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FOREIGN EXPERIENCE IN ESTABLISHING CARBON PRICES FOR ENERGY CONSUMPTION

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Abstract:
This article studies foreign experience in setting carbon prices for energy consumption. The significance and results of the measures taken by foreign scientists and governments are studied. It also aims to conclude the impact of setting these carbon prices on the economy and their implementation in developing countries through the study of supporting the green economy. The methodology used for the study included interpretation methods. Also, within the framework of the topic, the views of scientists and the work carried out by international financial institutions on changes in world trends and measures taken and goals were analyzed, and relevant conclusions and proposals were presented. In this, induction, deduction, and comparative analysis were used. It also highlights the advantages and disadvantages of this practice, and its importance by studying its implementation methods. The level of government participation in the implementation of pricing policy and scientific conclusions is drawn based on the data studied. The process of supporting the "Green Economy" around the world is developing rapidly. Also, subsidizing electricity with the aim of reducing poverty may not always yield positive results.
Keywords: Green Economy, Carbon Pricing, Energy Taxes, Energy Subsidies, Direct Carbon Pricing.

INTRODUCTION

Research is being conducted around the world to find ways to achieve sustainable development by supporting a green economy and the effective use of renewable energies. The main focus of this research is on the implementation of fiscal policies aimed at mitigating the effects of climate change in the country's economy while ensuring energy efficiency. The existence of inverse relationships between climate change and development trends indicates the need for this research.

In this regard, the World Bank Group's Climate Change Action Plan 2021-2025 emphasizes the need to directly price carbon to integrate the costs of climate change into economic decision-making (World Bank, 2021). Carbon pricing creates incentives to reduce carbon emissions and helps to generate revenue in a more efficient and less disruptive way than alternative sources. The World Bank refers to the "external costs" of carbon emissions as costs that people pay in other ways. The costs of crop damage from heat waves and droughts, health costs from global warming and air pollution, and property damage from flooding and rising sea levels are cited as the main sources of calculating the "carbon price."

Putting a carbon price on the environment would shift the financial burden back to those who are responsible for the damage and who could reduce it. A carbon price, as an economic factor, would not dictate where carbon emissions should be reduced, but would encourage polluters to decide for themselves whether to pay the carbon price by stopping their harmful activities, reducing emissions, or continuing to pollute. Thus, a common environmental goal would encourage clean technology and market innovation that is most flexible and least costly for society, and would foster new, low-carbon drivers of economic growth.

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The Energy Sector Governance Association, in collaboration with the World Bank, is conducting a study on poverty reduction and economic growth in low- and middle-income countries through sustainable energy sources: exploring direct and indirect carbon pricing instruments and understanding the factors that drive carbon prices (World Bank, 2024). Over the past three decades, countries around the world have been implementing energy, climate change, and fiscal policy instruments that directly or indirectly price carbon on economic actors using existing energy sources, through energy taxes and energy subsidies, and contribute to reducing carbon dioxide (CO2) emissions.

The total carbon price (TCP) indicator has been developed to assess the carbon price signals resulting from the combination of direct carbon pricing instruments with institutional instruments that serve as indirect carbon pricing, mainly energy taxes and subsidies (Agnolucci et al., 2023b).

Direct carbon pricing mechanisms, as developed by Agnolucci (2023a), are mechanisms that directly place a price on carbon emissions, while indirect carbon pricing policies impose costs on specific energy sources or energy carriers that produce carbon emissions by affecting the relative prices of goods and services. An energy carrier is defined as "a substance or phenomenon that can be used to produce mechanical work or heat, or to drive chemical or physical processes" (ISO13600, 1997).

In the energy value chain, transporters are considered as intermediate stages between primary energy sources, such as crude oil and coal and their final uses, such as cooling or heating. A system that categorizes the different instruments with carbon price signals, including price and non-price policies, and details their objectives is presented in the table below.

Table 1. Price and non-price policies and their objectives in carbon pricing

Policy	Policy classification		Tools
Pricing policy	Carbon price	Direct carbon pricing	Carbon taxes Commercially acceptable performance standards
		Indirect carbon pricing	Fuel (excise) tax Fuel subsidies (consumption) (production)
	Promoting technology and production	Support for renewable energies	Food tariffs, subsidies for technology deployment
		Other taxes and trade standards	Clean energy standards, tradable renewable portfolio standards, energy efficiency tax credits, VAT differential for cars, motor vehicle taxes
	Standards (non-commercial) and other regulations		Technology mandates, air pollution standards, fertilizer regulations, fuel efficiency, energy efficiency building codes.
A policy without a price	Public investment		Public transportation infrastructure, other infrastructure for innovation.
	Information policy		Certification, product labeling and ratings, information disclosure policies
	Other policies		

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Direct carbon pricing involves measures that impose costs on carbon emissions directly or in proportion to the carbon content of a product. Direct carbon pricing initiatives, typically implemented through carbon taxes and emissions trading systems (ETS), aim to set a clear price on emissions, expressed as a monetary unit per tonne of carbon dioxide (tCO2).

Table 2. Direct and indirect means of determining carbon pricing

Category	Elements	Data source and direction
Direct Carbon Pricing Tools	Carbon tax, emissions trading systems	World Bank, Carbon Pricing Dashboard
Indirect Carbon Pricing Tools	Energy (fuel) taxes, energy consumption subsidies, VAT exemptions	IMF (Parry, Black and Vernon 2021). Energy taxes and subsidies for energy consumption are calculated based on variable supply costs and retail prices in the database. VAT exemptions are calculated from economy-wide and fuel-specific VAT rates.

Energy subsidies cost billions of dollars in public and private funds each year. There are different approaches to quantifying energy subsidies, used by relevant multilateral agencies such as the International Energy Agency (IEA), the Organization for Economic Co-operation and Development (OECD), and the International Monetary Fund (IMF) think tanks. Most efforts to quantify energy subsidies focus on consumption subsidies and produce estimates of global averages using different methodologies.

There are two main approaches to quantifying energy subsidies: the price-gap approach and the inventory approach (Kojima, 2017). The price-gap approach measures the gap between the fair market prices and the prices charged to consumers, while the inventory approach calculates subsidies based on an inventory of government actions that benefit the production and consumption of fossil fuels.

The costs of energy subsidies to the economy, society, and the environment often outweigh their benefits. Common objectives for providing energy subsidies include ensuring affordable energy for households, reducing the impact of energy price volatility on consumers, increasing the competitiveness of local firms, facilitating the transition of households from traditional solid fuels, reducing negative health and environmental impacts, and promoting the natural development of fossil fuel extraction (Kojima, 2016).

Despite the goal of protecting the poor, the bulk of the benefits of universal price subsidies accrue to wealthy households, which consume more energy than poor households and are therefore considered "regressive" (del Granado et al., 2021). Especially in low- and middle-income countries, universal energy price subsidies disproportionately benefit high-income households and may further exacerbate social and gender inequality by diverting resources away from progressive and inclusive social programs (Kuehl et al., 2021).

Energy subsidies impose significant financial costs and create distortions in the economy. They divert fiscal resources from other spending priorities such as infrastructure or human development, exacerbate financial inequality (Flochel and Gooptu, 2017), and promote capital- and energy-intensive economic development. While energy subsidies reduce current inflation by dampening energy price increases, they do so only at the expense of future inflation. In the energy sector, the lack of full cost recovery and dependence on subsidies can affect the financial and operational

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performance of actors along the value chain and hinder the long-term financial sustainability of utilities if subsidies are not delivered in full or on time.

They reduce incentives for investment in renewable energy efficiency, lead to the closure of energy extraction and generation assets, and encourage fuel smuggling between neighboring countries. By artificially lowering consumer costs, energy subsidies encourage excessive energy consumption and send broader signals that influence short-term behavior and long-term investment choices. These subsidies incentivize emission-intensive end uses, which in turn increase local air pollutants and greenhouse gas emissions and contribute to land degradation and biodiversity loss (OECD, 2021b; World Bank, 2019). Energy subsidies have been widely recognized in recent literature as a negative carbon price (UNDP, 2021).

Building on the work done on the supporting documents, this report provides detailed information on the main components of the TCP and assesses how they vary across fuels, sectors and fossil fuel trade positions, with a particular focus on energy subsidies. The review examines the central role of energy subsidies in influencing the level and movement of the TCP over time. It provides illustrative estimates of the TCP by combining data from the IEA on energy consumption, direct carbon prices from the World Bank and net excise taxes and subsidies from the IMF (Parry et al., 2021).

In a study by Thi et al (2024), the study proposed the implementation of a practice for assessing and labeling building materials and building products that are suitable for current and future generations of energy-efficient and sustainable buildings. This primary study will contribute significantly to the development of new energy-efficient building materials to guide the building materials market towards the use of energy-efficient materials to achieve the goal of net-zero emissions by 2050.

Agung and Nurmala (2023) also emphasized that Green Organizational Identity (GOI) is necessary for companies to implement in order to achieve sustainable corporate outcomes. At the same time, they considered that GOI, as one of the intangible assets that can provide positive value to the company, can improve its Sustainability Performance (SP).

METHODS

The methodology used for the study included interpretation methods. Also, within the framework of the topic, the views of scientists and the work carried out by international financial institutions on changes in world trends and measures taken and goals were analyzed, and relevant conclusions and proposals were presented. In this, induction, deduction, and comparative analysis were used.

RESULT AND DISCUSSION

Carbon taxes are tailored to the carbon content of different sources of CO2 emissions and therefore send a direct price signal on emissions that is consistent across the economy. ETSs can take the form of cap-and-trade schemes, tradable performance standards (TPSs), and a selection of carbon crediting mechanisms.

Efforts to directly price carbon emissions are growing worldwide. The number of direct carbon pricing instruments is steadily increasing in countries at the subnational, national and international levels. According to the 2023 Carbon Pricing Status and Trends (World Bank, 2023), 73 carbon pricing schemes had been implemented by April 2023, compared to 68 in 2022, 43 in 2017 and 23 in 2012, implying the introduction of five new schemes each year.

The nominal price signal varies considerably across schemes, from USD 0.08 per tonne (CO2) for the Polish carbon tax to USD 137 for the Swedish carbon tax, with an average nominal carbon tax

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rate of USD 20. Over the past two decades, direct carbon pricing has become an integral part of the policy instruments used to mitigate climate change (Carbon Pricing Leadership Coalition, 2017; OECD, 2021c; UNDP, 2021).

The IEA's latest estimates, using a price gap approach, put subsidies at over US$1 trillion by 2022 (IEA, 2023). These figures fall short of the level of spending needed to achieve Sustainable Development Goal 7.1 of affordable, reliable, sustainable and modern energy for all, for which annual financing needs are in the range of US$10 billion.

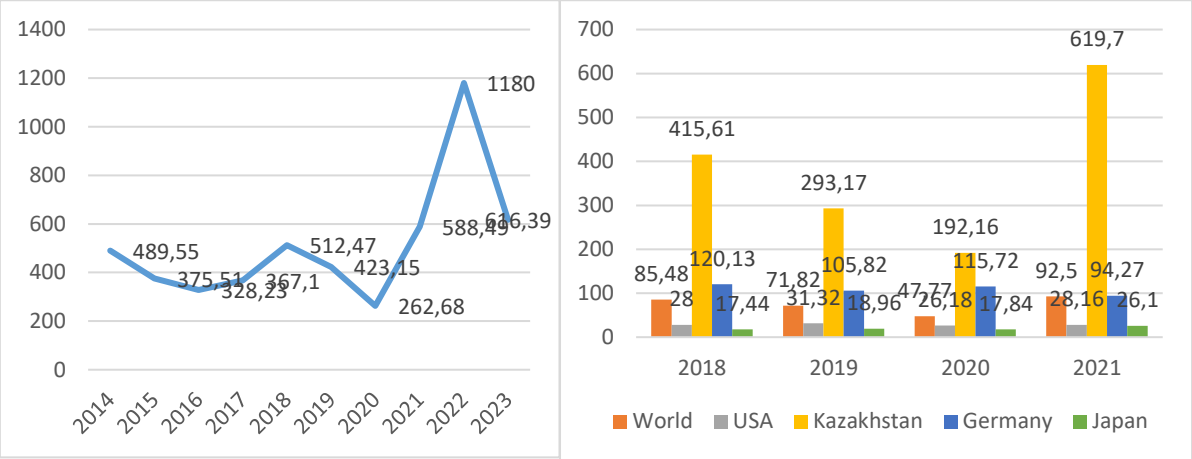

Figure 1. Global net fuel consumption subsidies (billion, $) and change in fossil fuel subsidies per capita ($)

Global fossil fuel subsidies amounted to $5.9 trillion in 2020, or 6.8 percent of GDP, and are expected to increase to 7.4 percent of GDP in 2025, as the share of fuel consumption in emerging markets continues to grow. Only 8 percent of the 2020 subsidy reflects underpayment for supply costs, and 92 percent reflects underpayment for environmental costs and repealed consumption taxes.

Effective fuel pricing by 2025 would reduce global carbon emissions by 36% below baseline levels, consistent with limiting global warming to 1.5 degrees Celsius, while raising incomes equivalent to 3.8% of global GDP and avoiding 0.9 million local air pollution emissions. This includes production and consumption subsidies, and is projected for 2021, before the energy crisis. Surprisingly, the countries providing the largest subsidies are major fossil fuel producers: major oil producers such as Saudi Arabia, Turkmenistan, Libya, and Algeria spend more than $500 (sometimes more than $1,000) per capita to support fossil fuel production. These subsidies can amount to more than 10% of GDP. Countries in Europe, North and South America, and East Asia typically give less than $100 per capita, while in Africa and South Asia, it is even less than $20, and sometimes close to zero.

This estimate is much higher than the numbers we looked at earlier because it includes not only explicit subsidies (i.e., direct payments) but also implicit subsidies—the social costs of burning fossil fuels. When we burn fossil fuels, we pollute local air, which harms human health, and contribute to climate change, which in turn leads to environmental and social harm. The IMF also links fossil fuels to the social costs of road accidents and congestion. Economists typically refer to

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these indirect costs, which are not reflected in market prices, as "externalities" rather than "subsidies."

Many countries, including most G20 countries, are implementing or exploring some form of domestic carbon pricing – compliance instruments (emissions trading systems and carbon taxes) and/or domestic carbon credit mechanisms. According to the World Bank's State and Trends in Carbon Pricing Panel, there will be 75 carbon pricing instruments in place in 2024, covering 24 percent of global emissions. The increasing adoption of these instruments could significantly contribute to global emissions reductions.

Carbon pricing in the European Union has played a significant role in reducing greenhouse gas emissions, with a 47% reduction in sectors covered by the EU Emissions Trading System since its launch in 2005. Today, the EU's share of global emissions is below 7% and declining. Building on the successful experience of the EU, the Working Group aims primarily to share lessons learned from the EU and to support other jurisdictions in developing and implementing effective domestically compliant carbon pricing and carbon market instruments (such as carbon taxes or emissions trading systems). All countries should adopt carbon pricing as a central part of their climate strategies to cover 60% of global emissions by 2030, reduce global greenhouse gas emissions and reduce the risk of carbon leakage.

CONCLUSION

The process of supporting the "Green Economy" around the world is developing rapidly. Also, subsidizing electricity with the aim of reducing poverty may not always yield positive results. Since the bulk of the benefits of universal price subsidies fall on rich households, which consume more energy than poor households, it is advisable to develop an effective system of subsidies. Although the disadvantage of setting carbon prices for energy consumption is that it may lead to an increase in the price level, in an open market environment, it will become a tool for encouraging energy consumers to use energy-saving devices effectively and to transition to "Green Energy".

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