approach would not be applicable to Pennsylvania because it would not generate income for beneficiaries of the trust. Although it assures emissions reductions, the ability to trade under the program ultimately depends upon other jurisdictions creating tradable allowances with a transparent price.

¹⁶¹ *Funk*, 144 A.3d at 235.

¹⁶² 35 P.S. § 4001 *et seq.*

¹⁶³ 23 PA. CODE §§ 23.1-23.8,

The APCA provides DEP with the authority to regulate air pollution in accordance with the federal Clean Air Act. The APCA states that DEP “shall have the power and its duty shall be to [i]mplement the provisions of the Clean Air Act in the Commonwealth.”¹⁶⁴ The Act further provides that the EQB “[s]hall have the power and its duty shall be to [a]dopt rules and regulations to implement the provisions of the Clean Air Act,” which “shall be consistent with the requirements of the Clean Air Act and the regulations adopted thereunder”.¹⁶⁵ These provisions suggest that the EQB has broad authority to promulgate regulations consistent with the requirements of the Clean Air Act and that DEP has authority to implement the provisions of the federal Clean Air Act. The statute further provides that no operating permit may be issued by DEP unless it determines that the source will not discharge air contaminants “in violation of any performance or emission standard or other requirement” established by EPA or DEP for such source.¹⁶⁶ Further, DEP must revise any permit to incorporate applicable standards and regulations promulgated under the Clean Air Act after issuance of the permit, in accordance with a timeframe set forth in the statute.¹⁶⁷ Because GHGs are now clearly pollutants under the Clean Air Act, DEP must regulate those gases, at least to the extent set out in the federal Clean Air Act. This includes control of new or modified major stationary sources emitting 75,000 tons or more of greenhouse gases if that source also emits other pollutants regulated under the Clean Air Act.¹⁶⁸

¹⁶⁴ 35 P.S. § 4004(1).

¹⁶⁵ 35 P.S. § 4005(a)(8).

¹⁶⁶ *Id.* at § 4006.1(b)(2).

¹⁶⁷ *Id.* at § 4006.1(k).

¹⁶⁸ In *Utility Air Regulatory Group v. Environmental Protection Agency*, 134 S. Ct. 2427 (2014), the Supreme Court upheld EPA regulation requiring control of greenhouse gases emitted by sources otherwise subject to Prevention of Significant Deterioration (PSD) review in quantities of at least 75,000 tons per year of carbon dioxide equivalent. *Prevention of Significant Deterioration and Title V Permitting for Greenhouse Gases: Removal of Certain Vacated Elements*, 80 Fed. Reg. 50,199 (Aug. 19, 2015). See also *Funk*, 144 A.3d at 250, n.17.

Although the Clean Power Plan, which would limit GHG emissions from power plants, has been stayed and

The EQB's duty to adopt regulations limiting GHG emissions goes beyond the minimum that may be required under the Clean Air Act, even without considering the Commonwealth's duty as a trustee under the ERA. The APCA provides the EQB with the authority and the mandatory duty to "[a]dopt rules and regulations, for the prevention, control, reduction and abatement of air pollution, applicable throughout the Commonwealth or to such parts or regions or subregions thereof specifically designated in such regulation which shall be applicable to all air contamination sources regardless of whether such source is required to be under permit by this act."¹⁶⁹

Those rules and regulation may, among other things, "prohibit or regulate any process or source or class of processes or sources."¹⁷⁰ Further, the APCA authorizes the Department to "[p]repare and develop a general comprehensive plan for the control and abatement of existing air pollution and air contamination and for the abatement, control and prevention of *any new* air pollution and air contamination . . . and to submit a comprehensive plan to the [EQB] for its consideration and approval."¹⁷¹ The APCA defines "air contaminant" to include a "gas," which would therefore include greenhouse gases. The statute defines "air contamination" as the "presence in the outdoor atmosphere of an air contaminant which contributes to any condition of air pollution," It further defines "air pollution" as

"[t]he presence in the outdoor atmosphere of any form of contaminant, including, but not limited to, the discharging from stacks, chimneys, openings, buildings, structures, open fires, vehicles, processes or any other source of any . . . gases, vapors, . . . or any other matter in such place, manner or concentration inimical or

it and certain other rules limiting GHG emissions, are under reconsideration by EPA, those regulations remain on the books. There are many other laws and regulations limiting GHG emission under the Clean Air Act that remain in force and are not under reconsideration. More significantly, there are substantial arguments that GHG emissions from power plants and other stationary sources must be regulated under section 111 of the Clean Air Act. *See, American Electric Power Company v. Connecticut*, 564 U.S. 410 (2011).

¹⁶⁹ 35 P.S. § 4005(a)(1).

¹⁷⁰ *Id.*

¹⁷¹ *Id.* at § 4004(18) (emphasis added).

which may be inimical to the public health, safety or welfare or which is or may be injurious to human, plant or animal life or to property or which unreasonably interferes with the comfortable enjoyment of life or property.”¹⁷²

The EPA endangerment finding under the Clean Air Act, as well as the 2015 DEP report under the Climate Change Act, support the conclusion that GHGs constitute air pollution.¹⁷³

Moreover, the Climate Change Act requires not only a report on greenhouse gas impacts every three years but also requires DEP to develop a climate change action plan for submission to the Governor identifying “cost-effective strategies for reducing and offsetting GHG emissions.”¹⁷⁴ This provision would not make sense unless the APCA allowed regulation of GHGs. Thus, DEP has authority under existing law to regulate GHGs through adoption of regulations by EQB, even in the absence of regulations under the federal Clean Air Act.¹⁷⁵

Case law supports this position. In *Commonwealth, Department of Environmental Resources v. Pennsylvania Power Co.*,¹⁷⁶ the Commonwealth Court held that the APCA authorized regulations more stringent than federal regulations. In addition, even before *Robinson Township* and *PEDF*, the Pennsylvania Supreme Court recognized that Article I, § 27 authorizes

¹⁷² *Id.* at § 4003.

¹⁷³ Compare *Massachusetts v. EPA*, 549 U.S. 497, 528-530 (2007) (analysis of why greenhouse gases are air pollutants under the Clean Air Act).

¹⁷⁴ 71 P.S. §§ 1361.3, 1371.7. Although the Act also requires the Plan to recommend legislative changes, this should not be read to suggest that existing law does not authorize comprehensive regulation.

¹⁷⁵ The APCA limits the stringency of some regulations that the EQB may adopt. These limitations are unlikely to apply to regulations limiting GHG emissions even assuming that they are constitutional under the Supreme Court’s decisions in *Robinson Township* and *PEDF*. Section 4004.2 of the APCA prohibits regulation beyond that necessary to meet the minimum requirements of the federal Clean Air Act for purposes of implementing section 109 of the Clean Air Act, which relates to “criteria pollutants” governed by National Ambient Air Quality Standards (“NAAQS”) established for GHGs. 35 P.S. § 4004.2. That section does not apply because EPA has not yet established an NAAQS for GHGs. Even if EPA establishes an NAAQS for GHGs in the future, it must be set at a level sufficient to protect public health and welfare 42 U.S.C. § 7409. Achieving and maintaining that NAAQS will require emissions reductions require emissions reduction commensurate with the social cost of carbon so that the regulation described here would be consistent with that section. Further, the EQB may not establish “a more stringent performance or emission standard for hazardous air pollutant emissions from existing sources” than federal section 112 standards. 35 P.S. § 4006.6(a); *PPL Generation, LLC v. Commonwealth, Dep’t of Environmental Protection*, 986 A.2d 48 (Pa. 2009). That section does not apply because greenhouse gases are not considered “hazardous air pollutants,” which is a narrow term referring to air pollutants that present “a threat of adverse human health effects.” See 42 U.S.C. 7412(b)(1) (list of hazardous air pollutants), (2) (criteria for revision of the list).

¹⁷⁶ 384 A.2d 273 (Pa. Commw. Ct. 1978).

DEP to adopt regulations going beyond the statutory minimum in order to implement a statute's legislative purposes.¹⁷⁷ In *Funk*, the Commonwealth Court noted that DEP and other state respondents "acknowledge that the General Assembly, through the APCA, bestowed upon them a duty to promulgate and implement rules and regulations to reduce CO₂ and GHG emissions."¹⁷⁸

The APCA also contains sufficient authority to extend regulations throughout the economy, by going “upstream” and regulating fossil fuels where it is impractical to regulate the emissions source. It is impractical to require that vehicles and individual homes and buildings measure emissions and surrender allowances. The RGGI program and the proposed Virginia emissions trading program cover only certain, larger electricity generating facilities, where emissions can be measured directly and regulated, but these programs fail to capture the majority of GHG emissions and allow intersectoral leakage. By contrast, the California-Quebec-Ontario auction, cap-and-trade-program extends to all major air pollution emissions sources where emissions can be measured, and also extends to sectors where it is infeasible to regulate at the emissions source. That program also requires that those distributing fossil fuels within the state or importing electricity or fuels acquire allowances, and therefore captures the majority of GHG emissions and more effectively prevents leakage.¹⁷⁹ This vastly more effective program is authorized by existing law in Pennsylvania. The APCA authorizes and gives the EQB the power and the duty to adopt regulations applicable to “all air contamination sources regardless of whether such source is required to be under permit by this act” and states that these regulations may “prohibit or regulate the combustion of certain fuels.”¹⁸⁰ This authorization appears broad

¹⁷⁷ *Eagle Environmental II, L.P. v. Com., DEP*, *supra*, note 87.

¹⁷⁸ *Id.*, 144 A.3d 228, n. 17.

¹⁷⁹ CAL. CODE REGS. tit. 17, § 95811.

¹⁸⁰ 35 P.S. § 4005(a)(1)

enough to encompass the broader and more effective California-Quebec-Ontario approach, particularly when read in light of the Commonwealth's duty as a trustee under the ERA.

There are cogent reasons for adopting the broader California-Quebec-Ontario approach and interpreting the APCA to support that approach. Most notably, it prevents leakage between sectors subject to a carbon price and those not subject to a price. For example, if electricity prices rise as a result of putting a price on carbon emissions and if the price of GHG emissions is not reflected in the price of motor vehicle fuels, this may discourage the purchase and use of electric vehicles, resulting in increased emissions of both GHGs and conventional pollutants. If electricity prices increase as a result of regulations and an equivalent price is not reflected in the price of natural gas and home heating oil, the price disparity may discourage electrification of the building sector and many industries. Electrification of these sectors will be required to achieve carbon neutrality by the second half of this century, as required to conserve and maintain a stable climate.

As noted above, interstate emissions trading with uniform pricing is one of the mechanisms necessary to prevent leakage. The Pennsylvania Uniform Interstate Air Pollution Agreements Act¹⁸¹ authorizes participation in interstate trading programs. That Act encourages DEP to coordinate and cooperate with "State and local authorities of other states affected by airsheds or regional air masses lying partly within another state or states, or moving between or among this State and another state or states."¹⁸² This statute, along with the broad authorizations in the APCA to address air pollution and to implement the Clean Air Act as interpreted by Pennsylvania courts appears to authorize Pennsylvania to develop and participate in interstate

¹⁸¹ 35 P.S. §§ 4101-4106.

¹⁸² *Id.* at § 4103(a); *see also id.* § 4101 (making it the policy of Pennsylvania to encourage interstate cooperation and agreements).

trading arrangements that would put a price on carbon. These include RGGI,¹⁸³ the broader programs being implemented by California, Quebec and Ontario, the trading-ready program being developed by Virginia, or a similar interstate or regional arrangement involving emissions trading or other mechanisms to put a price on GHG emissions or otherwise limit those emissions.¹⁸⁴

Under RGGI, allowances are auctioned by each state and a portion of the auction revenue (or a portion of the allowances themselves) must be devoted to strategic energy purposes.

Although the APCA lacks specific authorization for auctions of emissions rights, a partial

¹⁸³ Joining or leaving RGGI is arguably an action within the purview of the governor's executive power, even without other authority. Both the Governor of New York, in joining RGGI, and the Governor of New Jersey, in leaving RGGI, relied on their executive power. See, e.g., *Thrun v. Cuomo*, *supra* note 138; *In re Regional Greenhouse Gas Initiative*, No. A-4878-11T4 (N.J. Super. Ct., App. Div. March 25, 2014) (holding that notice and comment rulemaking is required before withdrawing rules implementing RGGI in response to Governor Christie's withdrawal from RGGI). The Governor of Virginia has issued an Executive Order directing the creation of a cap-and-trade program for the electricity sector. Executive Directive 11 (2017), available at <http://governor.virginia.gov/media/9155/ed-11-reducing-carbon-dioxide-emissions-from-electric-power-facilities-and-growing-virginias-clean-energy-economy.pdf>. Pursuant to that Order, the State has published a proposed regulation that mirrors the RGGI program and would allow trading even without Virginia joining RGGI. 9VAC5-140. Regulation for Emissions Trading Programs (adding 9VAC5-140-6010 through 9VAC5-140-6430), 34 VA. Reg. 924 (Jan. 8, 2018).

¹⁸⁴ See 35 P.S. § 4103(b). The Act imposes limitations on such agreements, requiring that DEP not delegate its enforcement authority to other states or agencies and limiting appropriation authority and authority to pledge credit. 35 P.S. § 4105. However, these limitations would not prevent participation in RGGI or similar interstate trading programs, since these programs are premised on voluntary coordination where each state relies upon its own statutes and regulations and each state enforces its own requirements.

The APCA also includes a provision authorizing the DEP to cooperate with other states and interstate agencies to control and prevent air pollution, and "where appropriate formulate interstate air pollution control compacts or agreements for the submission thereof to the General Assembly." 35 P.S. § 4004(24). Although this provision might be read to suggest that legislative authority is necessary before Pennsylvania could join an interstate trading program and adopt any necessary regulations to implement the program, it seems directed to agreements that are binding on the state and therefore require Congressional consent under the compacts clause of the U.S. Constitution. U.S. Const. art. I § 10 cl. 3. The trading regimes being independently implemented by states are implemented through a non-binding memorandum of understanding under which each state enacts and enforces its own laws and regulations, and therefore likely would not require Congressional approval under the Compacts Clause or require legislative approval under the APCA. See *United States Steel Corp. v. Multistate Tax Commission*, 434 U.S. 452, 470 (1978) (holding that creation of an "active administrative body" without Congressional consent did not "enhance the political power of the member States in a way that encroaches upon the supremacy of the United States" and therefore did not violate the Compacts Clause, based upon the following factors: (1) there were no features that, on their face, infringed on the supremacy of the United States; (2) the Compact did not authorize any of the member states to "exercise any powers they could not exercise in its absence"; (3) there was no "delegation of sovereign power to the Commission" and the states retained "complete freedom to adopt or reject the rules and regulations of the Commission"; and (4) each state was "free to withdraw at any time"); *Northeast Bancorp v. Bd. of Governors of Fed. Reserve Sys.*, 472 U.S. 159 (1985).

allowance auction has been implemented in Pennsylvania in the past, since the Title IV program under the federal Clean Air Act allocates some allowances by auction.¹⁸⁵

More significantly, the *PEDF* decision suggests that an auction with a reserve price is constitutionally required to allow the beneficiaries of the trust to benefit from the program. As discussed below, allowances may be considered to represent ecosystem services in that they represent the limited remaining ability of the atmosphere to absorb additional GHG pollution without disruption. Because the revenues would derive from the efforts to preserve the environmental trust, they could be considered renewable ecosystem services, similar to those produced by forests in producing timber. *PEDF* applied the law of trusts to invalidate a distribution of trust principal but recognized that trust income from renewable services could be moved to the General Fund. The rule of prudence requires that a trustee manage a trust with the prudence that a reasonable person would manage his or her own affairs, considering the needs of beneficiaries, the need to preserve the corpus the trust, and the amount and regularity of income.¹⁸⁶ Although the rule of prudence allows considerable discretion in managing a trust, it does not allow the trustee to give away either the principal or the income with no benefit to the beneficiaries or to favor one beneficiary over the other. Thus, the state auctions timber, minerals and other renewable and non-renewable resources produced by state forests. For this reason, an auction of GHG emissions allowances is not only authorized but arguably required in the absence of another rationale, such as preventing leakage.

¹⁸⁵ 42 U.S.C. § 7651*o*.

¹⁸⁶ RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); *see also Harvard College v. Amory*, 26 Mass (9 Pick) 446 (1830).

VII. ISSUES RELATING TO POSSIBLE LIMITATIONS ON AWARD OF ALLOWANCES AND USE OF REVENUES

PEDF restricted the General Assembly's ability to direct lease revenues to the unrestricted general fund based on the Court's conclusion that the Constitution required the principal of the environmental trust created by the ERA to be retained for the purposes set forth in the Constitution. We have argued that *PEDF* restricts the Commonwealth's ability to award allowances without recovering income for the beneficiaries and that the ERA both authorizes an auction with a reserve price based on the social cost of carbon and, in circumstances, requires this result. In this section, we address the limits of these requirements with respect to GHG emissions allowances and proceeds from the auction or sale of those allowances.

The law of trusts does not put handcuffs on a trustee. Rather, it imposes a rule of prudence, requiring that a trustee manage a trust with the prudence that a reasonable person would manage his or her own affairs, considering the needs of beneficiaries, the need to preserve the corpus the trust, and the amount and regularity of income.¹⁸⁷ Rather than being considered the proceeds from the liquidation of the principal of the trust, auction revenues are more properly considered to constitute income from measures to manage the trust corpus, much like income from sustainable harvest of timber; therefore, the proceeds can be used for any purpose, provided the use accrues to the benefit of the trust's beneficiaries. Likewise, the trustee need not receive income equal to the social cost of carbon in all instances regardless of the outcome, but may award allowances for a lesser cost or even no cost where the Commonwealth, as a prudent business person, could conclude this would serve the best interest of the beneficiaries. For example, awarding allowances at a lower cost or no cost would be prudent where necessary to prevent leakage that would drive business from the Commonwealth without achieving a

¹⁸⁷ RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); *see also Harvard College v. Amory*, *supra* note 186.

necessary reduction in GHG emissions. However, these situations should be treated as exceptions to the general rule and should be applied only as prudence demands.

A. PEDF's Implications with Respect to Use of Revenues from a GHG Emissions Auction

Questions have arisen as to whether *PEDF* has implications with respect to potential mechanisms to put a price on carbon. Without additional legislation, proceeds from an auction would be deposited in the General Fund. If *PEDF* restricts use of these revenues, the decision would remove a significant incentive for Pennsylvania to impose a price on carbon through an allowance auction. The proceeds of a carbon tax or auction could be used to promote a variety of important fiscal objectives,¹⁸⁸ and the current and the on-going budget crisis in Pennsylvania has created a very significant incentive for the General Assembly to adopt legislation establishing a GHG emission fee or auction and trade program or to allow the EQB's adoption of regulations establishing an auction, so as to generate revenue to fill the gap in the General Fund.

PEDF should not restrict the use of revenues from a GHG auction. The analysis of this issue differs according to how one views the auction. In this regard, there are two ways of looking at the auction of allowances. On the one hand, one can view the auction of allowances as a regulatory mechanism to reduce GHG emissions. On the other hand, one can view the auction of allowances as a charge for the sale of a public natural resource, either: (1) the air, (2) the limited capacity of the atmosphere to absorb GHG emissions without disrupting the climate, or (3) the costs that will be imposed on future generations from carbon dioxide emissions (*i.e.* "ecosystem services"). In both economic and legal theory, the auction has characteristics of both a regulatory mechanism and a charge. However, because differing legal and political

¹⁸⁸ See, McKinstry, Rose & Ripp., *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania*, *supra*, note 102, 14 Widener L.J. at 218-221.

considerations apply depending upon whether the fee/auction is characterized as a regulatory mechanism or as a fee for ecosystem services, we will address the considerations applicable to each rationale separately.

If the auction is examined through the regulatory lens, *PEDF* should have no impact on use of the revenues. An auction of allowances is simply one of several regulatory mechanisms to reduce emissions. In this way it is no different from a command-and-control emission limit.¹⁸⁹ Under this lens, the auction is a mechanism that acts to preserve the corpus of the trust created by the ERA and its imposition is therefore consistent with the trustee's duty to preserve the corpus of the trust and there should be no restrictions on the use of revenues.

Characterizing the auction/fee as purely a regulatory measure, however, has both legal and political disadvantages. Treating the auction as purely a regulatory measure under the APCA might undermine the argument for an auction with a meaningful reserve price. The APCA lacks specific legislative authorization for an auction or a reserve price, so that regulations establishing an auction and a reserve price without further action by the General Assembly depend upon authorization under the ERA. Treating the auction as purely a regulatory mechanism may also undermine the argument that the reserve price should be set equal to the social cost of carbon rather than the far lower reserve prices seen in the California and RGGI programs, which are lower than the marginal cost necessary to prevent further climate disruption.¹⁹⁰ Perhaps more significantly, characterizing the auction as a regulatory mechanism rather than the purchase of ecosystem services could be less palatable to those conservatives who

¹⁸⁹ A fee and a cap-and-trade program with an auction differ from each other only in that, under a fee approach, the market will determine the emissions levels that will be achieved, and, under an auction approach, the market will determine the amount of a fee. *Id.* Both RGGI and California use an auction with a reserve price, where the reserve price determines the emissions reductions if the cap is too lenient to drive emissions reductions.

¹⁹⁰ The social cost of carbon represents the marginal value of the damage to natural resources that would occur under higher risk scenarios. It is, therefore, tied to the value of the constitutionally protected resources and represents the minimum amount that should be charged to assure that the trust receives an adequate value from the sale.

support climate action. The conservative case for a carbon fee is based on the principle that GHG emitters should be charged a fee for the cost of the risk of environmental or other damage that will arise from use of the environment/ecosystem services, rather than the notion that regulation should be expanded.¹⁹¹

On the other hand, if one looks at the revenues from the GHG fee/auction as payments for ecosystem services, there is a risk that arguments will be raised that these revenues cannot be devoted to the General Fund to help address Pennsylvania's budget crisis but must be retained as part of the corpus the ERA trust. Although there is a risk that this argument may be raised, close examination of the *PEDF* decision and the facts presented there suggest that this argument should not prevail. Even if, and to the extent it does, it would not require retention of all revenues or even any revenues.

The legislation at issue in *PEDF* diverted revenues that had been devoted to the maintenance of the corpus of the trust away from that purpose and impaired DCNR's ability to maintain parks and forests, which also constitute the corpus of the trust. In contrast, the establishment of a GHG auction and generation of revenues would not divert any existing, similarly committed revenues away from the trust or impair the Commonwealth's ability to maintain and conserve public natural resources. It would instead create new revenues by a mechanism that would also maintain and conserve the corpus of the trust.

It should be noted that, even if the fee/auction is viewed as *both* a regulatory mechanism and the sale of a natural resource, as long as the revenue does not deplete or impair the trust

¹⁹¹ See, e.g., Marc Gunther, *Climate Converts: The Conservatives Who Are Switching Sides on Warming*, YaleEnvironment360 (Mar. 30, 2017), available at <http://e360.yale.edu/features/climate-converts-the-conservatives-who-are-switching-sides-on-climate-change>; Jerry Taylor, *The Conservative Case for a Carbon Tax*, Niskanen Center (March 23, 2015), available at <https://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf>; Bob Litterman, *What is the Right Price for Carbon Emissions*, 36 REGULATION 38 (Summer 2013), available at <https://object.cato.org/sites/cato.org/files/serials/files/regulation/2013/6/regulation-v36n2-1-1.pdf>.

corpus, the trustee should be entitled to distribute income to the beneficiaries. In *PEDF*, the Commonwealth was selling non-renewable resources, which depleted the capital of the trust, which ought not be depleted. A GHG auction preserves the capital and produces the equivalent of dividend income. Since the application of the income will benefit the beneficiaries, that income could go to the General Fund. In fact, because the social cost of carbon is set at the marginal cost/value of avoided future damage to trust resources, all revenues equal to the social cost of carbon come from measures to preserve the trust principal and can be considered income. In this sense, the revenues are more like revenues from the sale of renewable resources such as sustainably managed timber or sustainably managed game, which represent trust income rather than trust principal. As long as the principal is maintained, and income is provided for the benefit of the beneficiaries, the rule of prudence should be satisfied.

B. PEDF's Implications with Respect to Award of Allowances

We have made the case that allowances, as attributes of the environmental trust, should generally be auctioned, just as other sustainable products of the environmental trust, such as sustainably produced timber, should be auctioned. We also argue that the auction should include a reserve price based on at the social cost of carbon to assure that the measures undertaken in response to the cap-and-trade program will include the measures necessary to prevent human-caused climate disruption. This does not require an ironclad rule. Under the rule of prudence applicable to trustees, certain exceptions may be appropriate to prevent or moderate leakage, while still preserving the corpus of the trust and producing a stream of income to the trust's beneficiaries.¹⁹²

¹⁹² RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); *see also Harvard College v. Amory*, *supra* note 186.

First, under the rule of prudence, in order to prevent leakage, Pennsylvania could allow distribution of allowances free of charge or at a reduced rate to industries subject to international or interstate competition where necessary to preserve those industries' international markets. Because the allowances will have a value equal to or greater than the reserve price in the auction, these industries will still have strong incentive to reduce emissions and rely on electricity rather than fossil fuels. However, they will be able to price their products competitively and they will no longer have an incentive to move their operations to a state or nation without regulation where those operations would result in leakage. This approach will need to be employed cautiously, so as to avoid perverse results.¹⁹³

Second, it may be appropriate to provide for a lower reserve price initially if warranted to assure adequate long-term income. The RGGI and California-Quebec-Ontario programs all include significantly lower auction minimum reserve prices,¹⁹⁴ as well as cost containment reserves that provide for the release of additional allowances if allowance prices exceed a value significantly lower than the social cost of carbon.¹⁹⁵ The proposed Virginia program closely follows RGGI. If the Pennsylvania reserve price is set too high and trading is allowed, this may reduce the number of allowances that buyers will purchase from Pennsylvania, significantly depleting the income to be received by the trust beneficiaries. Therefore, Pennsylvania could

¹⁹³ For example, in industries outside the electricity sector with international markets (such as steel), it may be worthwhile to award free or reduced cost allowances based on the prior year's unit production, with the number of free allowances per unit of production decreasing over time. That approach would have perverse results, however, if it were applied to the electricity sector, since it would encourage production even where that production would increase overall emissions. In the electricity sector, an allowance would represent income and, if tied to production, would allow a lower bid, removing the incentive to switch dispatch away from units with higher emissions. Therefore, industry structure should be carefully assessed and exceptions to the general rule allowed only where strictly warranted.

¹⁹⁴ Cal. Reg. tit. 17, § 95911(c); RGGI Model Rule § XX-1.2 (definition of "minimum reserve price"), *available* at https://rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf.

¹⁹⁵ Cal Reg. tit. 17, § 95913; RGGI Model Rule §§ XX-1.2 (definition of "CO₂ cost containment reserve allowance or CO₂ CCR allowance"), XX-9.2(b), *available* at https://rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf.

initially establish a reserve price more consistent with California's reserve price. All of the other state trading programs call for reductions in the caps, increases in the reserve prices, and increases in the triggers for releasing cost containment reserves, such that the prices will approach the social price of carbon.¹⁹⁶ Moreover, because the social cost of carbon increases, accepting a lower price today will mean that the price to be paid eventually will be higher.¹⁹⁷ Thus, the rule of prudence provides the Commonwealth with flexibility.

VIII. BLOCKING ACTION BY THE GENERAL ASSEMBLY PREVENTING IMPLEMENTATION OF GHG REGULATION

Perhaps the clearest implication of the *PEDF* and *Robinson Township* decisions is that Article I, § 27 may be relied upon to invalidate actions by the General Assembly aimed at blocking the implementation of regulations establishing meaningful limits on GHG emissions. The General Assembly can exercise a variety of powers to attempt to block the adoption of regulations limiting emissions of GHGs and having the effect of putting a price on those emissions.¹⁹⁸ The General Assembly could also seek to block those regulations through its

¹⁹⁶ Arguably, the RGGI and California-Quebec-Ontario reserve prices are currently too low to drive necessary reductions, since the social cost of carbon is based on the economically efficient marginal cost of the damage averted. Because the allowance prices obtained in RGGI auctions have been insufficient even to prevent existing nuclear facilities from premature closure, New York promulgated regulations requiring that electricity distribution companies purchase ZECs based on the social cost of carbon from existing nuclear generation units to put a sufficient value on their emissions free electricity. The New York Clean Energy Standard upheld in *CCE v. Zibelman*, *supra* note 126, was designed to further New York's policy to reduce GHG emissions by preserving existing emissions free electricity provided by New York's nuclear plants and by encouraging the development of additional emissions-free electricity from renewable generation sources. It was motivated, in part, by the announcements that the Fitzpatrick and Ginna nuclear plants would close due to financial stresses caused by low electricity prices created by the oversupply of natural gas from shale gas resources, as well as by the failure of the RGGI prices to impose sufficient costs for CO₂ emissions from fossil-fired electricity generation.

¹⁹⁷ Increasing prices in later years, when there is a lower cap, will help maintain total revenues.

¹⁹⁸ For example, the General Assembly might adopt legislation such as the Pennsylvania Greenhouse Gas Regulation Implementation Act, 71 P.S. 1362.1 *et seq.*, where the General Assembly required legislative review of Pennsylvania's submission of its implementation plan for the Clean Power Plan and, unless the Act is construed to make it constitutional, provided a possible mechanism for an unconstitutional one-house veto of the plan. *See*, Pa. Const. art. I, §27, art. IV, §§ 9,15 (requiring passage of laws, resolutions and votes by both houses and presentment to the governor), *Commonwealth v. Sessoms*, 516 Pa. 365, 532 A.2d. 775 (1987) (invalidating legislative veto); *MCT Transportation, Inc. v. Philadelphia Parking Auth.*, 60 A.3d 899 (Pa. Commw. Ct. 2013) (holding that approval of a rule under a similar procedure did not constitute valid legislative action consistent with separation of powers

appropriations power or by adopting legislation repealing the regulations and removing the EQB's authority to regulate.

Robinson Township invalidated legislation that removed powers from municipalities that allowed those municipalities to exercise their duties as trustees. *PEDF*'s holding makes it clear that the Commonwealth's duty as a trustee applies to all types of actions, including appropriations. *PEDF* could be relied upon to invalidate the General Assembly's action, just as the transfer of funds through the budget process was invalidated in *PEDF*. Even the *Funk* decision recognized that the ERA could be used to invalidate legislation that impaired rights guaranteed by the ERA.¹⁹⁹

Legislation blocking a regulation required to maintain and conserve a stable climate, repealing such a regulation, replacing a regulation with a weaker version that did not maintain and conserve a stable climate, or removing the power to regulate GHGs from the EQB would all likely be an unconstitutional violations of the ERA under the reasoning in *PEDF* and *Robinson Township*.

IX. CONCLUSION

The precise contours of the broader application of Article I, § 27 rights enunciated in *Robinson Township* and *PEDF* to the regulation of GHG emissions and the necessity to put a price on those emissions have not been litigated. Nevertheless, those opinions provide substantial support both for meaningful regulation of GHG emissions by Pennsylvania and for regulation that puts a meaningful price on emissions sufficient to put the Commonwealth on a

principles and specifically disapproving of the process as a one-house veto). The General Assembly might also attempt to invalidate a regulation pursuant to the process prescribed in the Regulatory Review Act, 71 P.S. §§ 745.1–745.15. Because that mechanism requires presentment to the governor, this mechanism would not occur unless the governor's veto were overturned by a two-thirds majority.

¹⁹⁹ *Funk* cited *Cnty. Coll. of Delaware Cnty. v. Fox*, 20 Pa. Cmwlt. 335, 342 A.2d 468, 473 (1975) for the proposition that “the ERA “could operate **only to limit such powers as had been expressly delegated by proper enabling legislation.**” 144 A.3d at 249 (emphasis in *Funk*).

path to deep decarbonization and modernization of its economy. If these decisions are extended to support an interpretation of Article I, § 27 to mandate regulation of GHS as suggested here that extension can have international significance. Many states and nations that have similar provisions in their constitutions or through the public trust doctrine, and the scholarly constitutional jurisprudence of the Pennsylvania Supreme Court may be persuasive to these other jurisdictions.