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Externalities as the status quo: Federal application of environmental charges in the United States

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Abstract

Conceptualized as early as 1920 by English economist Arthur Cecil Pigou, but not formalized until later work in the 1970s and 1990s, "environmental charges" suggest the revenue burden of governance could be shifted from economic "goods" to environmental "bads." While their association with Pigouvian taxes would suggest that environmental charges are applied as a policy instrument to encourage the reduction or elimination of environmental externalities, their application at the federal level in the United States suggests this is not the case. As part of a review of environmental charges in the United States, this paper postulates that federally applied environmental charges accept environmental externalities as the status quo and are instead intended to recover the government's cost in addressing the environmental externality in conformance with the polluter pays principle.

KEYWORDS
environmental charges, externalities, Pigouvian taxes, polluter pays principle, United States

1 | INTRODUCTION

Controlling negative environmental externalities from industrial activities, such as noxious smells from nearby leatherworks, has been a challenge for governments dating back to medieval times (see Zupko & Laures, 1996). One proposed means of addressing these environmental externalities has been through the use of *environmental charges*, a general term for charges (e.g., taxes or fees) accessed on activities that produce negative environmental externalities (Repetto et al., 1992). Ideally implemented, environmental charges would recover the costs associated with the externality and reduce the activity producing said externality; effectively acting as a form of a Pigouvian tax. In practice, the limited number of policies implemented at the federal level in the United States that may be classified as an environmental change appear to be focused on cost recovery, effectively acting as a continuation of the "polluter pays" principle. This paper examines the current landscape of federal environmental charges in the United States and suggests that their structure (i.e., the plain text reading of the statutes) offers limited support for arguments that they are intended to be Pigouvian in nature. Indeed, their design suggests that they are intended to accept the environmental externality as the status quo and merely seek to recover the government's cost in addressing the externality.

The idea that federally enacted environmental charges in the United States are intended for cost recovery, and not to discourage pollution, has been previously suggested by Fullerton (1996):

> … in general, U.S. policy has not used "environmental taxes" for incentives to discourage pollution. The United States has no tax on vehicle emissions, no tax on smokestack emissions, and no tax on the generation or disposal of waste. Instead, actual policy has put great weight on the second objective – to collect from those responsible for pollution. (p. 35)

Fullerton then proceeds to build upon this argument by noting that if the government's objective is cost recovery, then a small tax broadly applied could achieve the same goal without the administrative overhead associated with individual taxes. However, this stands in contrast to arguments that environmental charges act as a Pigouvian tax (or are Pigouvian in nature) even when not explicitly constructed as

such (Scharff, 2018), or that environmental charges have been constructed in a Pigouvian tradition (Banzhaf, 2020; Barthold, 1994).

Since the 1996 publication of Fullerton's work, the landscape of "explicit" environmental taxes (i.e., labeled by the Internal Revenue Service as such) has contracted, but the premise appears to be unchanged. This paper will build upon the work of Fullerton (1996) by taking a closer look at policies that Fullerton identified as "implicit environmental taxes," reinterrogates their inclusions alongside a comprehensive list of candidate policies, and suggests a revised list of federal environmental charges. Following this examination of the current policy landscape, the argument that environmental charges act as a Pigouvian tax is reexamined before reasserting that they are only intended for cost recovery.

2 | BACKGROUND

2.1 | Development and use of environmental charges

English economist Arthur Cecil Pigou (1877–1959) appears to have been the first to make the connection between negative environmental externalities, the impact to the public, and the possibility of recouping those externalities through the use of taxation in "The Economics of Welfare" (Pigou, 1929). However, Pigou's argument was predicated solely upon the presumption that society (i.e., individuals and businesses) is damaged by these externalities as opposed to the environment. One important characteristic of negative externalities is that they result in a clear financial burden (i.e., the cost of doing extra laundry), whereas the financial value of a positive externalities may be difficult or impossible to access financially. Key to Pigou's work is the suggestion that in order to correct the social cost of the negative externalities produced, the government can intervene using taxation to ensure that the cost is corrected (Pigou, 1929).

The environmental movement of the 1960s, and accompanying development of environmental economics, resulted in both the reexamination of Pigouvian taxes and the formulation of alternatives such as the Coase theorem (Pearce, 2002). In "The Problem of Social Cost", Coase (2013) notes that externalities have two possible solutions. The first draws upon the work of Pigou in the form of taxation or regulation of a polluter, while the second suggests that negotiations between parties in the context of well-defined property rights can lead to a Pareto optimal allocation of resources. Effectively suggesting that paying the polluter not to pollute may also be an effective means of addressing negative externalities. The construction of this argument would later allow for the development of free market approaches to addressing negative externalities (Pearce, 2002).

By the 1970s, the open question of how to use Pigouvian taxes to reduce pollution was solved by Baumol (1972), who observed that a combination of setting appropriate pollution standards along with setting taxes (or charges) in conjunction with the pollution levels would result in an acceptable level of pollution, regardless of the economic motivations of polluters. Baumol and Oates (1975) built upon the work of Baumol (1972) to argue in support of policymakers intervening in the maintenance or improvement of environmental conditions by offering a theoretical analysis of externalities, based in part upon the work of Pigou, and suggesting various environmental taxes and subsidies as possible instruments for policymakers. However, the scholarship of the era was balanced by concerns that environmental taxes were limited as long-term solutions to environmental externalities (Carlton & Loury, 1980) and their application appeared sensitive to the size of the industry generating the pollution (Burrows, 1979).

The 1990s saw a resurgence of a broad interest in environmental charges triggered by environmental advocacy groups shifting to "pragmatic strategies" (Coglianese, 2001, p. 107) for environmental policies, such as advocacy of emissions trading as a market-based approach. One prominent advocate was the World Resources Institute, a nonprofit research organization based in Washington, D.C., which released a series of publications exploring tax policy and economic incentives to reduce pollution and excessive energy use (Repetto et al., 1992). World Resources Institute publications advocated for the adoption of environmental charges, which they broadly defined as fees or taxes on environmentally damaging activities (e.g., release of water effluents) or products that entail an environmental cost (e.g., gasoline taxes; Repetto et al., 1992). Their work argued that "Switching some of the revenue burden from taxes on income, employment, and profits to environmental charges on resource waste, collection, and pollution would yield double economic benefits." (Repetto et al., 1992, p. 11). In applying the hypothesized double-dividend for environmental levies (e.g., taxes or fees), the authors suggested that: "Unlike command-and-control regulations, [environmental charges] provide market signals that allow firms and households to respond in innovative and efficient ways." (Repetto et al., 1992, p. 7). Similar arguments were shared by Hawken (2013) who noted that environmental charges, in the form of green taxes, "[are] not to raise revenue for the government but to provide participants in the marketplace with accurate information about cost." (p. 144) This argument was further expanded by suggesting that the public generally preferred the use of economic incentives (i.e., environmental fees) to entice compliance with environmental goals as opposed to command and control regulation and the limiting factor in their use was the lack of experience applying them by policy makers (Dower & Repetto, 1994).

Despite the advocacy for environmental charges in the 1990s, the early 2000s through 2010s were defined by a shift to evaluating what had previously worked for environmental movements and regulations (Coglianese, 2001; Cranor, 2017; Markell, 2010). In critically reviewing existing regulations, authors argued that while some programs may have represented major advancements for environmental regulation in the United States, reform was needed to address shortcomings (Daley & Layton, 2004; Greenwood, 2009). Advocacy for environmental charges was also balanced by critical examinations of possible shortcomings inherent in how the taxes are implemented (Fleischer, 2015), and observations that public support for increased

taxation is quite tenuous (Agrawal et al., 2010; Duncan et al., 2020; Kallbekken & Sælen, 2011). Legal scholarship has highlighted that pricing environmental externalities is challenging under state laws given their diversity and possible resistance to the enactment of any new taxation (Scharff, 2018). Furthermore, the idea of an inherent "double dividend" was challenged with economists noting that while environmental taxation usually leads to positive environmental impacts (i.e., environmental dividends) general economic benefits were not assured (Freire-González, 2018).

2.2 | Environmental charges, taxes, or fees?

The terms *green fees*, *green taxes*, *environmental charges*, and *environmental taxes* are commonly (and confusingly) used in the context of *environmental charges* (see Hoffmann & Boyd, 2006; KPMG, 2017; Repetto et al., 1992; Williams, 2016). However, the Organization for Economic Co-Operation and Development (OECD, 2011) uses a strict definition for *taxes*, "any compulsory unrequited payment to general governments levied on tax-bases" (p. 15), versus *fees* or *charges*, "requited payments to government; … levied more or less in proportion to services provided" (p. 15). In the context of their implementation in the United States, *taxes* at the federal level must be legislated by Congress and may be used to fund any governmental function (Repetto et al., 1992; Spitzer, 2002). In contrast, *fees* are largely intended to recover the government's cost in providing goods or services (Scharff, 2018; Spitzer, 2002). Fees also typically have a voluntariness to them in that an individual or business should be able to avoid the fee by not engaging in the relevant activity (Scharff, 2018).

The implementation of environmental charges is nuanced, and while several different environmental policy instruments can be classified as an environmental charge, taxes or fees are typically the primary levy. Environmental taxes (or *green taxes*), impose a tax that is intended to reduce the production of an environmental externality when implemented in a corrective fashion, while at the same time generating revenue for the government (Williams, 2016). Carbon taxes that impose a tax upon the combustion of carbon-based fuels (Ramseur & Leggett, 2019), are a canonical example of an environmental tax. In contrast, fuel taxes that intended to fund repairs and improvements to transportation networks (Agrawal et al., 2010), are not since they are designed to reduce fuel consumption resulting in environmental benefits (Kallbekken & Sælen, 2011). Environmental fees (or *green fees*) are typically assessed in the context of a service being rendered, such as the emission of some form of pollution into the environment (Hoffmann & Boyd, 2006). An example is the intuitively named emissions fees that are assessed on the discharge of pollutants into the environment (e.g., emissions from a smokestack; Repetto et al., 1992). However, since the intent of this paper is not an examination of the implementation minutia, the term *environmental charge* is being used to refer to taxes or fees intended to capture or recover the costs associated with the environmental externalities (e.g., clean-up or safe disposal of waste).

3 | EXAMINING ENVIRONMENTAL CHARGES

3.1 | Approach

Presuming that an environmental charge must have a clear and specific connection to the environment or an environmental externality, a two-point test is used to allow for a board an examination of the current policy landscape:

1. Is there specificity in how the charge (i.e., tax or fee) is applied?
2. Are the proceeds used in connection to the environment?

The first question is intended to constrain a policy to a specific and targeted environmental purpose and exclude broadly applied taxes (e.g., income taxes) whose collection may serve an environmental purpose though General Fund appropriations (e.g., pollution clean-up by the Environmental Protection Agency [EPA]). The second question interrogates how the proceeds are being used in connection to the environment, namely that there is a defined purpose of for environmental charges in capturing or recovering costs associated with environmental externalities.

With these criteria in mind, possible environmental charges were identified based upon their prior classification as such in literature or government sources (see Barthold, 1994; Fullerton, 1996; KPMG, 2017), coupled with a keyword search and vetting for relevance of the relevant environmental statutes codified as part of the U.S. Code or U.S. Code of Federal Regulations (CFR). This accounted for the majority of policies selected for closer examination, barring the Nuclear Waste Fund Fee (NWFF), which was included due to the inherent negative environmental impact that high-level radioactive waste can have upon the environment (Holt, 2018). Government sources (i.e., government statutes or reports) where then used as the primary source to examine how the charges were accessed and used. This process resulted in a total of 15 policies identified as possible environmental charges (Table 1); and after closer examination six were identified as satisfying both criteria for an environmental charge (Table 2).

3.2 | Initial selection and evaluation

Preliminary evaluation of possible environmental charges began by first identifying various policies that have previously been discussed in the context of environmental charges or situate themselves within an environmental context in the statute (Table 1). Upon examination of the policies, the six were rejected as they do not meet the criteria outlined in in Section 3.1 and will be examined in the next section. This is followed by an examination of the three policies that have provisions that partially meet the criteria (Section 3.2.2), finally, the six that meet the criteria are examined in Section 3.2.3.

TABLE 1 Policies considered versus criteria for an environmental charge

	Specificity?	Use of proceeds?	Active
Aviation Taxes and Fees	Yes, on air transportation ticket sales as well as aviation fuel.	No, funds are deposited in the Airport and Airway Trust Fund which has only nominal environmental connections.	Yes
Coal Excise Tax	Yes, assessed on mined goal for sale or use.	Yes, funds benefits for coal miners affected by pneumoconiosis not cared for by responsible parties.	Yes
Corporate Environmental Income Tax	No, broadly assessed in corporate income.	Yes, funds are deposited in the Superfund.	No
Gas Guzzler Tax	Yes, vehicles that do not meet fuel economy standards.	No, funds are remitted to the General Fund.	Yes
Highway Trust Fund	Yes, largely financed by taxes on transportation fuels.	No, funds are primarily intended for the repair maintenance, and construction of roads.	Yes
Inland Waterways Trust Fund	Yes, limited to diesel fuel intended for use on commercial waterways.	No, funds are primarily intended for repair and maintenance, although some may be used to rehabilitate inland waterways.	Yes
Land and Water Conservation Fund	Partial, appropriations coupled with motorboat fuel taxes and revenues from oil and gas leases are used to meet $900 million yearly funding target.	Yes, funds are used for the acquisition of land intended for outdoor recreation by federal agencies and grants to state governments for the same.	Yes
Leaking Underground Storage Tank Trust Fund	Yes, tax is assessed on gasoline.	Yes, funds are deposited in the trust fund and used for the clean-up of leaking underground storage tanks.	Yes
Nuclear Waste Fund Fee	Yes, assessed on per kilowatt basis for power generated in civilian nuclear power plants.	Yes, long-term disposal of high-level radioactive waste.	No
Oil Spill Liability	Yes, assessed on barres of petroleum sold.	Yes, funds prevention, detection, and clean-up of leaking underground petroleum storage tanks.	Yes
Ozone Depleting Chemicals	Yes, assessed on chemicals based upon their physical characteristics.	No, funds are deposited in the general fund.	Yes
Sport Fish Restoration and Boating Trust Fund (formally Aquatic Resources Trust Fund)	Partial, proceeds come from a collection of excise taxes that include fuel, sport fishing equipment.	Partial, the trust fund has two accounts, one of which is allocated toward sport fish restoration.	Yes
Superfund Excise Taxes	Yes, assessed on petroleum and chemical feedstocks.	Yes, clean-up of hazardous waste sites.	No
Toxic Substances Control Act (TSCA) Administration Fees	Yes, limited to chemical manufactures and importers subject to TSCA provisions.	Yes, funds the operations of Office of Pollution Prevention and Toxics	Yes
Wildlife Restoration Trust Fund	Partial, limited to firearms, ammunition, and archery equipment.	Partial, funds primarily used for wildlife restoration programs but also support hunter safety programs.	Yes

Note: The "Specificity" and "Use of Proceeds" columns correspond to the two criteria for an environmental charge while the "Active" column indicates if the policy is still active as of the calendar year 2020.

3.2.1 | Excluded policies

In the analysis performed by Fullerton (1996), Aviation Taxes and Fees and various charges related to the Highway Trust Fund were included as implicit environmental taxes. However, while they may have some nominal environmental effects, both are primarily intended to support transportation infrastructure. Aviation Taxes and Fees, predominately on passenger tickets and aviation fuel, are used to fund the Airport and Airway Trust Fund (26 U.S. Code § 9502) which in turn is used for operations and maintenance as well as funding the Federal Aviation Administration (Tang & Elias, 2017).[1] Similarly, federal taxes on gasoline and diesel fund the Highway Trust Fund (26 U. S. Code § 9503) which in turn is used to finance infrastructure and public transportation programs (Kirk & Mallett, 2020; Lowry, 2016).[2] The Inland Waterways Trust Fund (26 U.S. Code § 9506) has a similar implicit environmental connection leading it its identification as a green tax (KPMG, 2017); however, it would more appropriately be classified as a transportation tax with nominal environmental effects. This is due to the financing of the trust fund by a fuel tax on commercial barge fuel, and these funds are in turn is used for operations and maintenance expenditures connected to inland waterways (Stern, 2014).

Contrasting policies focused supporting transportation infrastructure, the Gas Guzzler Tax (26 U.S. Code § 4064) offers a clear

TABLE 2 Identified environmental charges, the externality they address, and the nature of their cost recovery

	Externality	Cost recovery?
Coal Excise Tax	Damage to human health	Partial and Preemptive, mine operators must carry insurance to respond to miner claims, but the government will intervene with a responsible party cannot be found.
Leaking Underground Storage Tank Trust Fund	Ground pollution	Partial and Preemptive, funds are used for prevention, detection, and clean-up of leaks.
Nuclear Waste Fund Fee	High-level radioactive waste	Complete, statute allows for fees to be adjusted to ensure that the fund covers the costs of high-level radioactive waste disposal.
Oil Spill Liability	Ground and/or water pollution	Preemptive, trust fund is used to respond to spill, but responsible party is targeted for cost recovery.
Superfund Excise Taxes	Polluted sites	Partial and Preemptive, significant contributions were made to the Superfund for clean-up operations.
Toxic Substances Control Act Administrative Fees	Potential impact to the environment and human health	Preemptive, amount collected is limited to a fixed percentage of the costs associated with running Office of Pollution Prevention and Toxics.

connection to the environment and appears to be Pigouvian in design with the tax increasing as the fuel economy decreases. The Gas Guzzler Tax originated with the Energy Tax Act of 1978 and targets certain passenger vehicles whose fuel economy is under 22.5 miles per gallon (Guenther, 2006).[3,4] Passenger vehicles under the fuel economy requirements are then subjected to an increasing tax based their measured fuel economy (Office of Transportation and Air Quality, 2012). This has the effect of servicing two policy goals: promoting the development of fuel-efficient vehicles and "[mitigating] the negative external effects of driving relatively fuel-inefficient cars" (Guenther, 2006, p. 11). Both of these goals compare favorability to Pigouvian taxes intended to alter marketplace behaviors though goal setting and appropriate taxation (Baumol, 1972); however, the funds collected are remitted to the General Fund, causing the policy to fail the second test with regards to the use of proceeds.

The tax on ozone depleting chemicals was part of the Clean Air Act Amendments of 1990 (P.L. 101-549) and implemented the Montreal Protocol phase-out of ozone-depleting chemicals (Shouse & Lattanzio, 2020). The tax was codified as part of 26 CFR § 52, Environmental Taxes, and imposes a tax on the sale (26 CFR § 52.4682-2) and floor stocks (26 CFR § 52.4682-4) of ozone-depleting chemicals, exclusive of a limited number of permissible uses. The amount of tax is then determined based upon the base tax rate for the year of sale or use of along with the ozone depletion factor as a multiplier (Internal Revenue Service, 2007). However, the limiting factor is again the remittance of funds collected to the General Fund, which also offers support for Fullerton's (1996) argument that the tax may be considered a windfall profits tax.

The final policy that does not meet the criteria for an environmental change is the Corporate Environmental Income Tax (CEIT), created by the Superfund Amendments and Reauthorization Act of 1986. Upon its creation, the CEIT was set at 0.12% of the alternative minimum taxable income in excess of $2 million and payable even if the standard alternative minimum tax was not applicable (Bearden, 2012). While this limited the number of companies that were responsible for paying the CEIT, the revenues were enough to account for approximately 28.4% of Superfund revenues through the fiscal years 1991–1995 (Brazell & Gerardi, 1994; Ramseur et al., 2008).[5] While the lack of specificity of the CEIT precludes the CEIT as an environmental charge, it may ultimately act as a litmus test for how far the "polluter pays" principle can be extended due to the extent of its funding of the Superfund.

3.2.2 | Environmental charges in part

Three policies; the Land and Water Conservation Fund; Sport Fish Restoration and Boating Trust Fund, and Wildlife Restoration Act; contain provisions that partially meet the requirements for an environmental charge. The first policy is the Sport Fish Restoration and Boating Trust Fund (26 U.S. Code § 9504), which is the result of the elimination and transformation of the Aquatic Resources Trust Fund by Public Law 109-59 § 11,115, and is used for boat safety programs and funding under the provisions of the Coastal Wetlands Planning, Protection and Restoration Act (Upton & Corn, 2012). The trust fund is supported by fuel taxes attributed to motorboat fuel subject to the Highway Trust Fund (26 U.S. Code § 9503); annual excise taxes on sport fishing equipment; and import duties on fishing tackle, yachts, and pleasure craft (Upton & Corn, 2012). While the specificity test is fulfilled for sport fishing equipment, the connection becomes more tenuous with fuel taxes that are remitted to, then drawn from, the Highway Trust Fund. Likewise, the dual nature of the trust fund in supporting multiple actives dilutes the clear environmental connection.[6]

Parallels to the Sport Fish Restoration and Boating Trust Fund can be seen in the Wildlife Restoration Trust Fund or Wildlife Conservation and Restoration Account (16 U.S. Code § 669c), which was created by the Federal Aid in Wildlife Restoration Act (or Pittman-Robertson Wildlife Restoration Act) in 1937, and supports multiple purposes with clear environmental connections (Crafton, 2019). Funding for the trust fund is provided by taxes on firearms, ammunition, and archery equipment; with no distinction being on if the

equipment is likely to be used for hunting or not (Crafton, 2019; Crafton et al., 2018).[7] While there is a clear degree of specificity in terms of what the tax is collected on, the lack of distinction as to the intended use of equipment (i.e., hunting versus recreational shooting) suggests only a partial environment connection at the time of collection. Following the deposit of proceeds, funds are then allocated for administrative expenses, hunter safety and education, multistate conservation grants, and wildlife restoration (Crafton, 2019). While wildlife restoration and conservation grants support a clear environmental connection, the hunter safety and education programs indicate that the policy is fulfilling multiple roles. Accordantly, while aspects of the policy are suggestive of an environmental charge, the program as whole is multipurpose.

Finally, the Land and Water Conservation Fund (LWCF; 54 U.S. Code § 200,302) only partially meets the requirements of an environmental charge due to the mechanism of funding. This is despite the use LWCF funds, namely the purchase of recreational land by federal agencies or as matching grants to state governments for the same, having a clear environmental connection.[8] A creation of the Land and Water Conservation Fund Act of 1965, the law was quickly amended to have an annual authorization of $900 million, derived primary from oil and gas leases on the Outer Continental Shelf, followed by a tax on motorboat fuel and surplus property sales (Vincent, 2019). The funding was further augmented by the Gulf of Mexico Energy Security Act of 2006, which ensures mandatory appropriations that are earmarked to be used a as grants to state governments. However, in practice the LWCF operates more as an appropriations credit (or revolving fund) since funds are not deposited into a dedicated trust, but rather are credited and then appropriated by Congress on a discretionary basis (Vincent, 2019). As a result, while the funding (or crediting) of the LWCF has some specificity, as a whole the mechanism of funding precludes a clear environmental specificity and prevents consideration of the LWCF as an environmental charge.

3.2.3 | Environmental charges in full

Of the 15 policies selected for examination, six meet the criteria outlined in Section 3.1 for classification as an environmental charge in full. First, the Leaking Underground Storage Tank Trust Fund (26 U.S. Code § 9508) is funded as part of the larger collection of taxes on fuel collected as part of the Highway Trust Fund, of which one mill ($0.001) per gallon of fuel sold is deposited into the trust fund. The fund is then used by the EPA for the prevention, detection, and clean-up of leaks from underground petroleum storage tanks (Lowry, 2016). Next, the Oil Spill Liability Trust Fund (26 U.S. Code § 9509) provides an immediate reserve of funds for clean-up and recovery efforts following oil spills (Ramseur, 2017). The trust fund has had a chaotic history since its creation in 1986, being sunset and reauthorized repeatedly, and is funded via a per a $0.09 per barrel tax on crude oil (Ramseur, 2019). While these polices are straightforward in the purpose and implementation, the remaining four require examination in greater depth.

Coal excise tax

The Coal Excise Tax (26 CFR § 48.4121-1) funds the Black Lung Program and Black Lung Disability Trust Fund (26 U.S. Code § 9501) and is one of the earliest programs with parallels to an environmental charge at the federal level. The Black Lung Program's origin lies in Title IV of the Federal Coal Mine Health and Safety Act of 1969, and subsequent amendments such as the Black Lung Benefits Act of 1972 (Prunty & Solomons, 1989).[9] As part of the Black Lung Benefits Act Congress found, "…that there are a significant number of coal miners living today who are totally disabled due to pneumoconiosis arising out of employment in one or more of the Nation's coal mines;" (30 U.S. Code § 901). This effectively established a connection between employment and pneumoconiosis (i.e., *coal workers' pneumoconiosis* or *black lung*), an inflammation of the lungs commonly associated with occupational exposure to silica or coal dust (Prunty & Solomons, 1989; Szymendera & Sherlock, 2019).[10] The act then proceeded to establish that the intent was to provide adequate compensation due to total disability or death arising from pneumoconiosis. While early versions placed the onus of administration and financing upon the Social Security Administration, this proved untenable due to limited testing and the required burden of proof (Prunty & Solomons, 1989). This was addressed by shifting the burden to coal mine operators with the establishment of the Black Lung Disability Trust Fund through the Black Lung Benefits Revenue Act of 1977 (Kerr, 1980; Szymendera & Sherlock, 2019).

The Coal Excise Tax is an excise tax on each ton of surface or subsurface coal that is mined for sale or use in the United States, exclusive of lignite, and revenues are deposited in the Black Lung Disability Trust Fund (Lopatto, 1983; Szymendera & Sherlock, 2019).[11] Miners affected by pneumoconiosis were initially eligible for benefits upon quitting work and a determination they were totally disabled due to their exposure to coal dust, although these provisions were later relaxed (Kerr, 1980; Szymendera & Sherlock, 2019). Upon determination of eligibility, affected miners are eligible for medical and disability benefits (Szymendera & Sherlock, 2019).[12] Under the provisions of the Black Lung Benefits Act, coal mine operators are responsible for the payment of benefits due to disability or death arising from pneumoconiosis and must carry insurance (or self-insurance) sufficient to cover claims, in addition to payment of the tax. Funds collected through the excise tax are deposited in the Black Lung Disability Trust Fund and used to pay benefits when responsible mine operators are unable to pay benefits due to bankruptcy or lack of a successor operator (Szymendera & Sherlock, 2019).

The Coal Excise Tax demonstrates clear specificity with the tax being limited to mined coal. Furthermore, the use of proceeds is clearly directed at a negative environmental externality (i.e., coal dust impacting miner's health) and recovery of the government's burden in managing the externality from the responsible parties through the funding of the Black Lung Program and Black Lung Disability Trust Fund. While the provisions of the Black Lung Benefits Act call for coal mine operators to act as the responsible parties and carry insurance to cover damages due to disability or death in miners, in practice the government carries a significant ongoing burden in paying benefits due to current and potential bankruptcies by mine operators

(Szymendera & Sherlock, 2019). Despite the Federal Coal Mine Health and Safety Act and subsequent amendments being intended to improve the health and safety of miners (Kerr, 1980); coal miners continue to file for benefits and claimants with severe pneumoconiosis (progressive massive fibrosis) has been on the rise since the early 1990s (Almberg et al., 2018).

Superfund excise taxes

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 extensively applied the polluter pays principle in its construction and with regards to the payment for the clean-up of hazardous waste sites (Bearden, 2012; Daley & Layton, 2004). In addition to the formalizing the recovery of clean-up costs from potentially responsible parties, CERCLA also included provisions for the creation of the Hazardous Substance Response Trust Fund[13] (the Superfund) to finance clean-up when potentially responsible parties could not be found, or an immediate response was warranted (26 U.S. Code § 9507; Brazell & Gerardi, 1994). The initial funding of the Superfund was a combination of appropriations from the General Fund along with dedicated excise taxes on petroleum and chemical feedstocks (Bearden, 2012). This funding was later expanded by the Superfund Amendments and Reauthorization Act of 1986 to include an excise tax on chemical derivatives and the creation of the CEIT (Bearden, 2012).[14] Excise taxes and the CEIT would be a major source of income for the Superfund until 1995 when the taxing authority lapsed (Bearden, 2012). Since the lapse, appropriations from the General Fund have been a major source of revenue for the Superfund, although generally insufficient to support the full scope of the program (Government Accountability Office, 2015).

While the CERCLA and its amendments are built upon the application of the polluter pays principle, the excise taxes created by the Superfund Amendments and Reauthorization Act deviate from the Pigouvian expectations for an environmental charge, namely that the change is sufficient to encourage reductions in environmental externalities. In the case of the excise taxes, the impact on businesses purchasing petroleum as a raw material would have been minor. In the first fiscal year of the Superfund excise taxes, the per barrel tax on petroleum was $0.0079 while the cost per barrel crude was $33.67–$36.67 (Barnhardt, 1982; Braginskii, 2009).[15] This is approximately 0.022%–0.023% of the cost per barrel being the tax, strongly implying that the intent of the tax was not to discourage the utilization of petroleum as a raw material but rather the stated goal of funding the Superfund. However, the targeted nature of the excise tax allows for the specificity aspect of an environmental charge to be fulfilled. Likewise, the direction of proceeds from the excise tax to the Superfund, followed by their user in the clean-up of hazardous waste sites satisfies the second test for an environmental charge.

Nuclear Waste Fund Fee

The long-term disposal of high-level radioactive waste, such spent fuel rods from civilian nuclear power plants, remains a problem in the United States (Holt, 2018). Under the provisions of the Nuclear Waste Policy Act (NWPA) of 1982, high-level radioactive waste was to be disposed of in a geological repository, such as the facility proposed for Yucca Mountain, Nevada (Solomon, 2009). In order to support of such a facility, the NWPA established the Nuclear Waste Fund with a fee of one mill per-kilowatt hour of electricity generated and sold by nuclear power plants starting in 1983, intended to be collected in perpetuity (42 U.S.C. § 10222(a)(3)).[16]

When the NWPA was passed in 1982, Yucca Mountain was leading consideration as a possible geological repository and amendments to the NWPA in 1987 resulted in a Congressional mandate that Yucca Mountain was the sole site of interest (Solomon, 2009). However, Yucca Mountain would not become the de facto site until formal recognition in 2002 (Solomon, 2009). While the residents and government of Nevada were generally against the development of the site starting in the 1980s, it would not be until after the submission of a license application by the Department of Energy (DOE) in 2008 that legal protests resulted in the Obama Administration terminating consideration of the site (Holt, 2018; Werner, 2012). This triggered court challenges that led to the termination of the fee by the courts in 2013, who cited the DOE's inability to conduct a reasonable fee assessment due to lack of information on where the waste would go (*National Association of Regulatory Utility Commissions v. United States Department of Energy* 2013).

Had the development of Yucca Mountain proceeded, the NWFF would be an ideal example of an environmental charge as well as an exemplar for the acceptance of an environmental externality. While previous adequacy reports filed by the DOE raised the possibility that the fund may not be enough to cover costs, the provisions of the NWPA allowed the fee to be adjusted as needed (Holt, 2018). Accordingly, this supports the premise that the fee was intended to fully capture the government's burden in managing high-level nuclear waste. Given that high-level nuclear waste is effectively a durable threat to health and the environment, it is unclear if long-term disposal can be managed by the private sector (see Holt, 2018; Solomon, 2009; Werner, 2012). This precludes any argument that the NWFF may have been a Pigouvian tax since high-level radioactive waste is an expected by-product of uranium oxide-based nuclear power plants (Werner, 2012). On the contrary, Pigouvian concepts would support the elimination of civilian nuclear power plants given that they produce the waste in question.

Toxic Substances Control Act administration fees

As part of a broader policy agenda in regulating chemical substances and mixtures in U.S. commerce, the TSCA of 1976 directed the EPA to ensure that chemical manufacturers and processors conduct testing of chemical substances to determine the potential for harm to humans and the environment (Schierow, 2009). In addition to the ability to change manufactures with testing, the EPA was authorized to collect and inventory information on chemicals and their usage in commerce (Schierow, 2009). However, in practice the EPA struggled with compelling the necessary testing, leading to limited safety information on new products or those grandfathered under the TSCA (Cranor, 2017). While the TSCA was viewed as "cutting edge environmental law" (Greenwood, 2009, p. 10,034) at the time of its enactment, this view

diminished over time with the TSCA increasingly viewed as a "broken" (p. 10,034) statute (see also Abelkop & Graham, 2015; Cranor, 2017). As part of their critiques of the TSCA, scholars have noted that the EPA's Office of Pollution Prevention and Toxics, the implementer of the TSCA program, is "one of the most underfunded programs in all of [the] EPA." (Greenwood, 2009, p. 10,036). Indeed, Greenwood (2009) goes as far as to argue that the fiscal struggles of the Office of Pollution Prevention and Toxics have resulted in the EPA being unable to enact and enforce the TSCA as originally envisioned.

The Frank R. Lautenberg Chemical Safety for the 21st Century Act (Lautenberg Chemical Safety Act), passed in 2016, was intended to address the shortcomings of the TSCA and addresses the fiscal burden of the TSCA's administration by improving the ability of the EPA to use and assess fees for services rendered (Schmidt, 2016). While the original provisions of the TSCA allowed for fees to be assessed by the EPA, the fees were capped and collected funds remitted to the General Fund of the U.S. Treasury (Environmental Protection Agency, 2018b).[17] However, the provisions of the Lautenberg Chemical Safety Act allow for the promulgation of TSCA administrative fees to be charged to user and sufficient to cover 25% of the EPA's costs in administering the TSCA provisions concerning the oversight of testing, risk assessment, and chemical inventories maintained by the EPA (15 U.S. Code § 2625; Bergeson, 2018; Environmental Protection Agency, 2018b). The TSCA administrative fees can then be adjusted every 3 years as needed to account for inflation and budgetary charges (Bergeson, 2018). Following promulgation of the rule making the fees went into place October 2018 and are now being collected (Environmental Protection Agency, 2018a).

The promulgation of the administrative fees also ensures that they meet the criteria for an environmental charge. The assessment of the fees is limited to chemical manufactures or importers that are subject to the reporting provisions of the TSCA (Environmental Protection Agency, 2018a). The collection of these fees is then used to "… defray a portion of the costs of administering TSCA sections 4, 5, and 6 and collecting, processing, reviewing, providing access to, and protecting information about chemical substances from disclosure as appropriate under TSCA section 14." (Environmental Protection Agency, 2018a, p. 52,694).[18] These operations are the purview of the Office of Pollution Prevention and Toxics, which indicates that the fees will be used in a limited fashion for activities that are connected to the environment, namely the regulation of chemicals that have the potential to damage human health or the environment.

3.3 | Analysis of environmental charges

Upon examining the potentially qualifying policies (Table 1), six were identified that meet the criteria for an environmental charge (Table 2). Recalling that the first criteria for an environmental charge is addressing an environmental externality (Section 3.1), it is clear that externalities can generally be identified in environmentally focused policies (Table 1), although the CEIT proves to be an exception. However, these connections can be tenuous, as suggested by the TSCA administration fees, which are only indirectly tied to environmental externalities and is preventative in nature through the prevention the manufacture of damaging chemicals (Schierow, 2009). The TSCA administrative fees are also an example of how broad the externality addressed can be, although a narrow focus appears to be more common (e.g., ground pollution due to leaking underground storage tanks). The Coal Excise Tax also deviates from the concept of an environment exclusive of humans; although it is not unreasonable to consider humans part of the environment, partially if an anthropocentric lens is applied (Brennan & Lo, 2020; Kopnina et al., 2018).

The second requirement concerns the use of the funds raised by the environmental charge, namely a clear connection to the environment, and several patterns are apparent. First, the majority of the environmental charges have *partial* cost recovery since the funds received are insufficient to cover the complete costs, typically though the design of the policy itself. In contrast, the NWFF was designed with the intent to be a *complete* cost recovery since the DOE may adjust the fee as needed to match the operating costs (Department of Energy, Office of Standard Contract Management, 2013). The lack of complete cost recovery may be attributable to a number of the environmental charges being *preemptive* in nature since the funds are being collected before an event (e.g., chemical or oil spill) actually occurs. Likewise, while Oil Spill Liability program and CERCLA both direct that costs be recovered from responsibly parities (Bearden, 2012; Ramseur, 2017), recovery is not assured suggesting that the government may still be responsible for the full burden of costs. However, all six of the policies contain provisions that dictate the use of the funds collected for environmental purposes, thus satisfying the second requirement for an environment change outlined in Section 3.1.

Returning to the suggestion that federal environmental charges in the United States are constructed in a Pigouvian tradition (Banzhaf, 2020; Barthold, 1994), or act as a Pigouvian tax (Scharff, 2018), there is little evidence to suggest that this is the case. Indeed, the structure of the environmental charges themselves suggests that they are not intended to be Pigouvian in nature. This is due to the low setting of the charges involved, the timing of their collection, and lack of structural characteristics suggestive of a Pigouvian intent.

The first argument that the environmental charges are not intended to be Pigouvian is the low rate of the charges that are levied. As noted in Table 2, the majority of the charges only partially recover the total costs associated with addressing the environmental externality. Indeed, the low rates appear to be by design, which is self-evident in the case for the TSCA administrative fees being limited to 25% or 50% of the costs incurred by the specific activity (Environmental Protection Agency, 2018b). The stated justification for the low TSCA administrative fee is to ensure that the cost does not place an undue burden on small businesses (Bergeson, 2018). However, it is also clear that policymakers are capable designing charges that are capable of full cost recovery (i.e., NWFF), or use Pigouvian mechanics to incentivize compliance (i.e., the Gas Guzzler Tax and the tax on ozone depleting chemicals).

Another argument against a Pigouvian nature is the timing of collection and use of funds. Barring the TSCA administrative fees, which earmarks the fees collected for use by the Office of Pollution

Prevention and Toxics (Environmental Protection Agency, 2018a), the environmental charges identified deposit the funds received into trust funds that have significant restrictions upon their use, namely the redress of damage caused by the externality. Several of the environmental charges are also preemptive in nature with the tax or fee being collected before an environmental externality having occurred. While this approach is understandable given the nature of the externalities addressed (i.e., spills), it prevents them from acting in a Pigouvian manner since the underlying act is not discouraged (e.g., the storage of oil).

Finally, the environmental charges identified can be contrasted against the aforementioned Gas Guzzler Tax or the tax on ozone depleting chemicals, which are clearly designed to be Pigouvian in nature. In the case of the Gas Guzzler Tax, a progressive system to encourage improvements to fuel economy is present which echoes the control of externalities noted by Baumol (1972). Namely, there is a clear goal (i.e., pollution standards or fuel consumption measurements) coupled with a progressive increase in tax until that goal is met. Likewise, with the tax on ozone depleting chemicals a clear policy goal is present (i.e., phase out the use and discourage production of ozone depleting chemicals) along with a progressive increase in taxes that clearly signal to the marketplace these policy goals. While Fullerton (1996) suggested that the tax on ozone depleting chemicals was intended to be a windfall tax on profits resulting from the ban of ozone depleting chemicals, the marketplace reacted to the tax in accordance with Pigouvian theory (Fullerton, 1996). This structure in not present in the identified environmental charges (Table 2), nor policies that partially conform to the requirements for an environmental charge (Section 3.2.2).

4 | DISCUSSION

While the environmental charges identified are not Pigouvian in nature, the question remains as to their intended goal. Recalling the thesis stated in the introduction, the design of the environmental charges suggests that they are intended to accept the environmental externality as the status quo and merely seek to recover the government's cost in addressing the externality. This echoes the argument by Fullerton (1996) that that the United States has not used "environmental taxes" to discourage pollution, but rather to collect from those responsible for the pollution and conforms to the consensus that environmental policy making in the United States follows the polluter pays principle.

Collectively, the environmental charges identified each have a clear externality that they seek to address (e.g., ground pollution, damage to ecosystems, etc.) and there is a clear application of the funds raised in addressing that externality. However, the charges levied are either insufficient to have a detrimental effect on the source of the pollution or are preemptive in nature, thus preventing them from preventing the externality from occurring. Indeed, the low nature of the charges levied suggests that policymakers accept that the negative externality will occur. In the case of preemptive charges (e.g., Leaking Underground Storage Tank Trust Fund, Oil Spill Liability, etc.) this has a degree of intuitive logic since it likely that it is impossible to prevent all spills, short of banning the substances involved. Thus, the collection of charges and their deposit into earmarked trust funds offers a means of insuring against these probable future events. Likewise, the case of the NWFF, the acceptance of the externality (i.e., high-level radioactive waste) may be viewed as an acceptable policy choice when considered in the context of the energy security arguments of the period (Yergin, 1988). As similar, but much more cynical argument, can also be made in the case of the Coal Excise Tax.

Underscoring environmental policy in the United States is the polluter pays principle, which these environmental charges are consistent with. This further supports the argument that the overarching goal of environmental charges is seeking to recover the government's cost in addressing the externality. As noted by Fullerton (1996), a small tax broadly applied (such as the CEIT) would be more efficient from an administrative perspective; however, such a tax also runs counter to the philosophy that the polluter should pay. Indeed, one of the arguments against the CEIT was that it ran counter to the principle by effectively requiring that non-polluting businesses share the burden for clean-up with those responsible for the pollution (Brazell & Gerardi, 1994). Thus, by targeting small environmental charges, in the form of taxes or fees, on the entities that are produce (e.g., coal mine operators, nuclear power plants, etc.) or are likely to produce (i.e., consumers of oil) pollution, the government's costs in addressing the externality could be recovered in a manner consistent with the polluter pays principle. Indeed, the revision of the Coal Excise Tax to shift the burden to coal mine operators in 1977 (see Coal Excise Tax section), shortly after the adoption of the polluter pays principle by the OECD in 1974 (OECD, 2022), suggests it was quickly adopted and applied by policymakers.

Finally, the disparity between the environmental charges identified (Table 2) and those suggested as such (Table 1) is worth readdressing for three reasons. First, barring the Gas Guzzler Tax and tax on ozone depleting chemicals, the policies were included for analysis due to their association with implicit environmental impacts (Barthold, 1994; Fullerton, 1996; KPMG, 2017); however, examination of policies indicated that they have an intended policy goal in support of transportation infrastructure. As there is no underlying environmental policy goal behind their construction, it is difficult to advocate for their continued association with environmental taxation. Second, while not classified as environmental charges due to the remittance of funds collected into the General Fund, both the Gas Guzzler Tax and the tax on ozone depleting chemicals were constructed in accordance with Pigouvian concepts, suggesting that policy makers within the United States have designed some environmental policies with the intent of using Pigouvian principles to control or eliminate environmental externalities. The final point is a contrast with the work of Fullerton (1996), since this work suggests that environmental charges do not necessarily need to be concerned with pollution per se. While pollution clean-up or prevention is a common theme, the presence of policies such as the Coal Excise Tax (i.e., human health) or Wildlife Restoration Trust Fund (e.g., damage to ecosystems due to hunting) suggests that policymakers take a broader view of environmental externalities that just pollution.

5 | CONCLUSION

In conclusion, this paper has examined the current federal environmental policy landscape within the United States and performed and updated analysis of the environmental charges that are present. The list of policies developed (Table 2) is significantly shorter than previous works (Barthold, 1994; Fullerton, 1996; KPMG, 2017). Despite suggestions that environmental charges may be designed along Pigouvian concepts (Banzhaf, 2020; Barthold, 1994), only the Gas Guzzler Tax and tax on ozone depleting chemicals, which did not meet the criteria for inclusion as an environmental change, were Pigouvian in nature. Indeed, the design of the identified environmental charges suggest that the intended goal is cost recovery in agreement with the polluter pays principle for environmental externalities that may occur (e.g., oil spills) or are an ongoing concern.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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ENDNOTES

[1] For fiscal year 2016, 80% of operations and maintenance, and 88% of the Federal Aviation Administration's budget were from the Airport and Airway Trust Fund with the remainder being remitted from the General Fund (Tang & Elias, 2017).

[2] Truck registration fees as well as taxes on truck tires also contribute (Kirk & Mallett, 2020).

[3] Passenger vehicles exclusive of emergency vehicles, light trucks, and sport utility vehicles (SUVs) are not subject to the tax (Guenther, 2006).

[4] While the Gas Guzzler Tax offers clear connections to the environment, the emergence of gas guzzler taxes as a policy response to the oil embargo of the United States by the Organization of Arab Petroleum Exporting Countries (OPEC) is also an argument against an environmental intent behind the tax (Knittel, 2014).

[5] Superfund revenues for FY1991 to FY1995 were petroleum tax $2800 million (25.4%), chemical feedstocks and derivatives $1327 million (12.1%), CEIT $3121 million (28.4%), cost recoveries from potentially responsible parties $901 million (8.2%), fines and penalties $11 million (0.1%), interest $1003 million (9.1%), and general fund revenues $1845 million (16.8%) (Ramseur et al., 2008, p. 2).

[6] Other activities include coastal wetlands restoration, sewage disposal, docking facility maintenance, and other conservation activities (Upton & Corn, 2012).

[7] The rates are set at 10% on pistols and revolvers; 11% on all other firearms; 11% on ammunition inclusive of shells and cartridges; and 11% on bows, attachable bow accessors, quivers, broadheads, points, and arrow shafts (Crafton, 2019).

[8] The specific federal agencies are the U.S. Forest Service, National Park Service, Fish and Wildlife Service, and Bureau of Land Management. When the fund is used for grants to states, those grants may be used for up to 50% of the planning, acquisition, or development of projects by the states (54 U.S. Code § 200305).

[9] Further amendments to the Black Lung Benefits Act of 1972 include the Black Lung Benefits Reform Act of 1977, Black Lung Benefits Revenue Act of 1977, and Black Lung Benefits Amendments of 1981. (Lopatto, 1983; Prunty & Solomons, 1989)

[10] Formally pneumoconiosis is defined by the Black Lung Benefits Act as "any chronic lung disease or impairment and its sequelae arising out of coal mine employment. This definition includes, but is not limited to, any chronic restrictive or obstructive pulmonary disease arising out of coal mine employment." 20 C.F.R. §718.201(a)(2).

[11] As of January 1, 2020, the rates per ton of coal are the lower of $0.55 for surface, $1.10 for subsurface, or 4.4% of sales price (Internal Revenue Service, 2020, p. 32).

[12] Starting rate is equivalent to 37.5% of the basic pay for a federal GS-2, Step 1 employee without locality adjustment.

[13] Later renamed to the "Hazardous Substance Superfund" in statutes, but still colloquially referred to as the Superfund.

[14] Prior to their expiration at the end of 1995, these excise taxes amounted to $0.097 per barrel of petroleum, and variable rates on chemicals ranging from $0.22 to $4.87 per ton (Bearden, 2012).

[15] The tax is specifically for the quarters ending June 30, 1981 to March 31, 1982 while the nominal cost per barrel reflects the average world cost for the entire calendar year.

[16] Before the fee was terminated in 2013, proceeds were estimated at $750 million per year (Holt, 2018).

[17] The maxim fees were capped with small business being assessed up to $100 while other entities could be changed up to $2500 yielding approximately $1.1 million in annual revenue (Environmental Protection Agency, 2018b)

[18] TSCA section 4 governs chemical testing and reporting, section 5 governs review of new chemicals, section 6 governs import and export requirements, and section 14 concerns confidential business information (Schierow, 2009).

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