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THUẾ CARBON Ở CÁC NƯỚC CHÂU ÂU VÀ CHÂU Á – ĐỀ XUẤT CHO VIỆT NAM

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Tóm tắt

Trước những thách thức do biến đổi khí hậu đặt ra và các mục tiêu khí hậu trên toàn thế giới, việc tìm kiếm các chính sách khí hậu hiệu quả đang ngày càng trở nên cấp thiết. Định giá carbon, đặc biệt là dưới hình thức thuế carbon, đang ngày một thu hút được sự quan tâm của thế giới. Thông qua nghiên cứu định tính sử dụng dữ liệu thứ cấp từ các nguồn đáng tin cậy,bài viết này xem xét việc sử dụng luật thuế carbon ở châu Á và Liên minh châu Âu, đánh giá tính khả thi và hiệu quả của nó trong bối cảnh giảm phát thải carbon. Nghiên cứu này cho thấy rằng với chiến lược phù hợp, thuế carbon có thể là một công cụ hiệu quả để giảm lượng khí thải carbon. Dựa trên phân tích kinh nghiệm nước ngoài và tính khả thi trong ứng dụng tại Việt Nam, một số khuyến nghị cụ thể cho việc thực hiện thuế carbon được đề xuất.

Từ khóa: Thuế carbon, chính sách thuế, Việt Nam

CARBON TAXATION IN SEVERAL EU AND ASIAN COUNTRIES AND RECOMMENDATIONS FOR VIETNAM

Abstract

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In view of the challenges posed by climate change and the increasingly ambitious climate targets around the world, the search for effective climate policy instruments is gaining momentum. Carbon pricing, particularly in the form of a carbon tax, has garnered growing interest. Through qualitative research using secondary data from reliable sources, this study examines the use of carbon taxing laws in Asian and European Union, assessing its applicability and efficacy in the context of reducing carbon emissions. This research finds that with the right strategy, carbon tax can be an effective tool for reducing carbon emissions. Drawing from the analysis of foreign experiences and the application feasibility for Vietnam, some specific recommendations for the implementation of carbon tax are proposed.

Keywords: Carbon tax, Tax policy, Vietnam

1. Introduction

The increase in carbon emissions has become a major worldwide issue, carrying significant consequences for both climate change mitigation and environmental sustainability. The greenhouse effect is made worse by this spike in carbon emissions, which has a negative influence on ecosystems and human civilizations in addition to raising temperatures and changing weather patterns.

Therefore, carbon taxation has emerged as a crucial policy tool in the global effort to combat climate change by incentivizing reductions in carbon emissions. Various European Union (EU) and Asian countries have implemented carbon taxation schemes as part of broader strategies to mitigate climate change and transition to low-carbon economies. While the specifics of carbon taxation vary across jurisdictions, the overarching goal remains consistent: to internalize the social costs of carbon emissions and incentivize emissions reductions.

According to the Ministry of Natural Resources and Environment of Vietnam, the average annual growth rate of CO2 emissions from fuel combustion in Vietnam between 2010 and 2020 was 6.4%. As a result, Vietnam still ranks among the countries with the highest emission rates in Asia and globally. As such, mitigating greenhouse gas (GHG) emissions has emerged as a critical national priority for Vietnam.

This paper seeks to address this pressing issue by conducting a comparative analysis of carbon taxation strategies and providing targeted recommendations. By doing so, it aims to contribute to the ongoing dialogue on effective climate policy implementation, thereby aiding informed decision-making processes not only within Vietnam but also on a broader international scale.

Data is collected from a multitude of sources to ensure the quality and reliability of our analysis. Information is drawn from diverse references, including industry reports, academic literature, company disclosures, and assessments from international organisations. The report comprises the main sections:

- Literature review
- Carbon Taxation in Europe and Asia

- Recommendations for application of carbon taxation in Vietnam

2. Literature review

2.1. Overview of carbon tax

A carbon tax is a tax levied on the carbon emissions required to produce goods and services. By raising the prices of fossil fuels responsible for emissions when combusted, carbon taxes seek to mitigate greenhouse gas emissions by reducing the quantity of fossil fuels extracted (Naef, 2024). Consequently, this strategy reduces the demand for products and services with high emissions and encourages the adoption of less carbon-intensive alternatives (Do and Burke, 2021). In its most basic form, a carbon tax only applies to CO2 emissions. But, by pricing additional greenhouse gases according to their capacity to cause global warming, such as methane or nitrous oxide, it may also apply to other greenhouse gases (Babcock, 2009).

According to Nguyen (2022), carbon taxation is identified through the following basic characteristics:

- Firstly, concerning the tax base. Commonly, carbon taxation targets widely used fossil fuels in production and daily life, such as crude oil, coal, and natural gas.

- Secondly, regarding the entities liable for carbon taxation. Entities responsible for paying carbon taxes are typically those that sell fossil fuels into the market for consumption. This includes organisations and individuals involved in importing or extracting fossil fuels. The carbon tax amount forms a component of the fossil fuel price. Those who utilise fossil fuels (consumers) are the ones who ultimately bear the burden of carbon taxation. Therefore, fundamentally, carbon taxation is a form of indirect taxation.

- Thirdly, concerning the tax rate. The objective of carbon taxation is to offset the negative externalities caused by CO2 emissions. Thus, the tax rate is calculated based on the damage caused by one unit of CO2, usually one ton, emitted into the environment. Accordingly, the tax rate of carbon taxation is determined by a fixed amount per unit of one ton of CO2. As CO2 emissions increase, the amount of carbon tax payable also increases, and vice versa.

Carbon dioxide is one of several heat-trapping greenhouse gases (others include methane and water vapour) emitted as a result of human activities (US EPA, 2023). The scientific consensus is that human-induced greenhouse gas emissions are the primary cause of global warming, and that carbon dioxide is the most important of the anthropogenic greenhouse gases. Worldwide, through human activity, the carbon dioxide content has been raised by 50% in the last 200 years (NASA, 2023).

Carbon taxes are designed to reduce greenhouse gas emissions by increasing prices of the fossil fuels that emit them when burned. This both decreases demand for goods and services that produce high emissions and incentivizes making them switch to lower-carbon fuels and renewable energy (Parry, 2019). Revenue from carbon tax is also used to promote economic growth as the

additional fund can be used to reduce personal income tax or government budget deficit (Ghazouani et al., 2020).

2.2. Benefits and challenges of carbon tax

2.2.1. Benefits

Environmental benefits. Firstly, a carbon tax directly prices each unit of carbon dioxide equivalent emitted. This price tag incentivizes polluters to reduce their greenhouse gas emissions by adopting low-carbon technologies and practices. This shift towards cleaner alternatives stimulates innovation and investment in mitigation measures, ultimately leading to a decrease in overall GHG emissions in the atmosphere. Furthermore, reducing dependence on fossil fuels through a carbon tax also leads to a reduction in the emission of harmful pollutants such as nitrogen oxides and sulphur oxides. This translates to improved air quality, which can significantly benefit public health by lowering mortality rates from respiratory illnesses (Michaelowa, 2018).

Economic benefits. A carbon tax generates additional revenue for the state budget. These funds can be strategically allocated to support various initiatives. Originating from the core purpose of carbon taxation, which is to offset the social costs caused by CO2 emissions, the revenue generated from carbon taxes is utilised for various purposes aimed at mitigating global warming, promoting energy conservation, and fostering the development of renewable, "green" energy sources (Franks et al., 2018). Additionally, the revenue can be used to fund mitigation activities aimed at further reducing GHG emissions. Furthermore, the generated revenue can be directed towards broader sustainable development projects across the country. These projects can have a significant positive impact on society, especially for vulnerable communities and low-income segments of the population (World Bank, 2019). In many countries, a portion of carbon tax revenue is allocated to subsidise low-income individuals who are vulnerable to the impacts of carbon taxation. This is because individuals with lower incomes often spend a larger proportion of their earnings on fuel consumption or energy-intensive products. Therefore, carbon tax revenue redistribution serves to alleviate the financial burden on vulnerable populations while simultaneously encouraging the adoption of energy-efficient practices and sustainable energy alternatives. Additionally, a well-designed carbon tax can be revenue-neutral, similar to the one implemented in France (Michaelowa, 2018). This means the revenue generated can be used to reduce other, more distortionary taxes, potentially improving overall market efficiency.

2.2.2. Challenges

Regressive Impact. One major concern is their potential regressivity, meaning they can disproportionately burden low-income households. This occurs because essentials like fossil fuels, on which these households often rely more heavily, become more expensive. Even when designed progressively, low-income individuals still experience a loss in purchasing power due to the general price increase. Implementing effective compensation programs to mitigate this impact can be complex due to underdeveloped systems for identifying and distributing funds to those in need

(Alonso and Kilpatrick, 2022). This complexity can deter governments from setting carbon taxes at levels necessary to achieve their desired emission reduction goals.

Opposition. Another challenge is the inherent resistance to new taxes, especially those impacting businesses. Affected industries that stand to lose profits due to the increased cost of fossil fuels can put on significant pressure to protest against such policies (World Economic Forum, 2022). In addition, strong resistance from the public towards carbon pricing can arise due to its association with rising energy expenses. This was evident in Australia in 2011 when the government's proposal to introduce a carbon tax was met with widespread protests, resulting in a decline in the ruling party's popularity (Mercer, 2011). The opposition makes it difficult for governments to implement a carbon tax.

Economic Disruption. Abruptly raising fossil fuel prices to reflect their full social costs can trigger significant economic disruptions in the short term. As the carbon tax aims to restructure the economy by increasing the cost of a critical resource, it forces businesses and individuals to adjust their activities. This reallocation of resources, including capital and labor, towards cleaner alternatives takes time and can lead to unemployment and resource underutilization in the interim. The larger the immediate price increase, the greater the potential for disruption (Islam, 2022).

Uncertainty and Supply-Demand Mismatches. While some resources may shift towards renewable energy and related sectors, creating new jobs and investments, the transition is not seamless. Disinvestment in fossil fuels may not be immediately offset by growth in the new sectors, creating supply-demand mismatches. This can further exacerbate economic instability in the short term. Additionally, various economic uncertainties, such as fuel reserves, stranded assets, weather patterns, future climate policies, and innovation pace in the renewable sector, can magnify the potential for economic disruption (Li et al., 2022).

2.3. Implementation and impacts of carbon tax

2.3.1. Implementation

Around the world, nations, regions, and local governments have implemented carbon taxes or policies akin to energy taxes based on carbon content. In 2018, multiple carbon pricing schemes, such as carbon taxes or cap-and-trade systems were implemented or planned, covering 20 percent of the global greenhouse gas emissions (World Bank and Ecofys, 2018), albeit at carbon prices well below those that are considered to be in line with the targets of the Paris Agreement. Numerous countries also apply taxes or levies on fossil fuel use, for instance for transportation or heating. Even though these are not directly proportional to the carbon content, they nevertheless provide an incentive to reduce greenhouse gas emissions. A total of 37 carbon tax projects have been chosen for 2023; these efforts span 27 national jurisdictions and 10 subnational jurisdictions (Figure 1).

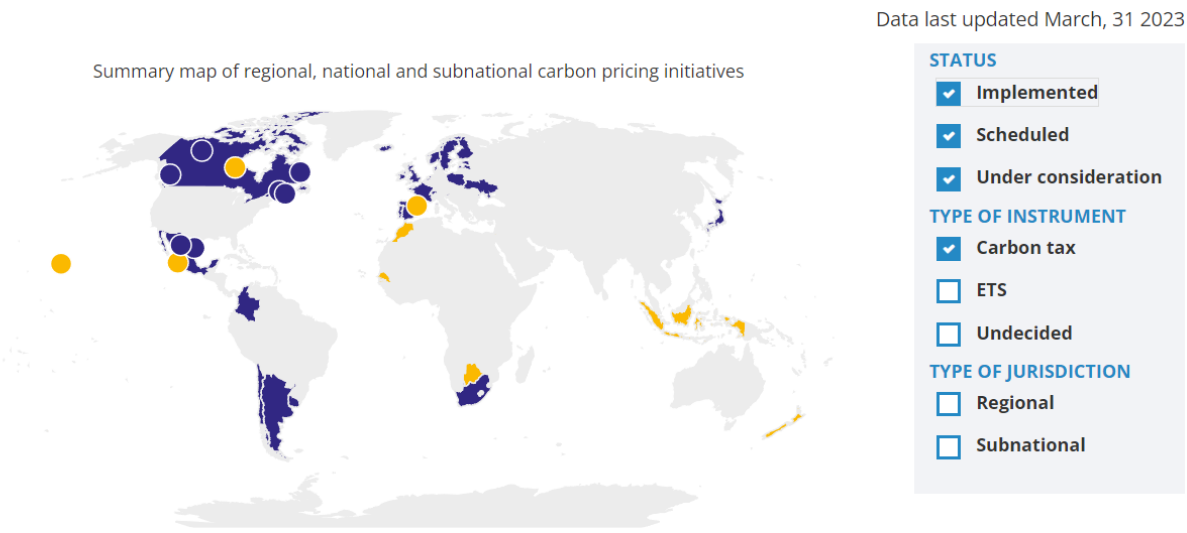

Figure 1. Worldwide carbon tax initiatives

Source: World Bank (2023)

2.3.2. Impact

European countries. In Finland, Sairinen (2012) documents the conclusions of a government task force on environmental taxation, indicating that carbon and energy taxation resulted in a reduction of over 7% in CO2 emissions from 1990 to 1998. Mideksa (2021) further demonstrates that the Finnish carbon tax contributed to decreases of 31% in 2005 compared to a scenario without carbon taxation. Next, for Sweden, Brännlund et al. (2014) examined the carbon intensity of the Swedish industry at the firm level from 1990 to 2004, noting a decrease across all industry sectors studied. This suggests a decoupling of production growth and CO2 emissions, primarily attributed to the Swedish carbon tax. Andersson (2019) recently estimated that the Swedish carbon tax led to a 6% reduction in CO2 emissions in the transport sector on average annually between 1990 and 2005. Bruvoll and Larsen (2004) explored the impact of carbon taxation in Norway, revealing a decline in emissions per unit of GDP attributed to reduced radiant intensity. However, despite significant tax hikes and fuel price escalations, total emissions increased. The efficacy of the carbon tax was modest, accounting for only a 2% reduction in CO2 emissions out of the total 14% decrease. Nonetheless, carbon taxation remains advocated for its cost-effectiveness in emission reduction efforts. Lin and Li (2011) conducted an assessment of CO2 emissions mitigation in five northern European countries using the difference-in-difference method. Their findings showed that in Finland, the implementation of a carbon tax resulted in a significant decrease in the growth rate of CO2 emissions per capita. However, in Denmark, Sweden, and the Netherlands, although there were decreases in emissions, these changes did not achieve statistical significance. For the United Kingdom, Martin et al. (2014) discovered that the Climate Change Levy, a form of carbon tax with varied rates across fuels, decreased CO2 emissions by 8.4%, energy intensity by 18.1%, and electricity usage by 22.6% in the period 1999–2004. Ecoplan (2017) estimated that the Swiss carbon tax, implemented between 2008 and 2015, resulted in a reduction of 6.9 million tons of

CO2 emissions, accounting for 4.4% of combustion emissions. Dussaux (2020) demonstrated that the French carbon tax led to a reduction in CO2 emissions ranging from 1% to 5% between 2014 and 2018. Overall, an increasing number of ex-post studies indicate that carbon taxes can effectively reduce CO2 emissions or at least mitigate their growth in EU nations. However, existing empirical research suggests that the impact of these measures is relatively modest, often falling short of current medium- and long-term emission goals outlined in international and national agreements and plans (Green, 2021; Rafaty et al., 2020). This is likely because tax rates in most countries are still relatively low (Green, 2021; Metcalf, 2021), and there are often generous exemptions, especially for the industrial sector. So far, only a few countries have implemented carbon taxes that, according to model simulations, are high enough to meet the goals of the Paris Agreement (ranging from US-$40 to 80 per ton of CO2 emissions in 2020, increasing to US-$50 to 100 by 2030) (Klenert et al., 2018).

Asian countries. Japan became the first Asian country to implement a carbon tax as part of its low-carbon policy initiatives. Since its introduction in 2012, Japan has consistently worked towards lowering its carbon emissions. By 2020, Japan's carbon tax had contributed to a 0.5% reduction in carbon emissions compared to 1990 levels. In Kawakatsu et al's analysis of low-carbon policies in East Asia, it is concluded that Japan's current carbon tax rate of JPY2,89/t-Co2 ($2.65) has led to minor reductions in emissions for Japan and has had a limited impact on its economic growth (Kawakatsu et al., 2017). However, Japan's current carbon tax policy is deemed insufficient in addressing the pressing climate crisis and achieving substantial domestic carbon emission reductions. In ASEAN, Singapore is the first country to implement a carbon tax. However, Sean (2022) stated that Singapore's carbon tax hasn't led to significant reductions in carbon emissions. Data until the end of 2020 shows only marginal decreases in emissions compared to previous years. For instance, in 2019, emissions decreased by 0.29 million tons of CO2 from 2018 levels, and in 2020, there was a further decrease of 0.21 million tons. However, the overall decrease since the tax was implemented isn't much different from the usual annual fluctuations seen before. Emissions per capita also saw only slight decreases.

Vietnam. Limited research exists on the potential avenues and impacts of carbon pricing in Vietnam. Michaelowa analyzed the challenges hindering the implementation of a carbon tax and potential strategies for its adoption, though without exploring the correlation between tax rates and Vietnam's emissions reduction objectives. Nong et al. employed static computational general equilibrium modeling to assess the potential environmental and economic ramifications of an Emissions Trading Scheme (ETS), but their scenarios deviated from Vietnam's Nationally Determined Contribution (NDC) and overlooked social and political dynamics. Do and Burke's finding, which use both quantitative and qualitative analysis, suggested that a gradually increasing carbon price could effectively guide Vietnam towards achieving its emission reduction targets. A carbon tax offers simplicity advantages, whereas an ETS might enjoy smoother political implementation. The scarcity of information represents a significant constraint in ongoing discussions regarding carbon pricing in Vietnam.

3. Carbon Taxation in Europe and Asia

3.1. Carbon Taxation in EU

3.1.1. National

On a national scale, Europe has witnessed a surge in carbon pricing, with 20 countries implementing carbon tax since Finland's pioneering move in 1990.

a. Implementation

Tax rate and coverage. Carbon tax rates can be determined through various methods, each with its own focus like matching the social cost of carbon, achieving specific reduction goals, generating targeted revenue or benchmarking against others (European Parliament, 2020). For example, Switzerland's carbon tax employs a dynamic pricing mechanism to ensure its effectiveness and maintain environmental credibility. This mechanism involves regularly re-evaluating and adjusting the tax rate based on current CO2 emissions and government-set emissions goals. To further improve its environment commitment and demonstrate the purely incentive-driven nature of the tax, Switzerland applies an automatic mechanism. If emission targets are not met, scheduled increases in the tax rate automatically apply. On the other hand, if the goals are exceeded, the carbon tax remains the same (Noka, Schumacher, and Förster, 2021). In France, the tax rate is determined based on the CO2 content (emission factor) of each taxable fossil fuel, the social costs of carbon, and has a gradual increase schedule each year (Phan and Nguyen, 2022). Among European countries with carbon taxes, Switzerland and Liechtenstein have the highest charges, at €120 per ton of emissions. Sweden and Norway follow closely, with rates exceeding €80 per ton. On the contrary, Ukraine and Estonia boast the lowest taxes, costing less than €2 per ton. In terms of coverage, variations exist among European countries regarding the gases targeted and the portion of emissions covered. Carbon taxes target different greenhouse gases like carbon dioxide, methane, and others. While some countries, like Spain, focus solely on specific gases like fluorinated gases, impacting only a small portion (around 3%) of their total emissions, others apply a wider range of coverage. For example, Norway and Liechtenstein cover a high percentage of their emissions (over 60% and 80% respectively) (Sharma, 2021; Tax Foundation, 2023). This diversity underscores the flexibility inherent in carbon pricing frameworks, allowing countries to tailor policies to their unique emission profiles and industrial landscapes.

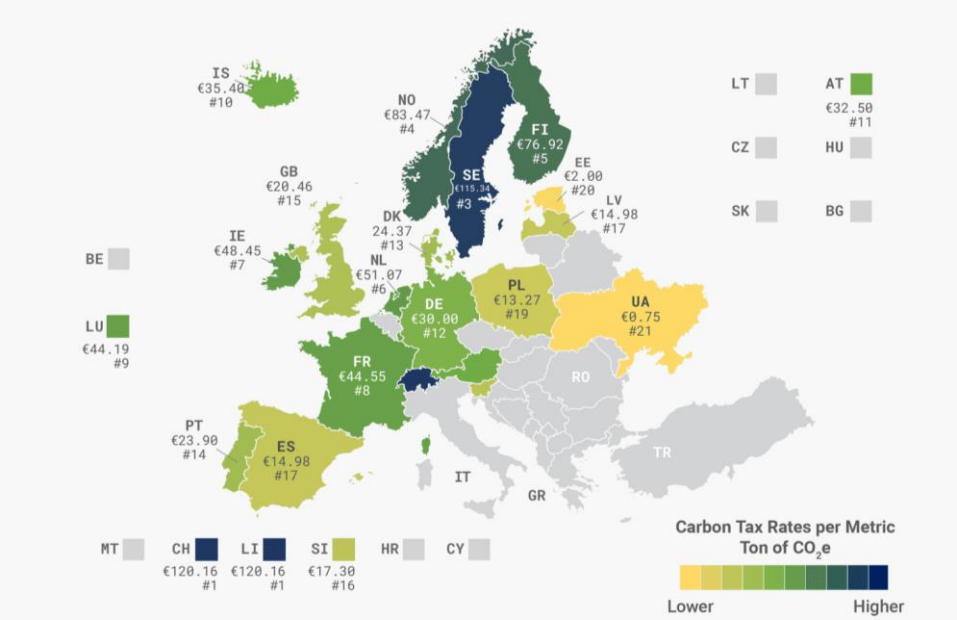

Figure 2. Carbon Taxes Rates in Europe (per Metric Ton of CO2)

Source: Mengden's construction based on World Bank (2023)

Taxpayers. Taxpayers vary in different countries regarding the application of the carbon tax. As per the World Bank (2017), the carbon tax can be imposed on various entities, including importers, producers, distributors, electricity generators, and consumers. In France, the responsibility typically rests on businesses and households that utilize taxable fossil fuels (Phan and Nguyen, 2022). In Switzerland, consumers, both businesses, and individuals, directly bear the carbon tax's cost, as it's applied at the point of purchase for fossil fuels used for purposes like heating, with exceptions for companies with binding reduction commitments or those in the CH ETS (Swiss Emissions Trading System) (Noka, Schumacher, and Förster, 2021). Sweden's carbon tax effectively targets importers, distributors, and significant consumers, reducing administrative complexities by avoiding taxing individual consumers extensively and simplifying tax collection processes (Jonsson, Ydstedt, and Asen, 2020).

b. Revenue

The allocation of tax revenue plays a crucial role in shaping the socio-economic impact of carbon pricing schemes.

In 2019, Sweden's carbon tax contributed SEK 22.2 billion ($2.3 billion), constituting approximately 1 percent of total tax revenues. Notably, the introduction of the CO2 tax in 1991 in Sweden coincided with a reduction in income and labor taxes. The income from the carbon tax played a crucial role in diminishing social contributions made by employers, benefiting vulnerable households through income tax exemptions (Metivier and Postic, 2018).

+ In Switzerland, the CO2 tax collected approximately 1.05 billion EUR in 2016 (Noka et al., 2021). Around one-third of the tax revenue is allocated to a national housing program

that subsidizes energy efficiency measures. An additional 25 million CHF is annually deposited into technology bonds. The remaining two-thirds of the tax income is redistributed to the population and the national economy. This redistribution involves rebates on mandatory health insurance payments for everyone residing in Switzerland, irrespective of their individual energy consumption (Noka et al., 2021). In 2018, a total of approximately 590 million EUR was redistributed, amounting to approximately 83 EUR per person (Noka, Schumacher, and Förster, 2021).

In contrast, Ireland's decision to channel carbon tax revenue into the government's overall revenue stream reflects a pragmatic approach aimed at addressing broader fiscal challenges, aiding in the recovery from the 2008 financial crisis (Metivier and Postic, 2018). While this approach diverges from Sweden's model of targeted reinvestment, it underscores the versatility of carbon pricing mechanisms in supporting diverse policy objectives.

3.1.2. Regional

a. EU Emissions Trading System

Most European countries that have a carbon tax are also part of a large market called the EU Emissions Trading System (EU ETS). “The ETS is a form of environmental taxation that seeks to use the dynamics of supply and demand to reduce the EU’s overall carbon emissions in line with its broader climate change reduction goals” (Tax Foundation, 2023).

This system, which includes all EU countries except three, plus Iceland, Liechtenstein, and Norway, allows companies to buy and sell permits to emit greenhouse gases (European Commission, 2023). Switzerland has its own similar system linked to the EU ETS, and the UK has its own system since leaving the European Union.

The EU ETS operates based on the "cap and trade" principle. A limit is imposed on the total greenhouse gas emissions allowed and this cap undergoes annual reductions in alignment with the EU's climate objectives, ensuring a gradual decline in emissions. While companies receive some allowances for free, they mostly acquire allowances on the EU carbon market. In the event that a company decreases their emissions, they have the option to keep the surplus allowances for future use or sell them to other companies (Vlachou, 2014).

The EU ETS includes greenhouse gas emissions from about 10000 installations from energy, manufacturing industry as well as aircrafts operating within the EU or flying to Switzerland and the UK. Starting in 2024, the EU ETS also includes emissions from maritime transport. Participants in the ETS consist of businesses in these sectors. However, some companies above a specific size can be excluded. Small companies can also be excluded in the case that the governments have alternatives solutions for them to cut emissions. Thanks to the EU ETS, emissions from power and industry sectors in 2023 decreased by 37% compared to 2005 (European Commision, 2023).

b. Carbon Border Tax - Carbon Border Adjustment Mechanism (CBAM)

The introduction of the Carbon Border Adjustment Mechanism (CBAM) by the European Commission in July 2021 represents a significant milestone in the EU's efforts to address carbon leakage and ensure a level playing field for industries exposed to global competition. By levying a carbon border tax on imported products based on their embedded emissions, CBAM seeks to incentivize emission reductions both within and outside the EU.

One of the key features of CBAM is its alignment with the EU Emissions Trading System (ETS), wherein the pricing of CBAM certificates reflects the market value of emission allowances. The categories subject to CBAM include iron and steel, aluminium, cement, electrical energy, hydrogen, fertilizers, selected precursors, and a limited range of downstream products like screws and bolts (PwC, 2023). By targeting a limited range of downstream products as well, CBAM ensures comprehensive coverage while minimizing administrative burdens on importers. This integration not only promotes consistency across carbon pricing mechanisms but also leverages the established infrastructure of the ETS to streamline implementation and enforcement.

The transitional period between October 1, 2023, and December 31, 2025, provides a phased approach to implementation, allowing importers time to adjust to reporting requirements and prepare for the eventual purchase of CBAM certificates. From January 1, 2026, importers of specified goods must register with a central CBAM authority, yet to be introduced, and declare the quantity and embedded greenhouse gas (GHG) emissions of imported goods annually. Importers will then be required to purchase corresponding CBAM certificates (European Commission, 2023). The calculation of embedded emissions involves methods specified in the Regulation, relying on information provided by third-country manufacturers on actual emissions during the manufacturing process. Additionally, standard emission values will be available, calculated by the European Commission based on default values from the worst-performing EU installations for each product type (PwC, 2023). This hybrid approach balances the need for accuracy and transparency with practical considerations regarding data availability and reliability.

By 2030, CBAM has the potential to generate approximately 14 billion euros in revenue. The funds generated should be allocated towards climate finance initiatives, specifically aiding developing countries in their efforts to decarbonize manufacturing. An underlying objective of CBAM is to encourage non-EU economies to adopt more stringent climate policies. In instances where exporting nations can prove that a carbon price has been previously paid, the CBAM levy will be diminished as an incentive (The Business Time, 2024).

3.1.3. Evaluation of carbon tax in European countries

a. Strength

Positive environmental impact. Research has demonstrated the effectiveness of carbon tax in reducing greenhouse gas emissions, with Sweden serving as a notable example of successful implementation. The Swedish carbon tax policy, considered one of the most successful, has notably contributed to a 27% reduction in greenhouse gas emissions between 1990 and 2018

without adversely affecting the national economy, as reported by the Swedish Environmental Protection Agency in 2019. Moreover, carbon tax played the greatest role in reducing emissions from transportation by almost 11% (6% from carbon tax alone) (Andersson, 2019). Similarly, in Switzerland, Ecoplan (2017) conducted a study that suggests a total reduction of 4.1 to 8.6 million tons of CO2 during the period from 2005 to 2015. In simpler terms, this represents a 0.7-1.5% decrease in emissions compared to the overall greenhouse gas emissions (excluding aviation) in Switzerland during the same time frame. The lower limit is determined by assessing the short-term effects of the tax, whereas the upper limit incorporates both short-term and longer-term impacts. The problem of carbon leakage is also mitigated with the regional initiatives (CBAM). Previously, with only national carbon taxation, manufacturers can shift their process abroad to neighbouring countries and regions (Omolere, 2024). These systems can spur other countries into action and prevent companies from avoiding carbon tax by moving manufacturing abroad.

Positive economic impact. Research has also proved that carbon tax did not have any negative impact on Europe's economy and employment. In fact, the research found a positive impact on employment and GDP growth (Metcalf and Stock, 2023). While the reduction in emissions without negatively affecting GDP cannot be solely attributed to carbon tax, as indicated by the Swedish study attributing only half of the decline to the carbon tax, it remains a crucial element, alongside other contributing factors like technological progress, increased efficiency, and the affordability of renewables (Ritchie, 2021).

b. Weakness

While the carbon tax plays an important role in reducing carbon emissions, there are still some limitations.

Narrow coverage. As analyzed above, European countries have the choice to decide what sections and gases to tax with many countries only imposing carbon tax on a limited selection, preventing carbon tax from reaching its full potential. According to Mengden (2023), the carbon tax policies from all European countries only cover 37% of greenhouse gas emissions on average. Even for leaders like Sweden whose carbon tax implementation is considered to be one of the most effective policies in the union, the policy only covers 40% of the emissions. Because of exemptions and limited scopes, the biggest polluters in Sweden which are responsible for about 70% of emissions do not have to cut their emissions (Cheung, 2022). This narrow coverage not only affects the overall impact of carbon pricing but also allows significant polluters, responsible for a large portion of emissions, to evade regulation.

Regressive tax. A common limitation of carbon tax in general and carbon tax in European's countries in specific is the regressive nature of the tax. Since low-income households typically spend a higher percentage of their income on polluting goods than high-income households, they will be the most impacted by carbon tax (Islam, 2022). A study by Douenne in 2020 found that households in the lowest income percentile experienced a tax increase that was 2.6 times greater as a proportion of their income compared to those in the top percentile. For several countries like France, the increase in the carbon tax rate goes along with reductions in labor and capital taxes,

known as the "double dividend" strategy. This approach aimed to boost the economy by using revenue from the carbon tax to alleviate the burden of distortionary taxes. However, the impact of these tax cuts mostly benefits high-income households, particularly those at the upper end of the income ladder (Jelloul et al., 2019). This further widens the income gap and undermines the redistributive potential of carbon pricing policies. Different strategies like equal lump sum transfer should be researched and applied to balance the fairness of carbon tax (The Wall Street Journal, 2019). By redistributing revenues from carbon taxes directly to households, regardless of income level, governments can mitigate the regressive impact of the tax while encouraging sustainable behavior across all segments of society.

3.2. Carbon Taxation in Asia

Compared to the EU, developed countries in Asia and the Pacific have made modest efforts in implementing carbon pricing initiatives. At the national level, there are currently six such initiatives in the region, with Japan and Singapore opting for a carbon tax in 2012 and 2019 respectively (Bicer, 2021).

3.2.1. Implementation

a. Tax rate and coverage

For Japan, carbon tax covers CO2 emissions for all fossil fuels including coal, gaseous hydrocarbons and crude oil/ petroleum products (Asian Development Bank, 2023). The Japanese government has extended various exemptions and refund measures for carbon tax rates applicable to specific fossil fuel products used in certain energy-intensive industries. There is no standalone carbon tax; instead, it is integrated into the existing coal and petroleum taxes. The current tax rate is 289 yen per ton of CO2, ranking one of the lowest among developed countries. To ease the carbon tax burden on covered industries and sectors, the carbon tax rate was initially planned to increase gradually over a period of three and a half years. However, the tax rate has remained unchanged since 2016 (Gokhale, 2021). This static tax rate raises questions about the effectiveness of Japan's carbon pricing strategy in incentivizing emission reductions and driving the transition to a low-carbon economy.

In the ASEAN region, Singapore has taken the lead in implementing a carbon tax as part of its initiative to shift towards a low-carbon economy. According to the Carbon Pricing Act in Singapore (effective from 2019), carbon tax applies to six types of greenhouse gases: CO2, CH4, N2O, HFCs, PFCs, and SF. During the transition period from 2019 to 2023, the specified carbon tax rate is 5 SGD per ton of CO2, which is far from the global recommendation of S$100 by 2030 for advanced economies. As a result, the tax rate puts Singapore as one of the countries with lowest carbon tax rate in the world (Elangovan, 2022). After the transition period, in alignment with the country’s commitment to achieving a net-zero target, there will be an increase in the carbon tax to $25 per ton of CO2 in both 2024 and 2025. Subsequently, in 2026 and 2027, the carbon tax will further rise to $45 per ton of CO2 equivalent. This trajectory is aimed at reaching a range of $50 to $80 per ton of CO2 equivalent by the year 2030 (Figure 3). According to Singapore Senior

Minister Teo Chee Hean, the government intends to regularly review and adjust this tax rate, considering international developments related to climate change, Singapore's progress in emission reduction initiatives, and the nation's economic competitiveness (Tan, 2023).

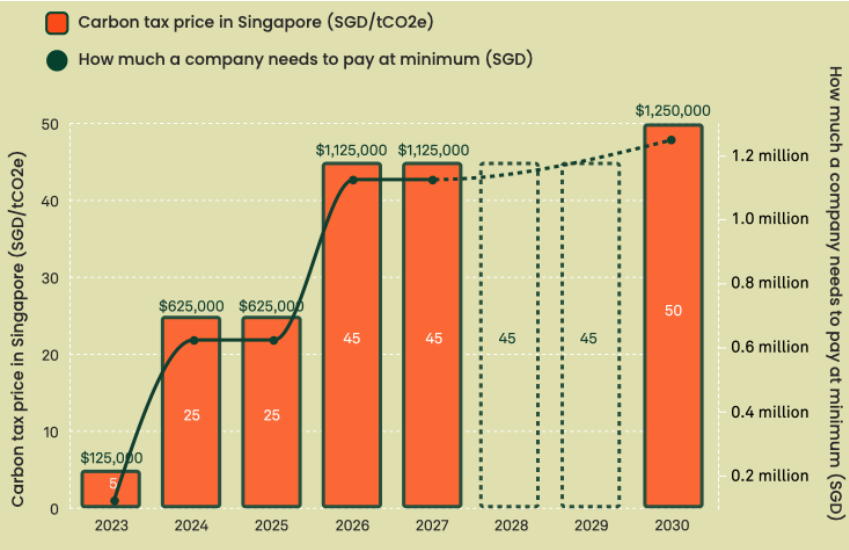

Figure 3. Carbon tax amount in Singapore and how much a company needs to pay at minimum from 2023 to 2030

Source: Cheng's construction based on the Strait Times (2023)

b. Taxpayers

In Japan, the entities liable for carbon tax are those dealing with taxed fossil fuels at the point of market entry (importation or extraction) (Phan and Nguyen, 2022). In Singapore, the carbon tax will be applied upstream on power stations and large emitters. The eligible facilities for taxation are those reporting emissions equal to or exceeding 25,000 tons of CO2 equivalent per year, and they are also mandated to submit an annual emissions report. In total, there are 50 such facilities which are responsible for about 80% of greenhouse gas in Singapore (Singapore National Climate Change Secretariat, 2021).

3.2.2. Revenue

Japan's carbon tax operates on a revenue-neutral basis, with the generated funds directed towards supporting renewable energy projects and supporting energy-saving initiatives (Gokhale, 2021). The tax revenue is utilized to implement various measures aimed at controlling CO2 emissions like energy-saving initiatives, the promotion of renewable energy, and the efficient utilization of fossil fuels. Notable initiatives include supporting small and medium-sized enterprises in installing energy-saving equipment. Additionally, financial assistance is introduced for local governments to promote energy-saving and renewable energy through initiatives like the "Green New Deal Funds" (Japan Ministry of Environment, n.d).

Singapore also follows a similar strategy with the funds generated from carbon tax being reinvested into the economy to assist companies in adopting energy-efficient measures (Duggal, 2021). According to the Singapore National Climate Change Secretariat, "the revenue will be used to support decarbonisation efforts and the transition to a green economy, and cushion the impact on businesses and households". This proactive reinvestment strategy reflects a commitment to fostering innovation, supporting green technologies, and transitioning to a sustainable future.

Overall, while Japan and Singapore both recognize the importance of carbon pricing as a tool for addressing climate change, there are notable differences in their policy design and implementation. Even though both countries' proactive reinvestment of revenue signals a more ambitious and forward-thinking approach to carbon pricing, Japan's stagnant carbon tax rate raises concerns about its effectiveness in driving emission reductions, whereas Singapore's trajectory of increasing tax rates suggests a promising path towards incentivizing significant reductions in emissions over time. Moving forward, both countries can benefit from continuous evaluation and adjustment of their carbon pricing policies to ensure alignment with long-term climate goals and encourage a transition towards a low-carbon, sustainable future.

3.2.3. Evaluation of carbon tax in Asian countries

a. Strength

Broad coverage. Carbon tax in Japan and Singapore both cover a relatively large proportion of carbon emissions. By adding carbon components to the existing Petroleum and Coal tax, Japan's policy "guarantees the broadest possible coverage" (Kawakatsu et al., 2017). Singapore's policy also covers about 80% of total carbon emissions. This broad coverage helps to ensure that the carbon tax effectively addresses the majority of emissions sources within each country, contributing to overall emission reduction efforts.

Minimal negative economic and social impact. The carbon tax policy outlined above aims to minimize negative economic and social impacts. As previously discussed, the relatively low tax rate ensures that the impact on typical households remains minor, as noted in the study by Kawakatsu et al. (2017). This low initial tax rate not only mitigates immediate financial burdens on households but also provides businesses with the necessary time and flexibility to transition towards greener and more sustainable alternatives (Arimura et al., 2022). By allowing businesses to adapt gradually, the carbon tax supports a smoother transition to a low-carbon economy, reducing the likelihood of abrupt disruptions to industries and employment.

Support of innovative solutions. Japan and Singapore's revenue from carbon tax are used to provide funding for sustainable initiatives. In Singapore, revenue has been used to enhance energy efficiency in manufacturing and data centers, implement water-recycling systems, adopt water-conservation technologies, promote energy-efficient technologies for early decarbonization, and accelerate the development of low-carbon energy technologies (Fasih, 2024). Utilizing sulfur charges in Japan has served as a means to provide compensation to individuals affected by air

pollution (Arimura et al., 2022). These approaches to utilizing tax revenue are often perceived as acceptable by both the general public and stakeholders impacted by the tax burden.

b. Weakness

Low tax rate. In order to minimize economic and social effects and encourage companies to embrace innovative solutions, Japan and Singapore apply low tax rates with scheduled increases. However, for Japan, even after the carbon tax rate has been fully implemented in 2016, the tax rate is still considerably lower than other developed countries (Gokhale, 2021; Kawakatsu et al., 2017). While Japan has witnessed a 0.5% reduction in carbon emissions compared to 1990 levels in 2020 due to its carbon tax rate, other developed economies with higher carbon taxes have achieved similar or greater reductions within a shorter time frame (Gokhale, 2021). The current carbon tax policy in Japan, which includes exemptions for energy-intensive industries, alongside fossil fuel subsidies, diminishes the overall efficacy of Japan's carbon tax rate. To enhance effectiveness, an improved carbon tax policy, rather than relying on additional voluntary low-carbon promotion programs, could better drive lasting changes in domestic industries' preferences for energy consumption. For Singapore, the initiative appears to be a gradual encouragement for companies to embrace innovative solutions rather than an abrupt push. This is also because of Singapore's current dependence on fossil fuels with fossil fuels making up for more than 96% of their energy mix (Quah and Siong, 2022). Real impact may only be seen after the government's scheduled hike in carbon tax price starting from 2024 (Leong, 2024).

Carbon leakage. With no carbon border tax, Japan's and Singapore's policy cannot prevent manufacturers from moving their production abroad to avoid the growing carbon tax. As the price of domestically produced goods increases due to carbon tax, consumers will switch to foreign products (Misch and Wingender, 2021). This undermines the effectiveness of the policy as well as the domestic economic competitiveness.

In conclusion, while Japan and Singapore's carbon tax policies demonstrate notable strengths in terms of broad coverage, minimal negative impacts, and support for innovation, they also face significant challenges such as low tax rates and the risk of carbon leakage. Addressing these weaknesses will be crucial for ensuring the effectiveness of carbon pricing policies in driving emission reductions and facilitating the transition to a sustainable, low-carbon future.

4. Recommendations for application of carbon taxation in Vietnam

4.1. Vietnam' CO2 emissions and reduction efforts

In the current era of economic development and globalization, most enterprises are aggressively pursuing industrialization in their production processes, leading to a surge in environmental pollution emissions. Vietnam's carbon footprint has witnessed a steady rise in recent years, primarily fuelled by rapid industrialization and economic expansion. According to data from the World Bank, Vietnam's CO2 emissions surged from 51.2 million metric tons in 2000

to 355.3 million metric tons in 2020, nearly tripling during this period (Figure 4). Consequently, mitigating adverse environmental impacts in general and reducing carbon emission in particular have become a pressing issue in Vietnam's pursuit of stable and sustainable development.

Vietnam has been taking steps to address environmental issues. The country's National Strategy on Climate Change supports 2050 net-zero emission goal with a 43.5% emissions reduction target by 2030, sector-specific targets, and outlined strategies (Agarwal et al., 2022). This commitment has proven its determination in reviewing and perfecting mechanisms, policies, and laws related to the implementation of commitments and international treaties in response to climate change.

Addressing this complex challenge necessitates the implementation of various measures, among which environmental management through taxation stands out as a potent tool utilized not only by Vietnam but also by nations worldwide.

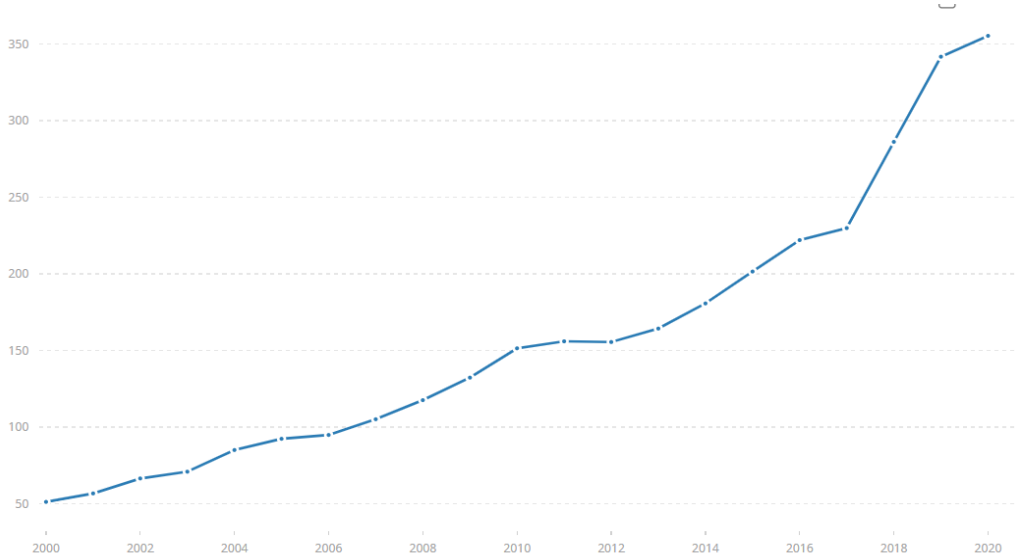

Figure 4. Vietnam's CO2 emissions

Source: World Bank (2020)

The Environmental Protection Law of 1993 was revised when the Law of Environmental Protection of 2005 called for an environmental tax. In which "organizations, households, and individuals that produce and trade in certain types of products that cause long-term adverse impacts on the environment and human health must pay environmental tax". In particular, The Environmental Protection Tax (EPT), as stipulated by Law No. 57/2010/QH12, targets specific categories of goods known to have adverse environmental impacts, such as gasoline, diesel, coal, plastic bags, herbicides, and wood preservatives by integrating environmental costs into the prices of goods and services. These goods, when utilized, contribute to ecological harm. Article 5 of the Law on Environmental Protection Tax defines taxpayers as organizations, households, and individuals involved in producing or importing goods subject to the environmental tax, effectively

closing tax evasion loopholes. The tax bases (Article 6 of the Environmental Protection Tax Act 2010) specify the foundation for the tax computation are determined by the quantity of taxable items and the absolute tax rate, with the calculation method straightforwardly multiplying the taxable goods by the prescribed rate. The National Assembly established tax rate ranges within the legislation (Table 1). The tax rates within the range are set according to Article 8 of the Environmental Protection Tax Act. The tax rates are formed and adjusted base on socio-economic alignment and policy alignment. Rates may be adjusted every two to three years, or annually if there's strong public support.

	Taxable object	Unit	Tax rate range (VND/unit)	Tax rate 2012/13 (VND/unit)
1.	**Gasoline, oil, grease**			
1.2	Gasoline (except ethanol)	Litre	1,000 - 4,000	1,000
1.3	Jet fuel	Litre	1,000 – 3,000	1,000
1.4	Diesel	Litre	500 – 2,000	500
1.5	Paraffin	Litre	300 – 2,000	300
1.6	Mazut	Litre	300 – 2,000	300
1.7	Lubricating oil	Litre	300 – 2,000	300
1.8	Grease	Kg	300 – 2,000	300
2.	**Coal**			
2.1	Lignite	Ton	10,000 – 30,000	10,000
2.2	Anthracite coal	Ton	20,000 – 50,000	20,000
2.3	Fat coal	Ton	10,000 – 30,000	10,000
2.4	Other types of coal	Ton	10,000 – 30,000	10,000
3.	**Hydro chlorofluorocarbons (HCFC)**	Kg	1,000 – 5,000	4,000
4.	**Taxable soft plastic bags**	Kg	30,000 – 50,000	40,000
5.	**Herbicides restricted in use**	Kg	500 – 2,000	500
6.	**Pesticides restricted in use**	Kg	1,000 – 3,000	1,000
7.	**Forest product preservatives restricted in use**	Kg	1,000 – 3,000	1,000
8.	**Warehouse disinfectants restricted in use**	Kg	1,000 – 3,000	1,000

Table 1. Ranges of environment protection tax in Vietnam

Source: Dinh's constructions based on Vietnamese environment protection tax

The environmental protection tax serves as an indirect levy aimed at incentivizing consumers, particularly those who use environmentally harmful products, to opt for eco-friendly alternatives. Consequently, consumers are required to bear this tax as it is factored into the selling price of goods, ensuring a measured approach to prevent adverse consumer reactions.

After eight years of implementation, the environmental protection tax itself has contributed to a significant increase in state budget revenue, contributing to the performance of the country's socio-economic tasks, including spending on environmental protection. This tax plays a vital role in reducing carbon emissions by influencing consumer behavior and encouraging the adoption of cleaner energy sources. The revenue generated from the environmental protection tax has demonstrated consistent growth since 2012. Starting at around 11,676 billion VND in 2012, it surged to approximately 63,079 billion VND in 2019 (as depicted in Figure 5). This revenue equates to roughly 0.34% to 0.98% of the annual GDP, according to the National Institute for

Finance (2022). By integrating into the price of goods and services, the EPT serves to incentivize and regulate production and consumption towards environmental protection goals.

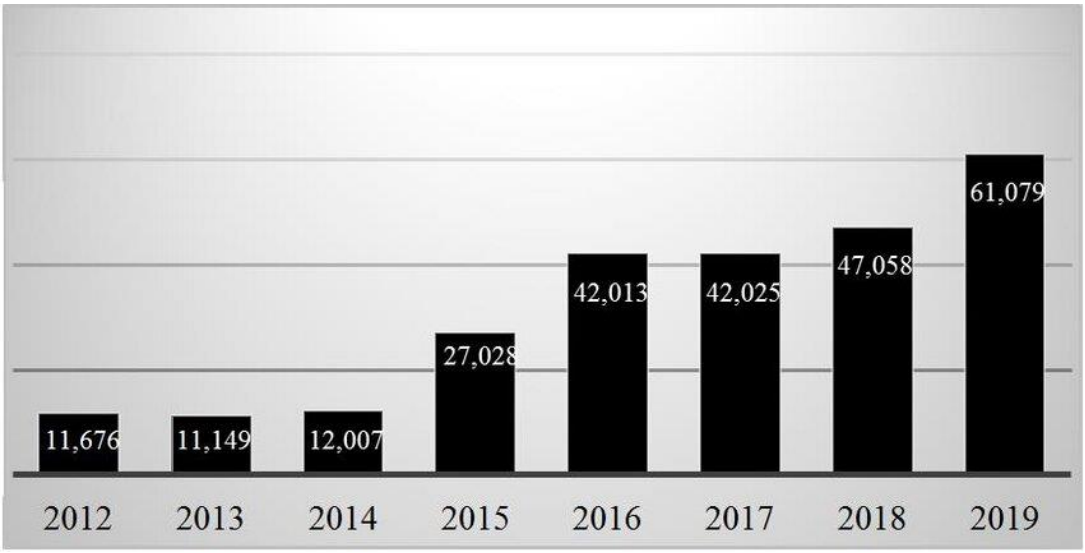

Figure 5. Revenue from environmental protection tax in the period 2012-2019

Source: Dinh (2021)

Furthermore, this tax contributes to mobilizing reasonable contributions from society to the state budget to carry out the country's socio-economic tasks, including spending on solving environmental problems, helping to reduce the burden of environmental protection. financial burden for the State in environmental management and protection.

According to the Ministry of Finance's 2024 report on environmental protection taxes from 2012 to 2016, state budget spending totalled around 131,857 billion VND for environmental protection tasks, exceeding revenue from environmental taxes, which amounted to about 105,985 billion VND. This spending included investments and grants for environmental projects, excluding local budget expenses and economic activities. Additionally, funds were allocated to projects promoting green and sustainable technology.

In addition to existing taxes aimed at carbon reduction and greenhouse gas effects, Vietnam is exploring carbon tax proposals to make it an effective economic tool in promoting greenhouse gas emissions reduction. On August 30th in Hanoi, the United Nations Office for Project Services (UNOPS) organized a consultation workshop on the proposed carbon tax to mitigate the impact of the EU's CBAM on Vietnam's goods (Vietnam Law and Legal Forum, 2023). The EU Parliament's approval of CBAM means taxes will be levied on imports from countries lacking carbon pricing mechanisms. Importers will need to report emissions in their goods without adjustment fees from 2023 to 2025 (European Commission, 2023). Vietnam, relying heavily on exports to the EU, faces challenges due to its lack of carbon tax implementation. As analyzed above, textiles, steel, and plastics, among others, are currently subject to carbon taxes for exports to the EU. In the short term, the EU's carbon border tax on Vietnamese exports could decrease Vietnam's GDP, given that

exports to the EU constitute about 16% of the nation's annual GDP from 2001 to 2018 (World Bank, 2020). Research from Hanoi National University states that Vietnam may face an additional 32-50 million USD in emission tax for products exporting to the EU (VOV, 2023). In the long-term, manufacturers from developed countries may reduce investments in Vietnam due to carbon border taxes on their exports to the EU. Therefore, Vietnam is now considering carbon taxes to reduce emissions and counter the impact of CBAM. This tax would apply during production, importation, or consumption stages.

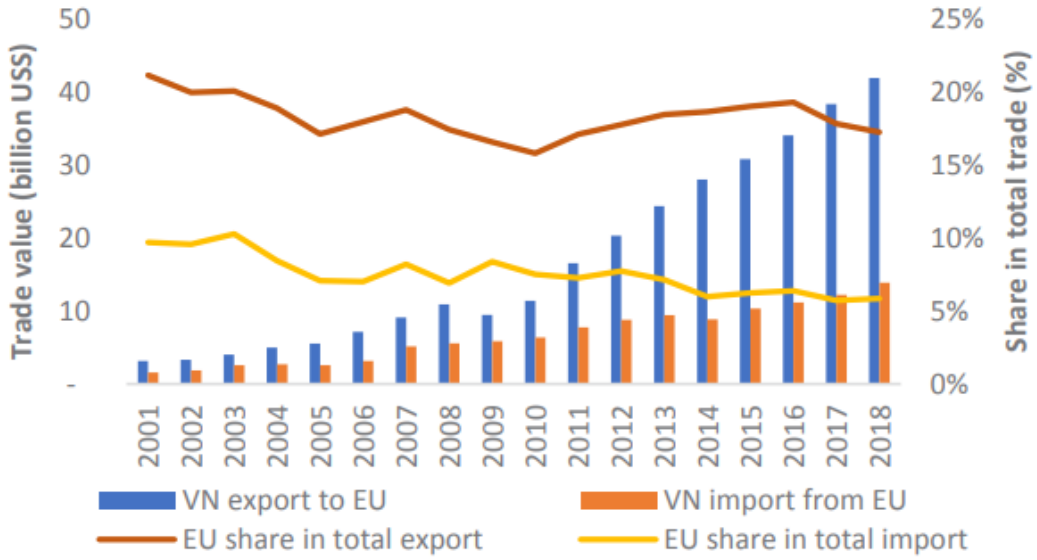

Figure 6. Vietnam-EU trade relationship

Source: World Bank (2020)

Vietnam has identified that implementing carbon pricing tools will support its goal of reducing greenhouse gas emissions (Ministry of Natural Resources and Environment (MONRE), 2023). This effort aims not only to fulfil the country's climate commitments but also to prepare for climate policies of other countries such as the EU's CBAM.

As a result, the Prime Minister has assigned relevant ministries the task of researching proposals and timelines for implementing carbon taxes in Vietnam (Ministry of Natural Resources and Environment (MONRE, 2023). Integrating carbon taxes into existing environmental protection taxes or fees provides a foundation for establishing a comprehensive carbon tax system. The decision regarding integration into environmental protection taxes or fees may depend on factors such as overarching policy objectives and government management. However, challenges such as potential overlap with existing environmental taxes and the lengthy legislative process mean that the implementation of this tax remains under consideration (Song, 2023). Vietnam is currently in the process of considering revisions and drawing lessons from international

experiences to design effective carbon tax proposals. This emphasizes the importance of adopting carbon taxation and underscores its strong potential for implementation in the future.

4.2. Analysis of carbon taxation application feasibility in Vietnam.

To assess the effectiveness of carbon taxation implementation, it's crucial to compare the applicability of carbon taxation with other measures and examine the compatibility of carbon taxes with other taxes in Vietnam.

4.2.1. Assessing the Applicability of a Carbon Tax in Vietnam from the Perspective of Compatibility with the Carbon Market

Carbon taxation and carbon emission trading are two carbon pricing tools (Tsai, 2020). They both share the commonality of imposing a cost on the amount of carbon emissions, which creates an incentive to reduce the production and consumption of greenhouse gas-emitting products.

In comparison to carbon taxes, the implementation of carbon emission trading presents several constraints. Firstly, under the carbon tax mechanism, revenue consistently accrues to the government and is typically utilized for general purposes, whereas with carbon trading measures, revenue is only generated through the auctioning of emission allowances; if allowances are freely allocated, the government will not receive this revenue (Parry, Black, and Zhunussova, 2022). Secondly, while carbon trading aims for the efficient allocation of emission rights, it may inadvertently lead to the creation of toxic hotspots (Lejano et al., 2020). Thirdly, while carbon taxes impose a direct cost on emitting greenhouse gases, incentivizing businesses to reduce emissions through various strategies, in the carbon market, businesses may opt to purchase permits instead of actively reducing emissions, potentially constraining the overall reduction impact compared to a fixed price incentive. Lastly, the operational procedures of the carbon market are notably more complex than those of carbon taxes. To operate a carbon market, the government must establish the total emission cap, organize the allocation of emission allowances, monitor the emissions of each business, and establish and oversee the market for trading emission allowances (Lederer, 2017).

With carbon taxation, the government simply needs to determine the tax rate and then monitor tax compliance by overseeing the emission levels of businesses if the carbon tax directly targets emissions. Alternatively, they can monitor import activities and fossil fuel extraction if the carbon tax applies to the stage of bringing fossil fuels into the market.

4.2.2. Evaluate the compatibility of carbon taxation with the tax system in Vietnam

In Vietnam, there are two types of taxes levied on the natural origins and the environmental impacts during the production period of the goods, which are environmental protection tax and severance tax. Both severance tax and environmental protection tax are forms of indirect taxation imposed on products, goods, or services that negatively impact natural resources and the environment.

The severance tax, although originating from the exploitation of natural resources, lacks the necessary regulations and calculation methods to address economic activities generating greenhouse gas emissions. Consequently, its primary aim does not include mitigating such emissions, making it incompatible with carbon taxes. Severance tax is primarily imposed to compensate states for the depletion of non-renewable sources and to cover the expenses related to their extraction (Kagan, 2020).

On the other hand, the environmental protection tax is imposed on the production and importation of goods with adverse environmental effects, with tax rates determined by the extent of environmental harm inflicted. Functioning as an indirect tax embedded in the selling price of taxed goods, it influences reduced consumption of environmentally harmful items, including those potentially escalating greenhouse gas emissions through fossil fuel usage, thereby stimulating green innovation (Deng et al., 2023). Thus, the environmental protection tax is considered to be compatible with carbon taxes.

Therefore, it can be observed that carbon tax is not in conflict with environmental protection tax, and it is not contradictory nor considered as an environmental protection fee. The implementation of carbon tax in Vietnam is both practical and necessary to address the limitations of carbon market tools. Simultaneously, it serves as a complement to environmental protection taxes to reduce greenhouse gas emissions, contributing to the fight against climate change.

4.2.3. Proposal for carbon taxation design in Vietnam

Drawing from international experience and various research findings, this paper will explore the most viable options for Vietnam.

Option 1: Amending the Draft Decree on Environmental Protection Fees for Greenhouse Gas Emissions. This option would involve amending the existing decree to include a carbon tax. The Ministry of Finance would be responsible for drafting the amendments and submitting them to the government for approval (Vietnam Investment Review, 2023). This option could be implemented relatively quickly, but it would require careful consideration of the potential impacts on businesses and households.

Option 2: Integrating Carbon Tax into the Amendment of the Environmental Protection Tax. This option would involve integrating the carbon tax into the existing environmental protection tax. This would require a more comprehensive amendment of the law, but it would also provide an opportunity to address other environmental issues. This option would take longer to implement, but it could be more effective in the long term. According to Nguyen Anh Minh, a lawyer at NHQuang and Associates, integrating the carbon tax into the Environmental Protection Tax (EPT) is feasible. Both taxes would focus on goods with adverse environmental effects. Minh pointed out that certain items like coal and petrol are already subject to the EPT, suggesting that the scope of the EPT could be broadened to explicitly encompass emissions stemming from the production and utilization of these specified goods (Vietnam Investment Review, 2023). By leveraging the

existing framework of the EPT, Vietnam can streamline administrative processes and minimize implementation costs associated with establishing a standalone carbon tax.

Option 3: Establish a dedicated Carbon Tax in parallel with Environment Protection Tax. The proposed Carbon Tax would require a new law established through legislation, adhering to the guidelines outlined in Government Decree No. 34/2016/ND-CP. This decree details specific articles and provides implementation measures related to the law on promulgating legal documents. While enacting a standalone carbon tax offers certain benefits, it faces substantial challenges in Vietnam's context. The complex legislative process, potential overlap with the existing environmental tax, need for a robust monitoring system, and high implementation costs pose significant problems (Michaelowa, 2018).

Given Vietnam's context, integrating the carbon tax into the environmental protection tax emerges as a more feasible option due to its compatibility with existing frameworks. Moreover, establishing a carbon tax based on the environmental protection tax is more likely to be accepted than establishing and applying it as a completely new and independent tax (Song, 2023). Furthermore, leveraging the existing environmental protection tax management mechanism for carbon tax administration reduces the need for additional resources and administrative costs, enhancing feasibility (Phan and Nguyen, 2022).

4.3. Recommendations

From the successful carbon tax experience of several countries outlined above and the specific context of Vietnam, the authors believe that policymakers should devote attention to a number of design issues including the choice of carbon tax base, carbon tax payers, the level of tax rate, tax distributional impact & industrial competitiveness and the tax revenue use in drafting carbon tax legislation. Specifically, Vietnam’s choices should take into account the experiences of Japan and Singapore, two Asian and ASEAN successful trailblazers in carbon tax application due to having more similarities in cultural and economic settings compared to their European counterparts.

When determining the carbon tax base, the primary concern is to maximize the coverage of emissions sources (Parry, Ploeg, and Williams, 2012). However, broadening the tax base to encompass as many emissions sources as possible must be balanced with mitigating the adverse effects of carbon taxes on the economy. Drawing lessons from Japan's experience, the carbon tax base could encompass various types of carbon sources, including emissions from fossil fuels such as coal, gaseous hydrocarbons, and crude oil/petroleum products. Additionally, when considering the possibility of overlapping tax, several experts believe that the issuance of a new carbon tax (if any) has the risk of overlapping with the current environmental protection tax due to common goals between the two types (MONRE, 2023). This scenario could result in double taxation of the same taxable subject. Therefore, careful consideration must be given to the scope of tax coverage to prevent double taxation, which could increase the tax burden on society. Building on Japan's previous experience and recommendations from the Perspectives Climate Group, Vietnam could integrate the carbon tax into an existing tax framework like the Environmental Protection Tax (EPT) to maximize tax coverage and mitigate complications arising from double taxation.

Regarding carbon taxpayers, it is important to note that the purpose of carbon tax is to regulate taxes on the consumption/burning of fossil fuels that cause greenhouse gas emissions. Ideally, it is suggested that carbon taxes should be imposed upstream in the fuel supply chain to maximize coverage (Parry, Ploeg, and Williams, 2012). This is in line with the current determination of carbon tax payers in Japan and Singapore - the leader of carbon tax among ASEAN countries (mentioned above). Therefore, in Vietnam, for the ease of tax management, carbon tax should also be regulated at the first stage of bringing fossil fuels into the market. Accordingly, carbon tax payers will be entities that import and exploit fossil fuels (Phan and Nguyen, 2022). Thus, the method of determining carbon tax payers is similar to that of special consumption tax payers and environmental taxpayers under current environment protection tax law.

With respect to tax rate level, the tax charge should be high enough to reduce fossil fuel use and create incentives for investing in low-carbon options, while at the same time, mitigate potential negative impacts on economic development such as causing the rise of energy prices (Taschini et al., 2014). Applying the same mechanism from Japan and Singapore, the starting tax rate should be set low to facilitate the application of carbon tax in practice among people and businesses as well as acceptance and political support. After that, the tax rate could be gradually adjusted upward annually until it reaches the desired target (United Nations, 2021). According to the recommendations of the Intergovernmental Panel on Climate Change (IPCC), to achieve the goal of keeping the temperature increase to a maximum of 1.5oC by the end of the 21st century, an appropriate carbon tax is from 40 USD to 80 USD/ton CO2 (Tonn, 2007). All potential CO2 emissions across different fuel types and fuel users should be taxed at the same rate (Parry, Ploeg, and Williams, 2012).

Carbon tax distributional burdens and industrial competitiveness should also be a matter of concern. Carbon tax is an indirect and regressive tax. The higher energy prices caused by carbon taxes are necessary to reduce emissions and promote clean technology investments, however they can have adverse implications for income distribution and industrial competitiveness. In middle - income countries such as Vietnam, poorer households (Parry, Ploeg, and Williams, 2012) tend to have the highest budget shares for energy, making them more vulnerable to higher energy prices. Therefore, the design of carbon tax, in practice, has to ensure that they do not worsen income inequalities. Additionally, higher energy prices may also hurt energy-intensive firms in some trade-sensitive sectors, especially SMEs with higher expenditure share for energy, as it is difficult for them to forward higher input costs to final product prices. To minimize the regressive impact of carbon taxes, these subjects should be considered for exemption and reduction of carbon tax payments. At the same time, it is possible to consider exempting or reducing carbon tax payments for some specific economic sectors to limit the impact of carbon tax on socio-economic development goals such as public transportation services, agriculture and forestry, etc (Phan and Nguyen, 2022). Another way to lower concerns about distributional burden and competitiveness, is to cut down pre-existing, environmentally ineffective electricity/energy taxes. In many OECD countries, the negative impacts on electricity/energy prices could be partly offset by lowering pre-existing taxes on electricity use at the household level and even at the industry level. Vietnam

policymakers can consider applying the same method with the VAT for household electricity. Similarly, in many countries, the added burden of carbon tax on motorists can be approximately compensated by lowering vehicle ownership taxes (Parry, Ploeg, and Williams, 2012).

As for the use of tax revenue, it is found that both Japan and Singapore dedicate this revenue source to green energy initiatives. Similarly, in Vietnam, carbon tax revenue could be spent to support the use of renewable energy. When applying carbon tax, the law on State Budget must add regulations on separating carbon tax from other revenue sources and clearly define the purpose of such revenue through separate revenue recycling schemes such as those of China (Timilsina, 2022). However, it is also believed that dedicating all tax revenues for environmental programs is not a wise decision. Instead, economic research suggests that using the revenues to reduce existing taxes on labor and capital (tax swap) like several European countries, can minimize the economic costs and may lead to net economic benefits (Center for Climate and Energy Solutions, 2018). Therefore, Vietnam should also consider compensation for losses caused to different groups of subjects in the economy from the carbon tax implementation. In general, the key here is that policy makers should ensure the productive use of revenues to keep down the overall costs of carbon taxes, or else carbon tax may lead to even higher costs for the economy.

Finally, the successful design and implementation of carbon tax would require a cross-sectoral approach and constant coordination between relevant agencies and management authorities. Research and consultation on key options such as scope of carbon tax in the context of national emissions reduction policy as well as on the use of carbon tax revenues are deemed necessary. It is also suggested that the carbon tax should be linked with progressive reforms for energy sector financial support packages, especially in the electricity sector, and pilot projects should be implemented to build practical experience on carbon tax collection and reporting systems for businesses and state agencies (MONRE, 2023).

5. Conclusion

In conclusion, this research paper delved into the experiences of various EU and Asian nations with carbon taxation, providing valuable insights into the implementation and effectiveness of such policies. While Europe utilizes diverse carbon taxes primarily targeting businesses and households using fossil fuels, with revenue supporting renewable energy, energy efficiency, and tax reduction efforts, only a few Asian countries have implemented them so far with relatively low tax rates. Additionally, the situational analysis of current efforts in Vietnam shows that besides existing taxes aimed at carbon reduction such as the EPT and NRT, Vietnam is at an early stage of researching and exploring carbon tax application proposals. Furthermore, our research also finds out that there are two possible ways of applying carbon taxation in Vietnam, both of which are under ministry consideration.

Through a thorough evaluation of world experiences and an assessment of Vietnam's current efforts and context, several recommendations have been formulated for policymakers in Vietnam

to consider when designing and implementing a carbon tax system. These recommendations encompass crucial aspects such as defining the carbon tax base, identifying carbon tax payers, determining appropriate tax rates, addressing distributional impacts and maintaining industrial competitiveness, outlining the utilization of tax revenues, and fostering collaboration across government sectors.

Finally, it is important to acknowledge the limitations in the scope of this study, particularly its focus on the early stages of research and development of carbon taxation in Vietnam. As such, future research can be developed to delve deeper into the various impacts and implications of implementing such a carbon tax within Vietnam's unique economic and social landscape.

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