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## TÁC ĐỘNG CỦA THUẾ BẢO VỆ MÔI TRƯỜNG TỚI KIỂM SOÁT Ô NHIỄM KHÔNG KHÍ: QUAN ĐIỂM PHÁT TRIỂN BỀN VỮNG Ở TRUNG QUỐC VÀ BÀI HỌC ĐỐI VỚI VIỆT NAM

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### Tóm tắt

Trong bối cảnh kinh tế mở rộng nhanh chóng và tình trạng suy thoái môi trường ngày càng nghiêm trọng, đặc biệt là ở các nước đang phát triển như Việt Nam và Trung Quốc, nghiên cứu này tập trung đánh giá việc triển khai và những tác động của các chính sách Thuế Bảo vệ môi trường. Với những thách thức môi trường đáng kể do quá trình tăng trưởng kinh tế gây ra, Việt Nam có nhiều điểm tương đồng với Trung Quốc, một quốc gia đã trải qua các giai đoạn phát triển tương tự. Bằng cách nghiên cứu cơ sở lý thuyết của Thuế Bảo vệ môi trường và mối liên hệ với phát triển bền vững, cũng như các yếu tố thực tế ảnh hưởng đến hiệu quả chính sách, bài nghiên cứu này nhằm cung cấp những hiểu biết dựa trên thực tiễn. Dựa trên kinh nghiệm của Trung Quốc về chính sách

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thuế môi trường, nghiên cứu đưa ra các khuyến nghị phù hợp cho Việt Nam, nhằm giải quyết bài cảnh kinh tế - xã hội đặc thù và thúc đẩy tiến trình đạt được các mục tiêu phát triển bền vững.

**Từ khoá:** Thuế bảo vệ môi trường, kiểm soát ô nhiễm không khí, Trung Quốc, phát triển bền vững, Việt Nam

## **IMPACT OF ENVIRONMENTAL PROTECTION TAX ON AIR POLLUTION CONTROL: A SUSTAINABLE DEVELOPMENT PERSPECTIVE IN CHINA AND IMPLICATIONS FOR VIETNAM**

### **Abstract**

Against the backdrop of rapid economic expansion and escalating environmental degradation, particularly evident in developing nations like Vietnam and China, this research paper scrutinizes the implementation and implications of Environmental Protection Tax policies. With Vietnam facing significant environmental challenges exacerbated by its economic growth trajectory, the study draws parallels with China, which has undergone similar developmental phases. By examining the theoretical underpinnings of Environmental Protection Tax and its relevance to sustainable development, as well as the practical considerations influencing policy effectiveness, this paper aims to provide insights grounded in real-world dynamics. Leveraging China's experiences with environmental taxation policies, the research offers tailored recommendations for Vietnam, aiming to address its unique socio-economic context and accelerate progress towards sustainable development goals.

**Key words:** Environmental protection tax (EPT), air pollution control, China, sustainable development, Vietnam

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### **1. Introduction**

The adverse impacts of air pollution on human health and life have become a hot topic, drawing significant attention from social communities. For human health, air pollution causes respiratory and immune-related issues, directly affecting quality of life and resulting in substantial healthcare costs. Regarding the environment, it degrades air quality, harms biodiversity, and contributes to climate change.

China, as a developed country, faces severe air pollution challenges, with cities frequently experiencing hazardous levels, adversely affecting public health and environmental quality. To address these challenges, China has implemented various environmental protection measures, including rationalizing and introducing reasonable environmental taxes to minimize pollution. By applying taxes on pollutants causing air pollution, China's environmental protection tax has significantly reduced emissions in recent years. Additionally, when local governments retain a portion of the environmental protection tax, local infrastructure and facilities are upgraded to improve living standards and minimize environmental damage caused by outdated technology, thereby reflecting the Chinese government's commitment to sustainable development.

Vietnam, a rapidly developing country, is also witnessing an increasing environmental pollution due to the rapid economic growth in recent decades. By examining previous studies, this research will explore the role of environmental protection taxes in mitigating air pollution in the context of sustainable development, thereby analyzing the success of implementing environmental protection taxes in sustainable development aspects in China to draw lessons for Vietnam. All these issues will be addressed through the following analytical sections.

## **2. Theoretical Framework and Conceptual Understanding**

### ***2.1. The concept of Environmental Protection Tax***

#### *2.1.1. Definition*

Environmental protection tax (EPT) means indirect-collected tax, collected on products and goods when used to cause negative environmental impacts (Vietnam's Environmental Protection Tax Law, 2020). It includes a wide range of legislative charges on businesses and private individuals, aimed at reducing practices which cause damage to the environment. There are many forms of EPT, some of which are aimed at penalizing those who emit harmful chemicals and some of which are aimed at rewarding those who employ environmentally-friendly practices.

Over the years, EPT has been a key pillar of every countries' transition to a cleaner, greener economy (Shira, 2023). By imposing taxes on goods and activities that contribute to pollution, such as emissions-intensive production processes or the use of fossil fuels, EPT effectively internalizes the externalities associated with pollution (Truong, 2021). This encourages businesses and consumers to adopt cleaner technologies and practices, leading to reduced emissions and improved air quality.

#### *2.1.2. Characteristics of Environmental Protection Tax*

Environmental protection tax embodies several distinct characteristics that shape its implementation and effectiveness in addressing environmental challenges. Firstly, it is primarily an indirect tax, typically levied on products and goods known to contribute to environmental degradation (Vietnam's Environmental Protection Tax Law, 2020). Unlike direct taxes, such as income or property taxes, EPT is primarily levied on goods and products known to contribute to environmental harm.

Secondly, EPT is characterized by its targeted approach. Rather than applying a blanket tax across all economic activities, it focuses specifically on activities, products, or behaviors that have detrimental environmental effects (Linh Trang, 2023). This targeted strategy enables policymakers to identify and address key drivers of environmental degradation, thereby incentivizing industries and individuals to adopt more sustainable practices.

Another notable characteristic of EPT is its singular impact upon the creation of taxable goods (Wang et al., 2023). This means that the tax is incurred only once during the formation or

manufacturing process of the taxed goods. This characteristic distinguishes EPT from other forms of taxation, as it places emphasis on addressing environmental impacts associated with the production stage rather than ongoing consumption or usage.

Finally, revenue generated from EPT serves as a vital source of funding for environmental conservation efforts and sustainable development initiatives. Governments can allocate these funds towards pollution control measures, environmental restoration projects, or investments in renewable energy infrastructure (Hoa Nguyen Quynh et al., 2023). This dual role of EPT in both mitigating environmental harm and financing environmental initiatives underscores its importance as a policy tool for promoting environmental protection and sustainability.

### *2.1.3. Components of Environmental Protection Tax*

a) **Taxpayer:** The individuals, businesses, or entities responsible for paying the Environmental Protection Tax. Taxpayers may include industries, manufacturing facilities, commercial enterprises, and individuals engaged in activities that have a significant environmental impact (Shira, 2023).

b) **Taxable and Non-taxable Objects:** Taxable objects refer to the specific activities, products, or behaviors subject to taxation under Environmental Protection Tax regulations. These may include emissions of pollutants, extraction of natural resources, production of environmentally harmful products, and generation of waste (Liu and Liu, 2022). Non-taxable objects, on the other hand, are exempt from Environmental Protection Tax and may include certain environmentally friendly activities, renewable energy production, or low-impact practices.

c) **Tax Bases/Tax Calculation Procedure:** The tax bases determine the amount of tax owed by taxpayers and are typically calculated based on the quantity or intensity of environmental impact associated with taxable objects. For example, emissions taxes may be calculated based on the volume or concentration of pollutants released into the environment, while resource extraction taxes may be based on the quantity or value of natural resources extracted (Hoa Nguyen Quynh et al., 2023). The tax calculation procedure outlines the methodology used to determine the tax liability of taxpayers based on the specified tax bases.

d) **Tax Rates:** Tax rates specify the percentage or amount of tax levied on taxable objects. Tax rates may vary depending on the type and severity of environmental impact associated with the taxable activity. Governments may adjust tax rates to achieve environmental policy objectives, such as reducing greenhouse gas emissions, promoting waste reduction, or conserving natural resources (Liu and Liu, 2022).

e) **Terms of Tax Payment:** The terms of tax payment establish the deadlines and procedures for taxpayers to fulfill their tax obligations. This includes deadlines for submitting tax returns, making tax payments, and complying with reporting requirements. According to He et al. (2022), governments may impose penalties or interest charges for late or non-payment of Environmental

Protection Tax to ensure compliance with regulatory requirements and incentivize timely tax payment.

## ***2.2. Sustainable Development and Air Pollution Control***

### *2.2.1 Definition of sustainable development and its relevance to environmental issues*

Sustainable development has become the buzzword in development discourse, having been associated with different definitions, meanings and interpretations. However, at its core, sustainable development recognizes the intricate relationship between economic growth, social justice, and environmental protection (Linh Trang, 2023). Sustainable development embodies a humanitarian perspective, markedly more modern than the notion of “development at any cost”, as development at any cost entails maximizing the exploitation of natural resources to serve developmental activities, without considering its impact on the very process of development. This concept is built upon the overarching principle of human progress, ensuring equitable relationships between generations.

Today, the widely accepted definition, also present in the “Brundtland Report” by the United Nations World Commission on Environment and Development (WCED) in 1987, states: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

### *2.2.2. Three pillars of Sustainable Development*

The concept of SD rests, fundamentally, on three conceptual pillars. These pillars are “economic sustainability”, “social sustainability”, and “environmental sustainability”.

#### a) Environmental sustainability

The central pillar of sustainable development is to reduce the environmental impact of human activities (Purvis, Mao and Robinson, 2018). Rooted in this principle, environmental sustainability serves as a cornerstone for achieving long-term ecological balance, societal resilience, and economic prosperity. Within the contemporary context, environmental sustainability is increasingly imperative as societies confront pressing challenges such as climate change and biodiversity loss.

Environmental sustainability theory posits that human activities should be conducted in a manner that ensures the well-being of both present and future generations while maintaining the integrity of ecological systems (WCED, 1987). Within this framework, environmental sustainability is conceptualized as a dynamic and multifaceted concept that encompasses ecological, social, and economic dimensions. This perspective emphasizes the importance of adopting holistic approaches that integrate environmental considerations into decision-making processes across various sectors. Mitigation efforts aim to reduce the environmental footprint of human activities through measures such as transitioning to renewable energy sources, promoting energy efficiency, and implementing policies to curb greenhouse gas emissions.

## b) Social sustainability

The social pillar of sustainable development must meet people's essential needs and contribute to their fulfillment. It stands as a pivotal pillar, urging a reevaluation of social structures and practices that prioritize long-term societal well-being over short-term gains. Understanding the nature of social dynamics and how these structures emerge from a systems perspective is of great importance to social sustainability (Zhai and Chang, 2019).

Social sustainability emphasizes the critical role of fostering social cohesion and community resilience in driving sustainable societal progress. According to Purvis, Mao and Robinson (2018), by investing in initiatives that promote inclusivity, diversity, and social justice, societies can cultivate stronger social networks and collective resilience to navigate challenges effectively. Embedded within the ethos of social sustainability is a recognition of the interconnectedness of various social elements and the importance of addressing systemic inequalities to achieve enduring social well-being. Fundamentally, social sustainability calls for a broader conception of societal prosperity - one that extends beyond economic indicators to encompass measures of social cohesion, equity, and quality of life.

## c) Economic sustainability

Economic sustainability implies a system of production that satisfies present consumption levels without compromising future needs (Lobo, Pietriga, & Appert, 2015). It encompasses a multifaceted framework aimed at fostering economic growth while simultaneously preserving and enhancing natural resources and ecosystems. At its core, economic sustainability entails the responsible stewardship of resources to ensure their availability and functionality for present and future generations. This necessitates the adoption of policies and practices that promote efficient resource allocation, minimize waste generation, and prioritize investments in renewable and regenerative technologies. In the context of research and policy formulation, economic sustainability demands rigorous analysis and evaluation of economic activities and policies to assess their long-term compatibility with environmental and social objectives.

Furthermore, economic sustainability necessitates the promotion of sustainable consumption and production patterns that decouple economic growth from environmental degradation (Holmberg et al., 2017). This entails shifting towards circular economies that prioritize resource efficiency, waste reduction, and the reuse and recycling of materials. Additionally, economic sustainability requires the alignment of financial systems and incentives with sustainability objectives, encouraging investment in green technologies, infrastructure, and practices.

### *2.2.3. Conceptual Linkages between Sustainable Development Goals and Air Pollution Control*

Air pollution control measures exhibit intricate connections with various facets of sustainable development, reflecting the multifaceted nature of efforts to mitigate environmental degradation (Wang et al., 2023). To begin, the reduction of air pollution levels is closely associated with significant improvements in public health outcomes (WHO, 2021). The efforts to reduce air

pollution may improve these conditions and thus benefit the attainment of the SDGs. Prioritizing public health considerations in air pollution control strategies not only promotes healthier communities but also advances the overarching goal of ensuring access to quality healthcare and well-being for all.

Moreover, efforts to control air pollution stimulate innovation in clean technologies, aligning with broader sustainable development objectives. Investments in research and development of clean technologies drive economic growth, create job opportunities, and foster sustainable industrialization (Zhai and Chang, 2019). Technological advancements in air pollution control contribute to the transition towards a more sustainable and resilient economy, supporting responsible consumption and production patterns.

Furthermore, air pollution control measures play a vital role in environmental conservation by reducing emissions of harmful pollutants and preserving natural habitats. It has been found that air pollutants can enter water and soil (Holmberg et al., 2017) and uptake by plants and grazing livestock, thus influencing the whole ecosystem. The efforts contribute to the protection and restoration of terrestrial ecosystems, supporting biodiversity conservation and the provision of ecosystem services essential for human well-being and sustainable development.

### **3. Review of Environmental Protection Tax Policies in China**

#### ***3.1. Evolution of Environmental Taxation in China***

##### **a) Before the policy shift in 2018**

China, before 2018, must face significant challenges of environment and economics, especially air pollution between urban and rural areas. Therefore, in 1978, China introduced an initial pollution fee system and initiated pilot projects (Anh Tuan, 2022). By 1982, China implemented temporary measures nationwide to collect pollution fees (Zhu and Dou, 2018) to address environmental concerns and generate revenue to supplement inadequate capital budgets for environmental management and protection programs. In 1988, China established a Special Pollution Control Fund to provide preferential loans for environmental protection activities (Tran et al., 2021) based on 20 years of experience.

In 2003, China officially institutionalized its pollution fee policy (Lin, 2023) by considering fee assessment based on the concentration of each pollutant within the total emissions and doubling the fee for emissions exceeding standards. In 2010, the 5th Plenum of the 17th Central Committee of the Communist Party of China proposed a new tax called the environmental protection tax in the 12th Five-Year Plan on national economic and social development, although it was not yet approved (Zhu and Dou, 2018). In 2014 and 2015, China continued to apply pollution fee methods (Tran et al., 2021) by doubling the pollution fee to accurately reflect actual emission levels and encourage less pollution (Lin, 2023).

b) After the policy shift in 2018

On January 1, 2018, the Chinese government implemented a new environmental tax policy, effectively ending the pollutant discharge fee that had been in effect for the past 40 years (China Briefing News, 2018). China's Environmental Protection Tax Law was passed by the Standing Committee of the 12th National People's Congress of China on December 25, 2016, and officially took effect from January 1, 2018 (China-Environmental Protection Tax Law Asia, n.d.). The law is designed to include 5 chapters with 28 articles and 2 appendices for air pollution, water pollution and noise pollution, providing principled regulations for taxpayers, tax collection scope, tax categories, tax rates, tax exemptions and reductions and managing methods.

The regulations for air pollution are stated in Article 2 of China's EPT with the taxpayers being public enterprises and production organizations that directly discharge pollutants into the territorial environment under the management authority of the government, residents are not subject to environmental protection tax.

**Table 1:** China's Environment Protection Tax 2018

<b>Taxable item</b>	<b>Tax unit</b>	<b>Tax rate</b>
Atmospheric pollutants	per pollution equivalent	between 1.2 and 12 Yuan
Water pollutants	per pollution equivalent	between 1.4 and 14 Yuan
Coal gangue	per ton	5 Yuan
Tailings	per ton	15 Yuan
Hazardous waste	per ton	1000 Yuan
Smelting slag, coal ash, cinder, and other solid wastes (including semi-solid and liquid wastes)	per ton	25 Yuan
Noise Industrial noise	1-3 dB above standard	350 Yuan per month
	4-6 dB above standard	700 Yuan per month
	7-9 dB above standard	1400 Yuan per month

<b>Taxable item</b>	<b>Tax unit</b>	<b>Tax rate</b>
	10-12 dB above standard	2800 Yuan per month
	13-15 dB above standard	5600 Yuan per month
	16 dB or more above standard	11200 Yuan per month

**Source:** China Law Translate (2017)

Specifically, about air pollution, China’s EPT law clearly indicates 44 air pollutants generated, including: sulfur dioxide, nitrous oxide, carbon monoxide, chromic acid mist, black carbon dust, lead and its compounds, carbon disulfide (Table 2). According to the EPT law, the tax rates are about 1.2 - 12 yuan (Law, 2017), however, they are applied uniformly nationwide according to the mechanism “The central government sets the minimum tax rate, localities determine the tax rate on the basis of the minimum tax rate” (Tran et al., 2021)

**Table 2:** Pollutant Equivalent Values for Atmospheric Pollutants

<b>Pollutants</b>	<b>Pollution equivalent values (kg)</b>
1. Sulfur dioxide	0.95
2. Nitrogen oxides	0.95
3. Carbon monoxide	16.7
4. Chlorine gas	0.34
5. Hydrogen chloride	10.75
6. Fluorides	0.87
7. Hydrogen cyanide	0.005
8. Sulfuric acid mist	0.6

**Source:** China Law Translate (2017)

And in the Articles 8, 9 and 11 of China's EPT, the emission tax is stipulated in 3 steps: firstly, find out how much of each air pollutant is being released by dividing the total pollutants by the pollution standard set by the law, then sort by pollution level from high to low, and lastly the tax to be paid is calculated based on the total emissions of the three substances with the highest pollution level (Grand, 2018).

Furthermore, China's EPT law indicates that there are six situations where companies don't have to pay the EPT for their emissions (Grand, 2018):

*When pollutants are released from agriculture activities (except large-scale farming).*

*When pollutants come from vehicles, machines, ships, or airplanes not used on roads.*

*When a waste treatment center meets national and local pollution standards.*

*When companies use solid waste according to environmental rules.*

*In other cases approved by the government.*

Also, there are two ways for the enterprises and organizations to lower the tax on emissions (Grand, 2018):

*If a company's pollution is less than 30% of the standards, they pay 75% of the tax.*

*If a company's pollution is less than 50% of the standards, they pay 50% of the tax.*

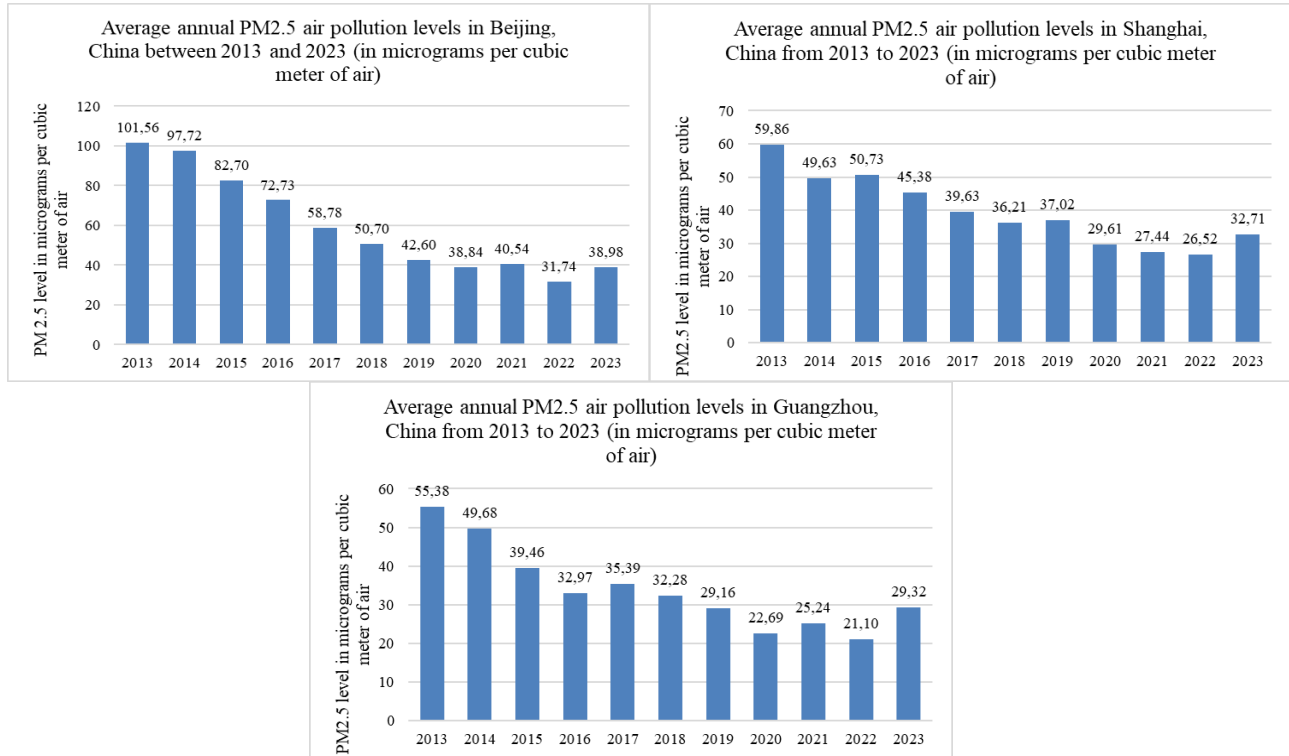
### **3.2. Impacts of implementing environmental protection taxes in China**

#### **3.2.1. Achievements of the environmental protection tax**

The imposition of the EPT has significantly hindered the production of heavily polluting companies in the short run by either forcing them to reduce emissions and increase their R&D investments and innovations for environmentally sustainable technologies and industrial restructuring to reduce the tax burden, or making those businesses invest less in the areas with stricter environmental tax. As a result, the pollutant emissions of all provinces have decreased on average (Yin, 2023). Guo (2022) proved that environmental tax reform has significantly improved urban air quality by reducing industrial sulfur dioxide emissions per capita and industrial smoke and dust emissions per capita. Tang (2023) showed that firms in regions with higher tax rates have higher emission costs, and are thus more inclined to reduce production and apply cleaner technologies. Local states will also try to strengthen the tax regulation due to the nimbyism attitude from the native citizens and financial liquidity factors that prefer a cleaner environment. Moreover, with the Chinese individuals and households no longer subjected to paying the fees directly, they are now less disincentivized to modify their consumption behavior towards sustainability.

The new and stricter tax enforcement, in comparison to the previous environmental fees, enhanced the effect on emission reduction. Particularly, it upgraded local underdeveloped industries with high pollution, energy consumption, and footprint to highly developed industries

with net zero pollution and low energy consumption and exhausts. Additionally, air pollution reduction has a spillover effect, as the effects from neighboring cities spread to the local area, effectively improving the air quality. Consequently, Beijing’s air quality met China’s national standards in 2021, which is 35  $\mu\text{g}/\text{m}^3$ . The mean density of PM2.5 dust in the province decreased by 13% to 33  $\mu\text{g}/\text{m}^3$ . In addition, the three largest urban cities in China has seen a general decrease in the PM2.5 pollution index until 2022, as demonstrated in the three charts below:



**Figure 1, 2, & 3:** Annual PM2.5 levels in Beijing, Shanghai, and Guangzhou, China 2013 - 2023 (unit:  $\mu\text{g}/\text{m}^3$ )

**Source:** C. Textor, Public Domain (Statista, 2024)

It can be concluded from the graphs 1, 2, and 3 that the EPT policy executed since 2018 had a positive effect on the air quality of the large cities in China. Particularly, the PM2.5 levels in Beijing, Shanghai, and Guangzhou had a pattern of decrease from 50.7, 36.21, and 32.28 to 31.74, 26.52 and 21.1 between 2018 and 2022. Despite the resurgence of the pollution levels in 2023 due to the country reopening its economic activities, the density of the PM2.5 particles in the three cities did not return as high as in 2018, at 38.98, 32.71, and 29.32, respectively. A possible explanation for the slight growth of PM2.5 particles in 2021 in Beijing and Guangzhou, as shown in Figure 1 and 3, is that they had to bear the pressure of ensuring that the country would not encounter an economic crisis during the stringent lockdowns by producing substitutes for other cities. It is believed that once China manages to restabilize its economic growth, the cities can reestablish their green agenda, further mitigating the PM2.5 concentration levels.

When it comes to sustainable development, there is an inverted U-shaped relationship between environmental tax and the sustainable performance of private enterprises (Zhao, 2022), which indicates that although EPT is beneficial in promoting sustainable performance, excessive amounts through the inflection point will be detrimental. Moreover, the tax policy also has a similar relationship to the corporate financial performance. However, for state-owned enterprises, the data only show a negative and significant linear relationship between environmental tax and financial performance, and there is no empirical evidence supporting the effect of environmental tax on the environmental social performance of state-owned enterprises (Zhao, 2022).

In conclusion, it can be inferred that the environmental tax policies have played a considerable role in lowering the pollution levels in some of China’s largest cities. In terms of sustainable development, the EPT has managed to encourage businesses, especially the ones in the heavily polluting industries, to pursue more sustainable innovation programs and production methods, such as efficient recycling and environmental management, thereby changing the industrial structure to more advanced versions; raise awareness and convince the local inhabitants to practice more ethical and environmentally friendly consumption lifestyle, shifting the market towards a greener condition. The promising signals from the EPT’s success and its ripple effects, combining with the rapid expansion of the Chinese economy, demonstrates a possible future in which the country will have a prosperous economy while the environment and public health is significantly recovered.

### 3.2.2. Prevailing hindrances of the environmental tax policy

On the other hand, the overall effects of the EPT is inadequate as it is only effective in reducing industrial SO<sub>2</sub>, smoke, and dust emissions. The smaller a business, the more apparent the tax burden, which will significantly increase the corporate tax avoidance and evasion activities in polluting industries in highly regulated cities. Moreover, after several years of executing the EPT, the improvements are not substantial enough to impact the air pollution crisis. For example, the below table illustrates the environmental performance index (EPI) of China in 2022:

**Table 3:** China’s 2022 Air Quality EPI

Component	Rank	EPI score	10-year change
Air Quality	157	20.60	6.60
PM2.5	147	13.80	4.50
Household solid fuels	103	32.90	9.70
Ozone	169	22.10	16.80
NO <sub>x</sub>	174	N/A	N/A

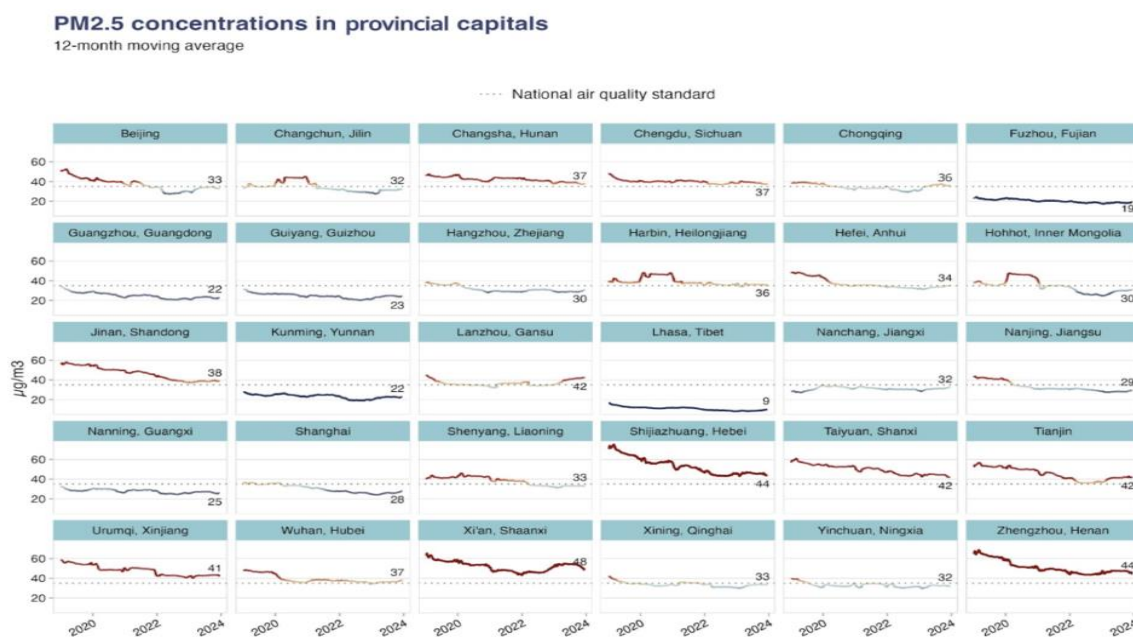
SO <sub>2</sub>	174	N/A	N/A
CO	172	N/A	N/A
VOC*	100	27.80	-1.30

**Source:** Environmental Performance Index (2022)

\*(VOC: Volatile Organic Compounds, which is the summed concentration of ethane, propane, formaldehyde, and isoprene (EPI, n.d.))

It is concerning that out of 180 countries recorded in the data published by the EPI, China ranked at 157, with some of its harmful substances like Nitrogen Oxides (NO<sub>x</sub>), Sulfur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO) are among the most emitted in 2022, while the VOCs increasingly got released into the environment. China is one of the most polluted countries in the world, and after 11 years of “declaring war” on pollution since 2013, the changes in air conditions can be concluded as insufficient.

It is also noticeable that in Figures 1, 2 and 3, the concentration of PM<sub>2.5</sub> particles resurged in all of the three cities in 2023. For the first 11 months in 2023, Beijing’s PM<sub>2.5</sub> reported concentrations went beyond twice of the national standard. The PM<sub>2.5</sub> concentration in the entire country rose by 3.6% compared to 2022. Besides, it is also argued that the density of the PM<sub>2.5</sub> dust particles in many Chinese cities have not reduced as much as predicted, as illustrated in the below line graphs:



**Figure 4:** PM<sub>2.5</sub> concentrations in provincial capitals of provinces in China until 2024

**Source:** ChengCheng Qiu (Centre for Research on Energy and Clean Air, 2023)

It can be concluded from the above graphs that, until 2022, the EPT had a more substantial effect on air pollution in more modern cities and in the north, for instance: Beijing, Jinan, Shanghai, Shijiazhuang, Taiyuan, Tianjin, Urumqi, Xi'an, and Zhengzhou, while having limited effect in less developed cities and southern China, for example: Changsha, Chengdu, Chongqing, Hangzhou, Hefei, Nanjing, and Wuhan. The EPT's overall effectiveness remained imbalanced throughout the country, being more influential in regions with higher pollution and development levels.

Finally, there also occurs budget constraints, which can result in less strict environmental regulations, ineffective policies, which will restrict the effectiveness of the EPT. The consequences are that the local Chinese governments have attempted to attract investment and labor, possibly even from more polluting firms, which causes tax competition between local administrations, further distracting the provinces from serious efforts for sustainability. The fiscal stress is also responsible for reduced expenditures on environment-related public goods, services, and projects.

## **4. Implications for Vietnam**

### ***4.1. Overview of Vietnam's environmental tax system***

Vietnam has achieved substantial economic growth in recent decades, but the expansion progress has also resulted in environmental degradation. Air pollution is created by burning fossil fuels in order to generate power for economic activities, which has resulted in the reduction of quality of the ecosystem as well as the Vietnamese people's quality of life. Along with many other policies in the effort of adapting to a greener economy and sustainable development, Vietnam introduced the Law on Environmental Protection Tax No. 57/2010/QH12 in 2010, which then came into effect in 2012. The EPT is implemented to serve the purpose of government revenue for public environmental investments, and to affect the market in such a way that incentivizes or coerces business into possessing more sustainable production chains, and consumers into adopting more environmentally friendly behaviors. Theoretically, the anticipated result is lower density of carbon footprint emissions and an overall better quality of air, which should contribute to the sustainable development plans of the Vietnamese government.

The taxpayers include organizations, households, and individuals that produce and import the taxable goods. There are some extreme cases that are regulated differently:

*In the case of entrusted import, the party entrusted is the taxpayer;*

*Where an organization, household, or individual is the procurement entity purchasing coal for retail but cannot present documents proving that the environmental protection tax has been paid, that organization, household, or individual is the taxpayer.*

Article 6 and 7 of the environmental protection tax law described the basis and method for tax calculation, respectively. In particular, the amount payable is equal to the multiplication of the number of units of taxable goods, with the absolute tax rate per unit of goods.

The absolute tax rate brackets and specific numbers for taxable goods are specified in reference to the following tables:

**Table 4:** Environmental tax brackets for taxable goods since 2010

No.	Products	Unit	Tax rate
<b>I</b>	<b>Gasoline, oil, grease</b>		
1	Gasoline except ethanol	liter	1,000-4,000
2	Aircraft fuel	liter	1,000-3,000
3	Diesel oil	liter	500-2,000
4	Petroleum	liter	300-2,000
5	Fuel oil	liter	300-2,000
6	Lubricant	liter	300-2,000
7	Grease	kg	300-2,000
<b>II</b>	<b>Coal</b>		
1	Lignite	ton	10,000-30,000
2	Anthracite	ton	20,000-50,000
3	Bituminous coal	ton	10,000-30,000
4	Others	ton	10,000-30,000
<b>III</b>	<b>Hydrochlorofluorocarbon solution (HCFC)</b>	kg	1,000-5,000
<b>IV</b>	<b>Taxable plastic bag</b>	kg	30,000-50,000
<b>V</b>	<b>Herbicide (restricted use)</b>	kg	500-2,000
<b>VI</b>	<b>Termiticide (restricted use)</b>	kg	1,000-3,000
<b>VII</b>	<b>Wood preservative (restricted use)</b>	kg	1,000-3,000
<b>VIII</b>	<b>Warehouse disinfectant (restricted use)</b>	kg	1,000-3,000

**Source:** National Assembly of Vietnam (2010)

Between January 1, 2023 and December 31, 2023, new absolute tax levels for gasoline, oil, and grease products have been adjusted according to the Resolution No. 30/2022/UBTVQH15 by the National Assembly Standing Committee, as specified in the following figures:

**Table 5:** Absolute environmental tax rate adjustments in 2023

No.	Products	Unit	Tax rate
1	Gasoline except ethanol	liter	2,000
2	Aircraft fuel	liter	1,000
3	Diesel oil	liter	1,000
4	Petroleum	liter	600
5	Fuel oil	liter	1,000
6	Lubricant	liter	1,000
7	Grease	kg	1,000

**Source:** National Assembly Standing Committee (2023)

Goods that are not specified in Table 3 are not subjected to the EPT. Products described above that are not subjected to it in the following cases:

Goods transported in transit or through Vietnamese border gates, including from the exporting country to the importing country without import and export customs into and out of Vietnam; goods in transit through Vietnamese border gates and border on the basis of agreements signed between the Vietnamese government and foreign governments or agreements between agencies and representatives authorized by the Vietnamese government and foreign governments;

Goods temporarily imported and re-exported within the time limit prescribed by law;

Goods directly exported by producers or entrusted to export business companies for export. Exceptions are organizations, households or individuals purchasing the goods for export.

After more than ten years of practical implementation, Vietnam's tax policy has had many achievements and shortcomings.

#### *4.1.1. Accomplishments*

It is undeniable that the existence of the EPT has primarily raised considerable awareness about environmental protection. The economic activities have encouraged the production and consumption of environmentally friendly products. Enterprises have been seeking to minimize adverse impacts on the environment, paying more attention to the application of greener technologies, using organic raw materials more frequently, economically, and effectively. Many

goods and services providers have replaced original products with more environmentally friendly materials. Besides, it is indisputable that the EPTs' rising revenue have raised the annual state budget revenues in order to finance sustainable socio-economic projects and enact environmental protection expenditures, as shown in the following table:

**Table 6:** Annual Environment Protection Tax revenue (unit: billion VND)

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>Total revenue</b>	11,160	11,512	11,970	27,020	44,323	45,133	47,923	61,570	59,234	58,592

**Source:** Authors' compilation from the Ministry of Finance

According to the aforementioned statistics, the total tax revenue had increased constantly between its first year of coming into effect and 2019, from VND 11,160 billion and peaked at VND 61,570 billion. However, the environmental tax revenue later experienced a contraction from the following year, with the latest recorded amount of VND 58,592 billion. The most evident causal factors include: the economic shutdown due to the pandemic, which obstructed the cash flows, and its consequential tax renewal policies that are administered by the Vietnamese state. Hence, the predictions for the year 2022 and 2023's total environmental tax income tend to be pessimistic.

#### 4.1.2. Limitations

On the other hand, there are still many other products that pollute the air when being used but are not yet covered in the taxable group, such as: industrial emissions, cigarettes, substances, radioactive emissions, electronics, rubber, and polymers, many of which are either used to manufacture environmentally sustainable products like electric cars, wind turbines, and solar panels, or too important for economic development and international competition.

Secondly, the EPT rate of taxable subjects is disproportionate with the amount of pollutants emissions. According to statistics published by the International Energy Agency (IEA), coal accounts for 60%, petroleum accounts for 28% and natural gas accounts for 12% of the total CO<sub>2</sub> emissions from all fuel burning activities in Vietnam, which implies that coal is the dominant source of pollution emissions in Vietnam instead of petroleum. The total EPT revenue in 2021 is 58,592 billion VND, of which, revenue from oil and grease account for nearly 97.9%, while coal only contributes nearly 2%.

Thirdly, the imposed tax rates are apparently still incentivized by budgetary constraints. The Ministry of Finance has continuously proposed increasing EPT on goods, and only moderately reduced the tax amount during the COVID pandemic. The total public expenditure for environmental protection projects during the 2012 - 2021 period was much lower than the environmental tax revenue. Higher tax rates will also result in price increases, while the average

income of the household is still quite low. As a result, the interests of consumers and businesses were adversely affected, which discouraged the incentives of protecting the environment.

Another factor that needs addressing is that the distance between the minimum and maximum absolute tax brackets creates the risk of inconsistent application of the tax law throughout time. Additionally, the ambiguous criteria and regulations on the methods to determine: the number of taxable goods (because the tax authorities determine the quantity themselves), taxable output of products that went through multiple stages of purchasing, and products used to manufacture other goods in the same processor will make inflate the sales prices, discouraging the competitiveness of businesses.

Nevertheless, despite the environmental protection efforts, it is noteworthy that even after 12 years of implementing the EPT, the quality of the air has evidently not improved as successfully as expected when the policy first came into effect. With the current state of environmental quality still deteriorating at an alarming rate, it is evident that the effectiveness of the EPT policy is not equivalent with the sustainable development goals.

## ***4.2. Recommendations for Policy Adoption in Vietnam***

### *4.2.1. Differences between environmental protection tax of Vietnam and China*

The EPT policies for air pollution both in Vietnam and China have two primary goals: to incentivize polluters to reduce the amount of waste discharged into the environment and thus increase revenue for the state budget by incorporating the costs of environmental discharge into product prices, based on the "polluter pays" principle. Both countries levy direct and indirect taxes on actions, products, or services that have the potential to harm the environment. These policies are intended to be fair and effective, with the purpose of ensuring clarity and efficacy in meeting environmental protection objectives while encouraging long-term economic development.

Furthermore, there are significant differences between Vietnam and China's EPT regulations for air pollutants. Clearly, the number of goods subject to environmental protection tax in Vietnam is still insufficient to cover all air pollution-causing substances, such as industrial emissions, tobacco, radioactive waste, and various hazardous chemicals as mentioned above. On the other hand, in China, the environmental protection tax directly addresses air quality-affecting substances, thereby potentially encompassing all the issues related to Vietnam's environmental protection tax.

This disparity also results in inconsistencies in tax rates for different goods in Vietnam. The current law in Vietnam determines environmental protection taxes based on absolute tax rates for simplicity, transparency, and stability in revenue collection. However, the significant gap between the minimum and maximum tax rates for a single type of goods may lead to inconsistent application across different regions. For example, in the case of coal, experts without expertise in coal may struggle to distinguish between taxed types at 15,000 VND/kg and 30,000 VND/kg, potentially leading to arbitrary application or negative implications in tax calculation. This issue

has been addressed by China through the application of absolute tax rates for air pollution - causing substances.

And according to the analysis of air quality in China and Vietnam in recent years, it is evident that the policy changes in China have yielded more significant results compared to those in Vietnam.

#### *4.2.2. Recommendations for Policy Adoption in Vietnam.*

Based on China's lesson, here are some recommendations for Vietnam's government regarding environmental protection tax policies to mitigate air pollution and foster sustainable economic development:

Accurately identify the entities subject to taxation, aligning with Vietnam's conditions. The current comprehensive taxation on environmentally harmful goods by the Vietnamese government has led to ambiguity and lack of specificity in distinguishing different types of environmental taxes. Therefore, the tax list and entities subject to taxation, including pollutants, should be assessed based on pollutant concentration or volume (rather than by commodities as presently done), while clearly allocating different types of pollutants to ensure fairness across industries.

Establish maximum and minimum tax rates for different pollutants, with specific rates determined based on the actual situations of each locality and enterprise. In cases of emissions exceeding standards, the tax payable should double compared to standard levels. The applied tax rate must be higher than or equal to the marginal processing/reduction costs to incentivize organizations and individuals to reduce emissions. The revenue generated from environmental protection taxes should also be reused by central and local government agencies to upgrade infrastructure, obsolete technology, and develop renewable energy sources such as solar and wind energy to mitigate air pollution on a broad scale.

However, unexpectedly changing the taxable items from commodities into pollutants under the environmental protection tax will present some challenges for enterprises. Therefore, in the short term, the government may consider raising taxes on common pollutants like gasoline and lubricating oils, which contribute significantly to environmental pollution, as well as adding other harmful gasses to the list of taxable items, such as coal gas and natural gas. Additionally, instead of tax exemptions and reductions for specific entities, it would be more suitable to implement policies exempting or reducing taxes for entities emitting pollutants below the standard by 30% or more.

Moreover, emphasis should be placed on dissemination and sharing of information through forms of social media and also data between tax authorities and environmental agencies to avoid misunderstandings regarding the mechanisms of environmental protection taxes. Penalty levels for violations should be adjusted to ensure sufficient deterrent effects.

## Conclusion

This study aims to analyze China's achievements in applying environmental protection taxes to reduce nationwide air pollution, thereby providing specific solutions regarding environmental protection taxes for Vietnam to improve the country's air quality.

Over the years, China has made remarkable economic progress, becoming one of the leading developed countries in Asia. However, along with this progress comes extremely harmful levels of air pollution, negatively affecting the health of its people over an extended period. To address this issue, China has amended its environmental protection tax policies, transitioning from environmental protection fees to environmental protection tax laws, officially implemented in 2018. Consequently, air quality in China has notably improved compared to previous years.

Vietnam, currently one of the rapidly developing countries in the region, has also witnessed environmental air pollution due to its recent economic growth. This has had significant impacts on the health of its citizens and environmental landscapes. While the implementation of environmental protection taxes has had some positive impacts on state budgets and air quality in Vietnam, the level of air pollution in the country has not shown signs of significant reduction but rather tends to continue increasing.

Drawing from the lessons of China and identifying certain limitations in Vietnam's environmental protection tax policies, this dissertation proposes several solutions to improve these policies. These include updating tax targets from goods to air pollutants, adjusting tax rates, adding exemptions for certain tax burdens, and most importantly, enhancing communication and information sharing between tax authorities, environmental agencies, and businesses. This also implies that the Vietnamese government must exert greater efforts to innovate and reform environmental protection tax policies, in collaboration with relevant stakeholders, investing time and budget appropriately aligned with the goals of individuals, organizations, and businesses to achieve optimal results in environmental protection towards sustainable development.

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