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Externalities as the Status Quo: Federal Application of Environmental Charges in the United States

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**EXTERNALITIES AS THE STATUS QUO: FEDERAL
APPLICATION OF ENVIRONMENTAL CHARGES IN THE
UNITED STATES**

By

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A REPORT

Submitted in partial fulfillment of the requirements for the degree of

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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” are a form of Pigouvian taxes that 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. This report 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.

1. Introduction

Controlling negative environmental externalities from industrial activities, such 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 *environmental charges*, which is a general term for charges (e.g., taxes or fees) assessed on activities that produce environmental externalities (Repetto et al. 1992). This report postulates that despite their basis in Pigouvian concepts, as implemented at the federal level in the United States, environmental charges typically accept an environmental externality as the status quo and merely seek to recover the government's cost in addressing the externality.

The conceptual origin of environmental charges can be traced back to the correction of externalities as suggested by Pigou in 1920 (Pigou 1929). Formalization of the concepts occurred in the context of environmental economics in the 1970s, and later advocacy for environmental charges was part of a shift towards market-based approaches to environmental policies in the 1990s (Pearce 2002; Coglianesi 2001). One of the arguments for environmental charges, and taxation in particular, developed in the 1990s was “shifting the revenue burden from economic ‘goods’ to environmental ‘bads’” (Repetto et al. 1992, p. 1), thus incentivizing environmentally positive actions (e.g., reducing waste) while at the same time allowing the government to capture the costs of managing any externalities that arise (e.g., pollution remediation) or fund other priorities. In addition to capturing these externalities, Repetto et al. (1992) argued that

environmental charges offer incentivization for consumers to adjust their behavior to avoid products or activities with taxes or fees.

As a means of capturing negative externalities, environmental charges are a form of a Pigouvian tax (also spelled *Pigovian tax*), which are “taxes designed to correct inefficiencies of the price system that are due to negative external effects” (Sandmo 2018, p. 10312); and an optimal Pigouvian tax would be one that fully captures the damage in the assessed tax (Sandmo 2018). While defining this tax structure in “The Economics of Welfare”, Pigou (1929, p. 186 - 187) connects environmental externalities such as smoke being emitted from factory chimneys, to increased costs borne by the community for washing clothing or the necessity of artificial light due to haze. In the scenario presented by Pigou (1929), the smoke emitted by the factory offers a clear source and target upon which a tax can be assessed (i.e., point pollution). However, non-point sources of pollution (e.g., agricultural runoff) can have significant environmental impacts which may be difficult to target (Zaring 1996). Indeed, it has been noted that as applied to pollutants, the Pigouvian paradigm may only work when pollutants are “exceptional and occasional” (Repetto 1996, p. 53) as opposed to normal outputs of industrial processes. Accordingly, while Pigouvian taxes may ultimately seek to correct the social externalities due to a product, environmental charges, seek to capture the environmental externalities as a result of a product or service

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

... 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 (1996) 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 the individual taxes. 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 premise appears to be unchanged. This report builds upon the work of Fullerton (1996) by taking a closer look at policies that Fullerton identified as “implicit environmental taxes” and nominally expands upon that list.

The next section of this report provides a deeper background on environmental charges and briefly examines how environmental charges may be implemented with particular focus on taxes and fees. In Section 3 the core thesis of this report is examined in greater depth with federal programs implementing environmental taxes being examined to determine if they are structured for cost recovery. After this examination, the policy implications of environmental charges are discussed in Section 4 before the report concludes with Section 5.

2. Background

2.1 Development 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. Pigou presented this argument in the context of positive and negative social impacts. As an example of a positive externality, Pigou noted that uncompensated services were rendered when private parks are developed and the surrounding community enjoys cleaner air (Pigou 1929, p. 186). The author then contrasted a negative externality in which the surrounding community may be damaged by smoke emitted from a factory (Pigou 1929, p. 186). In contrast to positive externalities, which may be difficult to apply a financial value to thus rendering recovery difficult, negative externalities tend to result in clear financial burdens (e.g., the cost of doing extra laundry). As such, in order to correct the social cost of the negative externalities produced, Pigou suggested that the government can intervene using taxation to ensure that the social cost is corrected (Pigou 1929, p. 215 - 229).

The development of environmental economics in the 1970s, along with the adoption of concepts such as the polluter pays principle, led to a reexamination of Pigouvian taxes and how they could be applied in an environmental context (Pearce

2002). This reexamination was focused on considering how environmental externalities could be controlled (see Baumol & Oates 1971; Sandmo 1975); however, it remained unclear how Pigouvian taxes could reduce pollution until the Baumol (1972) released the seminal paper “On Taxation and the Control of Externalities” which argued a two-fold approach would produce an efficient allocation of resources (i.e., permissible levels of pollution). The approach called for first setting appropriate standards; followed by setting taxes or changes that were deemed to result in an acceptable level of pollution (Baumol 1972). When properly implemented, the taxes would then 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) with the publication of “The theory of environmental policy” to argue in support of policymakers intervening in support of the maintenance or improvement of environmental conditions. In support of their argument, Baumol & Oates (1975) offered a theoretical analysis of externalities, based in part upon the work of Pigou, and offered various environmental taxes and subsidies as possible instruments for policymakers. However, this scholarship 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).

Following investigations of the 1970s a resurgence of interest was triggered by environmental advocacy groups shifting to “pragmatic strategies” (Coglianese 2001, p. 107) being applied to environmental policies, such as advocacy of emissions trading as a market-based approach (Coglianese 2001). One prominent advocate was the World

Resources Institute, a non-profit 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, p. viii). One aspect of World Resources Institute work was advocating for the adoption of environmental charges, which the authors 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, p. 72-73). In the seminal report “Green Fees: How a Tax Shift Can Work for the Environment and the Economy” (Repetto et al. 1992), authors affiliated with World Resources Institute noted 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.” (p. 11). This is a reference to the double-dividend hypothesized for environmental levies (i.e., taxes or fees) which hypothesizes that, in addition to environmental benefits, broad economic benefits could be realized when environmental externalities were taxed (Freire-González 2018). In addition to postulating that substituting green fees for other taxes would result in a double-dividend, Repetto et al. (1992) also argued that the existing tax system, focused on income and profits at the federal level, is burdensome and may result in less revenue being collected. To support their argument, the authors noted that there is a sensitivity between the labor supply and taxes, arguing that a rise in after-tax hourly earnings would lead to a rise in hours worked (Repetto et al. 1992, p. 3).

While Repetto et al. (1992) suggested that the existing tax system is burdensome, much of their justification for environmental charges is predicated upon the double-

dividend and the economic value of the charges. The authors stated that: “Unlike command-and-control regulations, [environmental charges] provide market signals that allow firms and households to respond in innovative and efficient ways.” (p. 7). To support this argument the authors examined case studies of fees charged for municipal solid waste collection, tolls charged to reduce congestion, and carbon taxes (Repetto et al. 1992). Similar arguments were shared by Hawkins (2013) in the 1990s who advocated for green fees and green taxes, although a clear functional decision between the two does not appear to have been made.¹ However, Hawken (2013) notes that green taxes “[are] not to raise revenue for the government but to provide participants in the marketplace with accurate information about cost.” (p. 144) Much like green fees, this point is predicated upon Pigouvian concepts. However, the advocacy by Hawkins (2013) for a revenue neutral policy appears to preclude green fees as a means of recapturing the government’s cost in addressing an environmental externality.

Dower and Repetto (1994) built upon previous work by noting that the results from public opinion polls and focus groups suggested that the public generally preferred the use of economic incentives (e.g., environmental fees) to entice compliance with environmental goals of policymakers as opposed to command and control regulation (Dower & Repetto 1994). The authors ultimately concluded that “[the] lack of experience with pollution taxes creates a ‘chicken or the egg’ problem” (Dower & Repetto 1994, p. 170), noting that existing fees and changes on waste and pollution had not been enough to entice policymakers to explore environmental taxes. In contrast, the earlier work by

¹ Originally published in 1993, “The Ecology of Commerce” in fact cites Repetto et al. (1992) in the revised edition referred to in this report (Hawkins 2013).

Repetto et al. (1992), while still advocating for a revenue shift, portrayed environmental charges as policy instruments that could be used for used to collect general revenue (i.e., taxes) or recapture the government's costs (i.e., fees). This distinction is even more germane when Repetto argued that taxing environmental resources, whose use generated negative externalities (e.g., pollution and waste), was more appropriate than taxing the earnings of labor and capital, which generated positive social and economic externalities (Repetto 1996).

Despite the advocacy for environmental charges in the 1990s, the early 2000s through the 2010s were defined, in part, by a shift to evaluating what had previously worked in environmental movements and regulations (Coglianese 2001; Markell 2010; Cranor 2017). In critically reviewing existing regulations, authors would argue that while the programs may have represented major advancements for environmental regulation in the United States, reform was needed to address shortcomings (Daley & Layton 2004). The Toxic Substances Control Act (TSCA) was particularly targeted with calls for reform with authors noting that a mechanism for properly funding it was needed (Greenwood 2009). These critical reviews were also accompanied by arguments in favor of new regulation to address such problems as electronic waste (Elisha 2010) and cigarette waste (Novotny et al. 2009). Additionally, the role of carbon dioxide in global climate change was increasingly a concern, leading the exploration of carbon taxes (Sumner et al. 2009; Lin & Li 2011; Metcalf 2019) and market-based policy approaches such as national cap and trade programs (Metcalf 2009; Astoria 2014).

Scholarship advocating for Pigouvian approaches to addressing environmental externalities was balanced by critical scholarship noting possible shortcoming inherent in how Pigouvian taxes are implemented (Fleischer 2015). Authors also frequently noted that public support for increased taxation could be quite tenuous (Agrawal 2010; Kallbekken & Sælen 2011; Duncan et al. 2020). Legal scholarship also noted that pricing environmental externalities was 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). Effectively, the 2010s concluded with continued interest in the use of Pigouvian approaches to address environmental externalities, but limited interest in green fees *per se* while other policy instruments received more interest.

2.1 Environmental Charges, Taxes, or Fees?

Table 1. Various environmental charges that may be applied, as defined by Repetto et al. (1992)

Environmental Charges	
Taxes	Fees
Green Taxes / Environmental Taxes Carbon Taxes Fuel Taxes	Green Fees Emissions Fees / Effluent Charges Impact Fees
Subsidies or Rebates	Deposit-Return Charges
Electric Vehicle Rebate	Bottle Deposits

The terms *green fees*, *green taxes*, *environmental charges*, and *environmental taxes* are commonly used in the context of *environmental charges* (see Repetto et al. 1992; Hoffmann & Boyd 2006; KPMG 2017; Williams 2016). However, the Organization for Economic Co-Operation and Development (OECD 2001) uses strict definitions for *taxes*, “any compulsory unrequited payment to general governments levied on tax-bases” (p. 15), and *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 (Spitzer 2002; Scharff 2018). Fees typically also 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 can be nuanced, and while several different environmental policy instruments can be classified as an environmental charge, taxes and fees are typically the primary focus. In their advocacy of environmental charges, Repetto et al (1992) developed the classification depicted in Table 1. In addition to taxes and fees, the authors included subsidies or rebates along with deposit-return charges.² Environmental taxes (also referred to as *green taxes*), impose a tax that is

² To elaborate on the instruments. Subsidies or rebates, may be offered to consumers or businesses to elicit more environmentally friendly purchases, such as plug-in electric vehicles, thus influencing consumer decision making (DeShazo et al. 2017). Deposit-return changes are programs in which a deposit is collected when a product is purchased (e.g., beverage containers) and the deposit is returned when the used product

intended to reduce the production of an environmental externality (e.g., carbon dioxide emissions) while at the same time generating revenue for the government (Williams 2016). The first example of these, carbon taxes, impose a tax upon the combustion of carbon-based fuels (Ramseur & Leggett 2019). The second example, fuel taxes, differ from other taxes on fuel that intended to fund repairs and improvements to transportation networks (Agrawal et al. 2010), since they are designed to reduce fuel consumption resulting in environmental benefits (Kallbekken & Sælen 2011). Environmental fees (also referred to as *green fees*) are typically assessed in the context of a service being rendered, typically the emission of some form of pollution into the environment (Hoffmann & Boyd 2006). Intuitively named emissions fees are assessed on the discharge of pollutants into the environment (e.g., emissions from a smokestack), but may also include charges assessed on wastes deposited for treatment in public wastewater treatment works (Repetto et al. 1992). Finally, impact fees are assessed to offset the environment impacts associated with an activity (e.g., installation of a septic system) (Repetto et al. 1992).³ Since the intent of this report is not intended as examination of the implementation details, the term *environmental charges* has been adopted to refer to taxes or fees that are intended to capture or recover the costs associated with the environmental externalities (e.g., clean-up or safe disposal of waste).

is returned (e.g., empty beverage containers). While these programs have been credited with reducing littering (Moore & Scott 1983), their applicability is inherently limited to situations where there is a product that can be effectively returned.

³ The assessment of fees on tourists to mitigate the environmental impacts of their visits (see Lyte 2019) could be considered green fees or impact fees. Ultimately it would be the precise legal implementation and how the revenues collected were used that would determine the categorization

3. Examining Environmental Charges

3.1 Approach

While Fullerton (1996) classified environmental taxes based upon their inclusion in the Internal Revenue Services' "Statistics of Income" this report takes a simpler two-point approach to selecting them:

1. Is there specificity in how the tax is applied?
2. Are the proceeds used in connection to the environment?

Underlying both these questions is the presumption that an environmental tax has an obvious connection to the environment. For example, income taxes which are deposited in the General Fund may ultimately fund a wide range of environmentally positive actions (e.g., funding pollution clean-up via appropriations to the Environmental Protection Agency); however, it is intuitive that income taxes are constructed with the intent of funding a wide range of governmental operations and services. Thus, it is necessary to examine a tax for the specificity associated to determine what the connection to the environment may (or may not) be. The second question interrogates how the proceeds are being used in connection to the environment. This point is particularly germane to the considering "implicit" environmental taxes identified by Fullerton (1996) as well as expanding beyond their work to consider other programs.

With these criteria in mind, possible environmental charges were collected based upon their classification as such in literature sources (see Fullerton 1996; KPMG 2017).

This accounted for the majority of policies barring the Nuclear Waste Fund Fee which was included due to the negative environmental impact that high-level radioactive waste can have upon the environment (Holt 2019). Government sources (i.e., government statutes or reports) were then used as the primary source to determine how the charges were applied and used. Upon completion of the examination policies were deemed an environmental charge if they met both criteria in full or part. This resulted in a total of fourteen policies were identified as possible environmental charges, of which six clearly satisfy both criteria.

3.2 Examination

In 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 appear to be 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 which in turn is used for operations and maintenance as well as funding the Federal Aviation Administration (Tang & Elias 2017).⁴ Similarly, federal taxes on gasoline and diesel fund the Highway Trust Fund which in turn is used to finance infrastructure and public transportation programs (Kirk & Mallett 2020; Lowry 2016).⁵ The Inland Waterways Trust Fund has a similar implicit environmental connection leading it its

⁴ 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).

⁵ Truck registration fees as well as taxes on truck tires also contribute (Kirk & Mallett 2020).

identification as a green tax (KPMG 2017); however, closer examination shows that it may be considered a transportation tax with nominal environmental connections. The trust fund is financed by a fuel tax on commercial barge fuel, which in turn is used for operations and maintenance expenditures connected to inland waterways (Stern 2014).⁶

While some of the policies considered were predominately focused supporting transportation infrastructure, the Gas Guzzler Tax and the tax on Ozone Depleting Chemicals appear to be Pigouvian in their applications. The Gas Guzzler Tax originated with the Energy Tax Act of 1978 targets certain passenger vehicles whose fuel economy is under 22.5 miles per gallon (Guenther 2006).⁷ 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). As noted in the Congressional Research Service report by Guenther (2006) 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” (p. 11). Both of these goals compare favorably to Pigouvian taxes intended to alter marketplace behaviors through goal setting and appropriate taxation (Baumol 1972).

The second policy that may be considered a Pigouvian tax is the tax on ozone-depleting chemicals, which was implemented with the Clean Air Act Amendments of 1990 (P.L. 101-549) to implement the Montreal Protocol phase-out of ozone-depleting chemicals (Shouse & Lattanzio 2020). The tax was codified as part of 26 CFR § 52,

⁶ The tax was set at \$0.20 per gallon as of 2014 (Stern 2014).

⁷ Passenger vehicles exclusive of emergency vehicles, light trucks, and sport utility vehicles (SUVs) are not subject to the tax (Guenther 2006).

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 (IRS 2007). While Fullerton (1996) argues that the tax may be considered a windfall profits tax, the annual increase in tax rates coupled with production cuts by manufactures in response to the cut suggest that Pigouvian concepts at play.

The remaining policy that does not fit the criteria for an environmental charge is the Corporate Environmental Income Tax (CEIT) that was created by the Superfund Amendments and Reauthorization Act of 1986 (Bearden 2012). 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 to 1995 (Brazell & Gerardi 1994; Ramseur et al. 2008).⁸ However, the CEIT was controversial while it was active, and opinions were, and remain, split upon its fairness and impact upon businesses (see Brazell & Gerardi 1994; Felsenthal 1996; Ramseur et al. 2008; Bearden 2012). While the unpopularity of the CEIT may have contributed to the expiration of the taxing authority, Ramseur et al. (2008) note that Republican leadership during the 104th and 106th

⁸ Superfund revenues for FY1991 to FY1995 were: petroleum tax \$2,800 million (25.4%), chemical feedstocks and derivatives \$1,327 million (12.1%), CEIT \$3,121 million (28.4%), cost recoveries from potentially responsible parties \$901 million (8.2%), fines and penalties \$11 million (0.1%), interest \$1,003 million (9.1%), and general fund revenues \$1,845 million (16.8%) (Ramseur et al. 2008, p. 2).

Congresses were opposed to renewal unless the liability provisions; which governed the identification of potentially responsible parties; of the CERCLA were “removed or modified” (p. 3). As such, while the lack of specificity of the CEIT precludes the CEIT as an environmental charge, it may also act as a litmus test for how far the “polluter pays” principle can be extended.

The next two policies, the Aquatic Resources Trust Fund and Wildlife Restoration Trust Fund, offer a transition between policies that do not meet the criteria for an environmental charge and those that do since both contain provisions that partially meet the requirements for an environmental charge. The Aquatic Resources Trust Fund consists of two accounts, a Sport Fish Restoration Account which is used for environmentally connected programs, and the Boating Trust Fund which is used for safety programs (Upton & Corn 2012). The trust fund is supported by fuel taxes attributed to motorboat fuel subject to the Highway Trust Fund, 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 activities dilutes the clear environmental connection.⁹

Originally enacted through the Federal Aid in Wildlife Restoration Act in 1937, also referred to as the Pittman-Robertson Wildlife Restoration Act, the Wildlife Restoration Trust Fund supports multiple purposes with clear environmental connections

⁹ Other activities include coastal wetlands restoration, sewage disposal, docking facility maintenance, and other conservation activities (Upton & Corn 2012).

(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 (Crafton et al. 2018; Crafton 2019).¹⁰ While there is a clear degree of specificity in terms of what the tax is collected on (in contrast to the CEIT), the lack of distinction on equipment intended for hunting versus recreational shooting suggests only a partial environment connection at the time of collection. Following the deposit of proceeds in the trust fund they 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.

While the Aquatic Resources Trust Fund and Wildlife Restoration Trust Fund occupy liminal positions as environmental charges, the remaining six clearly meet the requirements. The first two of these, the Leaking Underground Storage Tank Trust Fund and Oil Spill Liability program are similar in their targeted function. In addition to other taxes collected as part of the Highway Trust Fund, a nominal collection is allocated to the Leaking Underground Storage Tank trust fund for use by the Environmental Protection Agency for the prevention, detection, and clean-up of leaks from underground petroleum storage tanks (Lowry 2016).¹¹ The Oil Spill Liability Trust Fund provides an immediate

¹⁰ 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 accessories, quivers, broadheads, points, and arrow shafts (Crafton 2019).

¹¹ Currently set at one mill (\$0.001) per gallon of fuel sold (Lowry 2016).

reserve of funds for clean-up and recovery efforts following oil (Ramseur 2017). While the trust fund has had a chaotic history since its creation in 1986, being sunset and reauthorized repeatedly, it is intended to be funded via a per barrel tax on crude oil (Ramseur 2019).¹²

Next the Coal Excise Tax, Superfund Excise Taxes, Nuclear Waste Fund Fee, and TSCA administrative fees will be examined in greater depth. These environmental charges were selected for closer examination for a variety of reasons specific to each reason. First, while the Coal Excise Tax was noted by Fullerton (1996), only a cursory exemption was offered and the focus on human health warrants closer examination. In contrast, Fullerton (1996) offered a close examination of Superfund Excise Taxes, but the expiration of the excise taxes since the work of Fullerton suggests that an update is warranted. Finally, the remaining two policies, the Nuclear Waste Fund Fee and TSCA administrative fee were not examined by Fullerton (1996).

3.2.1 Coal Excise Tax

One of the earliest programs with parallels to an environmental charge at the federal level is the Coal Excise Tax, which funds the Black Lung Program and Black Lung Disability Trust Fund. The federal 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

¹² Set at \$0.09 per barrel as of 2019 (Ramseur 2019).

Lung Benefits Act of 1972 (Prunty & Solomons 1989).¹³ As part of the Black Lung Benefits Act, Congress found that, "...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 the pneumoconiosis, also referred to as *coal workers' pneumoconiosis* or *black lung*, which is an inflammation of the lungs commonly associated with occupational exposure to silica or coal dust (Prunty & Solomons 1989; Szymendera & Sherlock 2019).¹⁴ The Black Lung Benefits Act then proceeded to establish the intent was to provide adequate compensation due to total disability or death arising from pneumoconiosis. While early versions of the Black Lung Benefits Acts 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). To address the growing concerns and alleviate the burden on the Social Security Administration, the burden was shifted 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

¹³ 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 and Solomons 1989)

¹⁴ 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)

deposited in the Black Lung Disability Trust Fund (Lopatto 1983; Szymendera & Sherlock 2019).^{15, 16} Miners that are 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 starting at a rate equivalent to 37.5% of the basic pay for a federal GS-2, Step 1 employee without locality adjustment (Szymendera & Sherlock 2019).¹⁷ 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 Coal Excise 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 (i.e., the Coal Excise Tax funding the Black Lung Program and Black Lung Disability Trust Fund). While the provisions of the

¹⁵ Lignite, also referred to as brown coal, is the lowest grade of coal that is mined.

¹⁶ 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)

¹⁷ \$660.10 per month as of calendar year 2019, this figure would increase based upon the number of dependents the claimant has (Szymendera and Sherlock 2019).

Black Lung Benefits Act calls 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).

3.2.2 Superfund Excise Taxes

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 extensively applied the polluter pays principle in its construction and who pays for the clean-up of hazardous waste sites (Daley & Layton 2004; Bearden 2012). However, despite the goal of CERCLA being the recovery of clean-up costs from potentially responsible parties, CERCLA included provisions for the creation of the Hazardous Substance Response Trust Fund (the Superfund) to finance clean-up when potentially responsible parties could not be found, or an immediate response was warranted (Brazell & Gerardi 1994). 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). The 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 Corporate Environmental Income Tax (CEIT) (Bearden 2012).¹⁸

Excise taxes, along with 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 it is clear that 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 the charge 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 to \$36.67 (Barnhardt 1982; Braginskii 2009).¹⁹ This is approximately 0.022% to 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. This targeted nature of the excise tax allows for the specificity aspect of an environmental charge to be fulfilled.

While it fell upon other policy instruments present in the CERCLA to attempt to address

¹⁸ 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).

¹⁹ 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.

the environmental externalities produced through abandoned or improperly disposed of waste, the proceeds from the excise tax were used remitted to the Superfund and intended for the clean-up of hazardous waste sites (Bearden 2012). This satisfies the second test for an environmental charge by establishing that the proceeds were used in connection to the environment.

3.2.3 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 support of such a facility, the NWPA established the Nuclear Waste Fund and established a fee of one mill (\$0.001) per-kilowatt hour of electricity generated and sold by nuclear power plants starting in 1983 (42 U.S.C. § 10222(a)(3)).²⁰ While the fee was intended to be collected in perpetuity, the inability for a geological repository to be constructed has resulted in the fee being suspended due to the Department of Energy's (DOE) inability to take possession of high-level radioactive waste.

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

²⁰ Before the fee was terminated in 2013, proceeds were estimated at \$750 million per year (Holt 2018).

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 DOE in 2008 that legal protests were sufficient for the Obama Administration (2009 - 2017) to terminate consideration of the site (Werner 2012; Holt 2018).²¹ The termination in turn resulted in 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).²² Since the termination, nuclear power plant operators have sued the DOE to recover storage costs with payments totaling \$7.4 billion as of 2019 (Holt 2019). The payments of \$7.4 billion to nuclear plant operators for storage costs can be contextualized against the \$28.2 billion balance of the fund as of August 2012, the result of collections from 1983 to 2009 and accrued interest on the balance (DOE 2013). While a sizable position of the fund's balance, storage of high-level radioactive waste does not imply disposal and a long-term solution is still needed as the nuclear plant operators remain the custodians of the waste (Holt 2019). Thus, while the loss of the fee has not necessary been detrimental to the health of the fund, there is also lack of clarity as

²¹ Following termination of Yucca Mountain for consideration as a geological repository, the Obama Administration established a Blue Ribbon Commission to evaluate how high-level radioactive waste may be handled in the future. As part of their report, the commission declined to comment upon the appropriateness of Yucca Mountain as a geological repository citing the fact that the commission was not charged with evaluating sites (Blue Ribbon Commission on America's Nuclear Future 2012).

²² While terminated by the Obama Administration, the Trump Administration (2017 - present) has attempted to restart the process of considering Yucca Mountain (Holt 2018).

to what the fund can be used for giving the statutory requirements that the fund be used solely for the disposal of, and activity related to, the disposal of radioactive waste (42 U.S.C. § 10222(d)).²³

Had the development of Yucca Mountain proceeded as intended by policymakers in designing the Nuclear Waste Fund and associated fee, the program would be an ideal example of an environmental charge as well as an exemplar of 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 Nuclear Waste Fund 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 Solomon 2009; Werner 2012; Holt 2018).²⁴ This precludes any argument that the Nuclear Waste Fund Fee 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.

²³ The Nuclear Waste Fund balance was approximately \$37.2 billion at the end of FY2019, yielding approximately \$1.5 billion in interest (Holt 2018).

²⁴ As noted by Pasqualetti (1997) disposal sites are presumed to be hazardous up to 10,000 years in the future or longer.

3.2.4 Toxic Substances Control Act Administration Fees

As part of a broader policy agenda in regulating chemical substances and mixtures in U.S. commerce, the Toxic Substances Control Act (TSCA) of 1976 directed the Environmental Protection Agency (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. 10034) at the time of its enactment, this view diminished over time with the TSCA increasingly viewed as a “broken” (p. 10034) 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. 10036). 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 (EPA 2018b).²⁵ 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 (Bergeson 2018; EPA 2018b). The TSCA administrative fees can then be adjusted every three years as needed to account for inflation and budgetary changes (Bergeson 2018). Following promulgation of the rule making the fees went into place October 2018 and are now being collected (EPA 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 (EPA 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." (EPA 2018a, p. 52694).²⁶ These operations are the purview of the Office of Pollution Prevention and Toxics which indicates that the fees

²⁵ The maxim fees were capped with small business being assessed up to \$100 while other entities could be charged up to \$2,500 yielding approximately \$1.1 million in annual revenue (EPA 2018b)

²⁶ 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).

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 Policy Summary

Table 2. Policies considered versus criteria for an environmental charge. 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.

	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
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 towards sport fish restoration.	Yes
Coal Excise Tax	Yes , assessed on mined coal 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

	Specificity?	Use of Proceeds?	Active
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
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 barrels of petroleum sold.	Yes , funds prevention, detection, and clean-up of leaking underground petroleum storage tanks.	Yes ²⁷
Ozone Depleting Chemicals	Yes , assessed on chemicals based upon their physical characteristics.	No , funds are deposited in the general fund.	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

Before evaluating the environmental charge found, it is appropriate to first summarize which were identified as such. Table 2 surmises all of the polices that were examined and

²⁷ Set to expire on December 31, 2020 (P.L 116-94 § 134)

indicates if they pass the tests for an environmental charge. The “Active” column in Table 2 is also provided since some of the policies are no longer in effect (e.g., Superfund Excise Taxes) or may soon expire. Review of the policies showed that all, barring the CEIT, were limited as to what was taxed. In the case of the Aquatic Resources and Wildlife Restoration Trust Funds the broader scope of the tax assessments precluded them being considered specific, but they were not as broad as the CEIT. For the second part of the test (i.e., are the proceeds used in connection to the environment) all except for the tax on ozone depleting chemicals used some form of use of earmarks and trust funds to limit how the proceeds were used. Accordingly, determining the environmental connection became the primary litmus test for the environmental charges. While some of the policies reviewed have a nominal environmental connection (e.g., Inland Waterways Trust Fund), policies were deemed to pass when there was a clear environmental externality being addressed (e.g., cleaning up hazardous waste).

3.4 Analysis

Table 3. Identified environmental charges, the externality they address, and the nature of their cost recovery.

	Externality	Cost Recovery?
Aquatic Resources Trust Fund	Damage to aquatic ecosystems	Partial , funds allocated to sport fish restoration are used for environmental restoration activities.
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.

	Externality	Cost Recovery?
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.
Wildlife Restoration Trust Fund	Damage to ecosystems	Partial , funds allocated to wildlife restoration programs are used for environmental restoration activities.

This report postulates that the while environmental charges are typically based upon Pigouvian concepts, at the federal level in the United States, they are typically used to recover the government’s costs in addressing an environmental externality, a sentiment shared by Fullerton (1996). Based upon a review of potentially qualifying policies (see Section 3.1), eight policies were identified that meet the criteria for an environmental charge (see Table 3). In order to fully examine the claim, it must be established that an environmental externality is addressed along with the nature of the cost recovery.

As demonstrated in Table 3, all of the environmental charges, except for the TSCA administrative fees, address a clear environmental externality. In the case of the Aquatic Resources Trust Fund and Wildlife Restoration Trust Fund the environmental

externality is quite broad; however, others are narrowly focused on specific environmental externalities. The Coal Excise Tax deviates from the concept of an environment exclusive of humans; however, it is not unreasonable to consider humans part of the environment, partially if an anthropocentric lens is applied (Kopnina et al. 2018; Brennan & Low 2020). The environmental externality addressed by the TSCA administrative fees is preventative in nature since the provisions of the TSCA should be sufficient to prevent manufacture of a damaging chemical (Schierow 2009). As such the TSCA administrative fees is similar to the Aquatic Resource or Wildlife Restoration Trust Funds by addressing broad environmental externalities. Accordingly, all of the environmental charges outlined in Table 3 address an environmental externality, satisfying the first half of the claim.

The second half to the claim concerns the usage of the funds raised by an environmental charge, namely as cost recovery. Table 3 outlines the nature of the cost recovery by the environmental charges and several patterns are obvious. First, the majority of the environmental charges have *partial* cost recovery, since the fund received are insufficient to cover the complete costs. In contrast, the Nuclear Waste Fund Fee is intended to be a *complete* cost recovery since the DOE may adjust the fee as needed (DOE 2013). A number of the environmental charges are also considered *preemptive* since the funds are being collected before an event actually occurs. Furthermore, while Oil Spill Liability program and CERCLA both direct that costs be recovered from responsibly parties (Ramseur 2017; Bearden 2012), recovery is not assured. This supports the concept that the federal government is concerned with cost recovery since

the trust funds may be viewed as a form of insurance against future events. In contrast, trust funds where the proceeds are used to fund restoration activities are intuitively linked to cost recovery.

Except for the TSCA administrative fees, the polices deposit the funds received into trust funds that have significant restrictions upon their use. While the partial nature of the Aquatic Resources and Wildlife Restoration Trust Funds as environmental charges accounts for funds to be used for alternative purposes (e.g., boating and hunter safety programs, respectively), a connection to environmental restoration remains for the remainder. This statutory restriction on how the funds may be used further supports the claim that cost recovery is the intent. Finally, while the TSCA administrative fees collected are not deposited into a trust fund, they are earmarked for use by the Office of Pollution Prevention and Toxics (EPA 2018a).

Collectively, the presence of a clear externality and evidence to support cost recovery supports the claim that the federal government uses environmental charges to recover the government's costs in addressing an environmental externality. Furthermore, federal applications of environmental charges also contrast significantly with how environmental taxes have been applied from a Pigouvian perspective. For example, with carbon taxes there are clear attempts to inform the policy with Pigouvian concepts and effect behavioral change in the marketplace (Fleischer 2015). This leads to complications as taxes are set at rates high enough that it is necessary to ensure they do not become regressive (see Sumner et al. 2009; Fleischer 2015; Ramseur & Leggett 2019). In contrast, the federal policies examined typically have low fees that do not suggest an

intent to be punitive, as would be necessary to act as a Pigouvian tax.²⁸ Indeed, the Pigouvian structure of the taxes on ozone depleting chemicals and the Gas Guzzler Tax suggest that policy makers are aware of Pigouvian concepts and have applied them with the intent of reducing an environmental externality.²⁹ This suggests that while policymakers may be concerned about an environmental externality in the construction of an environmental charge, prevention or reduction of the externality is not the intent. This offers further, indirect, support for the claim that the focus is on cost recovery.

One aspect of this analysis that is worth contrasting with the claim of Fullerton (1996) is 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 than just pollution.

4. Policy Implications

4.1 Limitations

Environmental charges, as narrowly defined by this report (see Section 3.1), appear to be effective in situations where they can be narrowly applied without concern for managing

²⁸ While not closely examined by this report, low rates may actually be by design, as suggested by the TSCA administrative fees bore by individual users. Under the terms of the act, the Environmental Protection Agency is limited to collecting fees that defray 25% or 50% of the costs depending upon the specific activity (Environmental Protection Agency 2018).

²⁹ Authors such as Fullerton (1996) may debate this point since they noted the tax on ozone depleting chemicals was intended to be a windfall tax on profits resulting from the ban of ozone depleting chemicals. However, given that the marketplace reacted to the tax in accordance with Pigouvian theory (i.e., reducing production (Fullerton 1996)) this may be a philosophical point.

environmental externalities. The existence of a clear good or service upon which charges can be assessed and the government is required to intervene to mitigate the externalities may also assist in applying them. Examples such as the Coal Excise Tax and Nuclear Waste Fund Fee clearly demonstrate this since these programs have clear points of collection for fees (i.e., sale of coal and generation of power from nuclear fuel, respectively) and government intervention is required to manage externalities (i.e., disability due to pneumoconiosis and construction of geologic repositories, respectively). These programs also exhibit a clear connection between the what that the fee is being assessed upon and the necessity for government intervention. While not necessarily advantageous to these programs, this may also allow for more public acceptance for change given it goes to a clear purpose (Kallbekken & Sælen 201), although the extent of this effect may be quite limited (Duncan et al. 2020). However, the narrow scope in which green fees are appropriate may be a limitation, although it is not the only limitation to green fees as a policy instrument.

One potential risk associated with the use of environmental charges is that increased costs of production might be mitigated by shifting the burden to markets with lower associated costs, the “race to the bottom” effect (Wheeler 2001) leading to the development of “pollution havens” where heavily polluting industries are subjected to lower regulations (De Melo & Grether 2004). This could be mitigated by having the application of environmental charges be applied to goods regardless of their country of origin. Thus, goods produced internationally and imported would be subjected to the same associated fees as those produced domestically. While this does not mitigate the

possibility of manufacturers relocating for lower wages, it does ensure that relocation to avoid associated fees is avoided.

A major risk in developing environmental charges is their potential to become a regressive tax. This is a common critique of carbon taxes, particularly when they are broadly applied to all fuels (Sumner et al. 2009; Fleischer 2015; Ramseur & Leggett 2019). Santos and Catchesides (2005) argue that the effects of the increases to the United Kingdom's Fuel Price Escalator, which increased the duty that was applied to fuel sales in the United Kingdom, were unequal in their distribution. The authors note when all households were examined, the gasoline costs as a portion of the total budget appears low for low-income households. However, when the costs are isolated to car-owning households, the lowest-income households may allocate 18% of their income to fuel compared to the richest which may only allocate 2%. Building upon this argument the authors modeled the possible effects of higher fuel duty rates and found that cost-of-living increases were disproportionately borne by the poorest car-owning households as well as rural households. Despite this, fuel taxation remains frequently associated with environmental charges (see Agrawal et al 2010; Kallbekken & Sælen 2011). While the incorporation of taxes or fees on transportation fuels may be warranted as part of a broader framework, care is needed to avoid disproportionate impacts to lower income households.

4.2 Possible Applications

One of the challenges that policymakers face is determining how to ensure adequate funding to support their goals and objectives, particularly when remediating environmental externalities where cost recovery may be extremely limited (e.g., abandoned waste sites) or when managing non-point pollution sources (e.g., air pollution or litter). Environmental charges offer a possible solution in these cases and appear to be most effectively applied when assessed on products where the public bears the responsibility for disposal (e.g., nuclear fuels), or the products result in a significant public burden (e.g., construction of geological repositories). This also limits possible applications, although some applications remain for examination.

An intuitive application of environmental charges is in the context of toxic chemicals, hazardous waste, and other pollutants. For example, funding for the Superfund remains dependent upon appropriations from the General Fund (Government Accountability Office 2015). As a result, funding is tied to the policies and priorities of the current administration, as opposed to being driven by the real needs of the program. However, the Superfund Trust Fund Excise Taxes (see Section 3.2.2) offers a template for a historical program with demonstrated efficacy in funding the Superfund (Ramseur et al. 2008), although ensuring that appropriate green fees would not require periodic reauthorization may be a necessary. Examining pollution in a general sense also suggests the need for green fees. For example, there are long-standing connections between environmental quality and public health (Di et al. 2017; Jian et al. 2017). This connection strongly implies that government programs such as Medicare and Medicaid have

increased costs due to the poor environmental quality (e.g., air pollution) and a green fee allocating funds to Medicare and Medicaid may be appropriate, although a clear connection may not be obvious.

In contrast, a clear connection between an environmental assessment on cigarettes and the public's cost in cleaning up cigarette butts is obvious. Cigarette butts are frequently discarded as litter (Patel et al. 2013). However, the improper disposal of cigarette butts generates nonpoint pollution that can have a negative aesthetic impact on public spaces (ex., parks or beaches) (Novotny et al. 2009); or have a toxic effect upon wildlife when cigarette butts accumulate in waterways (Torkashvand et al. 2020). As a result of these externalities, governments incur a financial cost in cleaning up cigarette butts (Schneider et al. 2011). Environmental charges are an attractive policy instrument since there is a clear point-of-sale where they can be collected, but the complete life cycle of cigarettes commonly involves government intervention in disposing of the waste generated. This suggest an approach in which they would be assessed at time of sale with the proceeds deposited in a trust, with funds distributed to government agencies (e.g., local water boards) upon a demonstrable financial cost in remediating the impacts of cigarette butts (e.g., cost of additional filtration needed to capture cigarette butts during water treatment). In contrast to prior applications of green fees at the federal level in the United States, it is likely that the assessment of a green fee on cigarettes would be in line with the theoretical understanding of green fees (i.e., discouraging an externality generating activity) and would serve as a counterexample to this report.

States are currently exploring environmental charges in the form of fees as a means of remediating electronic waste; however, a comprehensive plan for electronic waste management at the federal level is still needed (Elisha 2010; Westervelt & Beckham 2015). While the logistical management of electronic waste might be more appropriately managed at the state or municipal level, a federal policy may find fees set at a national level to be an effective means of funding program administration. National collections of fees may also help to mitigate long standing problems of interstate sales tax avoidance (Fox & Murray 1997), and funds could ultimately be redistributed to the states to support local collection and disposal. However, ensuring general public support for the program may be difficult due to the broad application, despite suggestions that the public is willing to support fees and taxes connected to environmental issues (Agrawal et al. 2010; Kallbekken & Sælen 2011).

Ultimately these examples suggest that the application of environmental charges by policymakers may be limited. While only a limited number of policies examined are suggestive of Pigouvian concepts underlying them, there is still considerable debate as to the efficacy of Pigouvian taxes to drive significant reductions in behaviors that result in negative externalities (Carlton & Loury 1980; Repetto 1996; Fleischer 2015). Accordingly, environmental charges should continue to be viewed by policymakers as a means of funding programs and remediation as opposed to a regulatory instrument that will result in behavioral change. While environmental charges are a noteworthy policy instrument to be considered during policy formulation, policymakers need to be aware of the limitations.

5. Conclusion

Environmental charges are a form of Pigouvian taxes intended to correct environmental externalities. Clearly defined environmental taxes, such as carbon taxes implemented outside of the United States, make clear attempts to do this with changes being set at rates high enough to potentially alter behavior. In contrast, environmental charges implemented at the federal level in the United States are typically used to recover the government's costs in addressing an environmental externality. Suggesting acceptance an environmental externality as the status quo.

In order to examine the premise of this report, fourteen policies were identified as possible environmental charges, of which six met the criteria for an environmental charge and two partially met the criteria. Each of these policies examined is characterized by features that establish them as environmental charges, but are either not designed to, or have rates whose rates that are set too low to have any significant impact upon the creation of the relevant environmental externality. This stands in contradiction of the theoretical foundation for environmental taxes, supporting arguments that the United States implements environmental taxes as a means of recovering costs associated with clean-up.

Despite the current application of environmental charges at the federal level in the United States typically accepting the production environmental externalities as the status quo, they may still have some unity to policymakers. The restatement of the Superfund Trust Fund Excise Tax would serve to address continual issues with funding the

Superfund. Likewise, the enactment of a green fee on cigarettes to address the waste produced by cigarette butts could help address existing environmental concerns.

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