Asian Institute of International Financial Law

Faculty of Law, The University of Hong Kong

Taxation Law Research Programme

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TAXATION and CLIMATE CHANGE

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Overview

- International agreements: (1) Montreal Protocol (1987), (2) UN Framework Convention on Climate Change (1992), (3) the Kyoto Protocol (1997) and (4) the Paris Agreement (2015).
- Commitments under the Paris Agreement to submit emissions reduction pledges known as *Nationally Determined Contributions* (NDCs).
- How taxation fits into the Paris Agreement and different countries' NDCs.
- Types of climate taxes -- (1) carbon taxes, (2) emissions trading systems that establish a price for carbon (and can be considered a variant of carbon taxes), (3) European Union's Carbon Border Adjustment Mechanism, and (4) tax incentives that encourage (and tax subsidies that discourage) climate mitigation.
- Trump's second withdrawal of the US from the Paris Agreement and implications for the future.
- What's a "good tax" and a "bad tax" in the climate change mitigation area?

Montreal Protocol (1987)

- Let’s start with a success

- Montreal Protocol was designed to protect the ozone layer by phasing out the production of numerous substances responsible for ozone depletion.
- Ozone hole has been slowly recovering. Climate projections indicate that the ozone layer will return to 1980 levels by 2040 (across much of the world) and by 2066 (over Antarctica).
- Protocol established the “Multilateral Fund for the Implementation of the Montreal Protocol” to provide financial and technical assistance to developing countries to help them comply with the Protocol's control measures.
- Under the Protocol, developed countries committed to contribute to the Multilateral Fund to provide financial incentives for developing countries to transition away from ozone depleting substances.
- By 2024, US$4.2 billion in grants have been made via the Multilateral Fund. To obtain the funds, developing countries need to comply with the control measures and phase-out schedules of the Montreal Protocol.
- Some countries enacted taxes on ozone depleting substances such as chlorofluorocarbons (CFCs). See, for example, US IRS Form 6627.

US IRS Form 6627

Form **6627** (Rev. January 2024)
Department of the Treasury
Internal Revenue Service

Environmental Taxes

Attach to Form 720.
Go to *www.irs.gov/Form6627* for instructions and the latest information.

OMB No. 1545-0023

Name (as shown on Form 720) | Quarter ending | **Employer identification number (EIN)**

Part I Tax on Petroleum

		(a) Barrels	(b) Rate	(c) Tax
1	Crude oil received at a U.S. refinery			
2	Crude oil taxed before receipt at refinery			
3	Taxable crude oil. Subtract line 2 from line 1. Enter the result on both lines 3(a) and 3(b), column (a). Enter in column (c) the amount of tax by multiplying column (a) by column (b) for both lines. (a)		$ .17 bbl	$
	(b)		$ .09 bbl	$
4	Crude oil used in the U.S. before the tax was imposed. Multiply column (a) by column (b) and enter the amount of tax in column (c). Enter on both lines 4(a) and 4(b), column (a). Enter in column (c) the amount of tax by multiplying column (a) by column (b) for both lines. (a)		$ .17 bbl	$
	(b)		$ .09 bbl	$
5	Total domestic petroleum superfund tax (add lines 3(a) and 4(a), column (c)). Enter here and on Form 720 on the line for **IRS No. 53**			$
6	Total domestic petroleum oil spill tax. Add lines 3(b) and 4(b), column (c). Enter the total here and on Form 720 on the line for **IRS No. 18**			$
7	Imported petroleum products superfund tax. Enter the number of barrels imported in column (a). (Must agree with line 8, column (a).) Enter in column (c) the amount of tax by multiplying column (a) by column (b), and also enter it on Form 720 on the line for **IRS No. 16**		$ .17 bbl	$
8	Imported petroleum products oil spill tax. Enter the number of barrels imported in column (a). (Must agree with line 7, column (a).) Multiply column (a) by column (b) and enter the amount of tax in column (c). Also enter the amount on Form 720 on the line for **IRS No. 21**		$ .09 bbl	$

Part II Tax on Chemicals (Other Than Ozone-Depleting Chemicals (ODCs)), IRS No. 54

	Chemical (general formula or symbol)	(a) Tons	(b) Rate	(c) Tax (multiply column (a) by column (b))		Chemical (general formula or symbol)	(a) Tons	(b) Rate	(c) Tax (multiply column (a) by column (b))
1	Acetylene (C_2H_2)		$9.74		24	Lead oxide (PbO)		$8.28	
2	Ammonia (NH_3)		5.28		25	Mercury (Hg)		8.90	
3	Antimony (Sb)		8.90		26	Methane (CH_4)		6.88	
4	Antimony trioxide (Sb_2O_3)		7.50		27	Naphthalene ($C_{10}H_8$)		9.74	
					28	Nickel (Ni)		8.90	
5	Arsenic (As)		8.90		29	Nitric acid (HNO_3)		0.48	
6	Arsenic trioxide (As_2O_3)		6.82		30	Phosphorus (P)		8.90	
					31	Potassium dichromate ($K_2Cr_2O_7$)		3.38	
7	Barium sulfide (BaS)		4.60						
8	Benzene (C_6H_6)		9.74		32	Potassium hydroxide (KOH)		0.44	
9	Bromine (Br)		8.90		33	Propylene (C_3H_6)		9.74	
10	Butadiene (C_4H_6)		9.74		34	Sodium dichromate ($NaCr_2O_7$)		3.74	
11	Butane (C_4H_{10})		9.74						
12	Butylene (C_4H_8)		9.74		35	Sodium hydroxide (NaOH)		0.56	
13	Cadmium (Cd)		8.90						
14	Chlorine (Cl)		5.40		36	Stannic chloride ($SnCl_4$)		4.24	
15	Chromite ($FeCr_2O_4$)		3.04						
16	Chromium (Cr)		8.90		37	Stannous chloride ($SnCl_2$)		5.70	
17	Cobalt (Co)		8.90						
18	Cupric oxide (CuO)		7.18		38	Sulfuric acid (H_2SO_4)		0.52	
19	Cupric sulfate ($CuSO_4$)		3.74		39	Toluene (C_7H_8)		9.74	
20	Cuprous oxide (Cu_2O)		7.94		40	Xylene (C_8H_{10})		9.74	
21	Ethylene (C_2H_4)		9.74		41	Zinc chloride ($ZnCl_2$)		4.44	
22	Hydrochloric acid (HCl)		0.58		42	Zinc sulfate ($ZnSO_4$)		3.80	
23	Hydrogen fluoride (HF)		8.46						

43 **Total Chemical Tax** (add lines 1–42, column (c)). Enter here and on Form 720 on the line for **IRS No. 54** $

For Privacy Act and Paperwork Reduction Act Notice, see the Instructions for Form 720. Cat. No. 43490I Form **6627** (Rev. 1-2024)

Form 6627 (Rev. 1-2024) Page **2**

Part III Tax on Imported Chemical Substances, IRS No. 17

	(a) Imported chemical substance	(b) Tons	(c) Taxable chemical used in manufacture of substance	(d) Conversion factor or entry value	(e) Rate	(f) Tax (see instructions)
1						
2						
3						

4 **Total imported chemical substances tax.** Add all amounts in column (f). Include amounts from any additional sheets. Enter here and on Form 720 on the line for **IRS No. 17** $

Part IV Tax on Ozone-Depleting Chemicals (ODCs), IRS No. 98

Elections. If you elect to report the tax on post-1989 ODCs at the time you sell or use a mixture containing such chemicals instead of when you make the mixture, check this box (the 1990 election) ☐

If you elect to report the tax on post-1990 ODCs at the time you sell or use a mixture containing such chemicals instead of when you make the mixture, check this box (the 1991 election) ☐

	(a) ODC	(b) Number of pounds	(c) Tax per pound (see Part IV instructions)	(d) Tax (multiply column (b) by column (c))
1				
2				
3				

4 **Total ozone-depleting chemicals tax.** Add all amounts in column (d). Include amounts from any additional sheets. Enter the total here and on Form 720 on the line for **IRS No. 98** $

Part V ODC Tax on Imported Products, IRS No. 19

Election. If you elect to report the tax on imported products at the time you import the products instead of when you sell or use the products, check this box ☐

	(a) Imported product and the applicable ODC	(b) Number of products	(c) ODC weight of product	(d) Tax per pound	(e) Entry value	(f) Tax (see Part V instructions)
1						
2						
3						

4 **Total ODC tax on imported products.** Add all amounts in column (f). Include amounts from any additional sheets. Enter the total here and on Form 720 on the line for **IRS No. 19** $

Part VI Tax on Floor Stocks of ODCs, IRS No. 20

	(a) ODC	(b) Number of pounds	(c) Tax per pound (see Part VI instructions)	(d) Tax (multiply column (b) by column (c))
1				
2				
3				

4 **Total floor stocks tax.** Add all amounts in column (d). Include amounts from any additional sheets. Enter the total here and on Form 720 on the line for **IRS No. 20** $

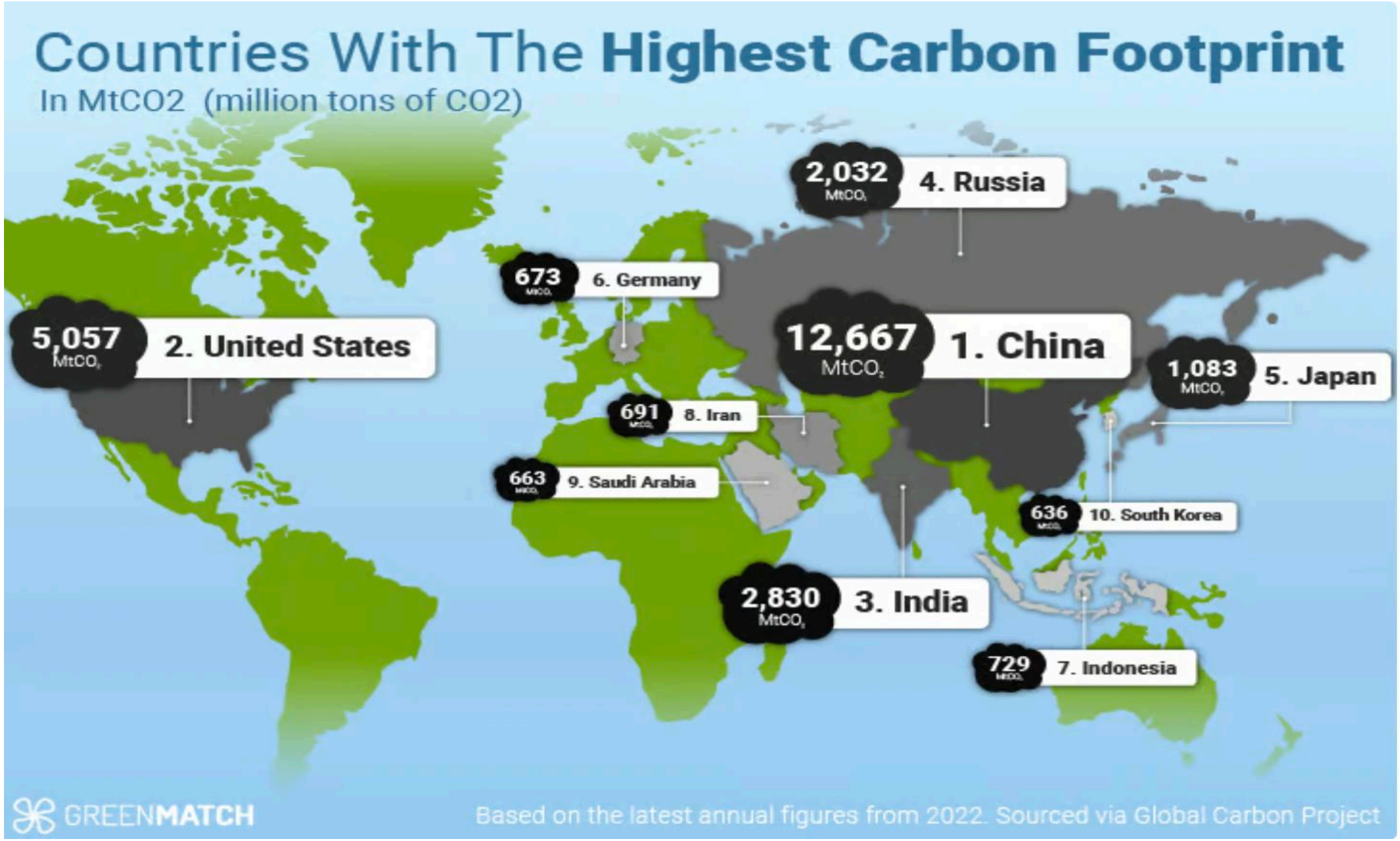
Form **6627** (Rev. 1-2024)

ODCs for 2025. The following ODCs are taxed for **2025** as follows.

Post-1989 ODCs	**Tax per Pound in 2025**
CFC-11	$18.85
CFC-12	18.85
CFC-113	15.08
CFC-114	18.85
CFC-115	11.31
Halon-1211	56.55
Halon-1301	188.5
Halon-2402	113.1
Post-1990 ODCs	**Tax per Pound in 2025**
Carbon tetrachloride	20.73
Methyl chloroform	1.88
CFC-13, CFC-111, CFC-112, and CFC-211 through CFC-217	18.85

United Nations Framework Convention on Climate Change

- In 1992, UNFCC sets objective of stabilizing greenhouse gas concentrations "at a level that would prevent dangerous, human-induced interference with the climate system."
- The Convention establishes important principles, including:
  - Common but Differentiated Responsibilities: Namely, while all countries have a responsibility to address climate change, developed countries should take the lead due to their historical contribution to GHGs.
  - Precautionary Principle: It states that lack of full scientific certainty should not be used as a reason for postponing action when there is a threat of serious or irreversible damage.
- The UNFCCC established key institutions and processes for international climate action, including:
  - Conference of the Parties (COP): The annual meeting of UNFCCC parties, where progress is reviewed and further action is negotiated.
  - Secretariat: The UN body tasked with supporting the implementation of the Convention.
  - Reporting Requirements: The Convention requires countries to report on their emissions and actions to address climate change.


Countries With The Highest Carbon Footprint
In MtCO2 (million tons of CO2)
2,032 MtCO2 4. Russia
673 MtCO2 6. Germany
5,057 MtCO2 2. United States
12,667 MtCO2 1. China
1,083 MtCO2 5. Japan
691 MtCO2 8. Iran
663 MtCO2 9. Saudi Arabia
636 MtCO2 10. South Korea
2,830 MtCO2 3. India
729 MtCO2 7. Indonesia
GREENMATCH
Based on the latest annual figures from 2022. Sourced via Global Carbon Project

Kyoto Protocol (1997) and Paris Agreement (2015)

- Kyoto Protocol (1997) is important because it established commitments (of countries that ratified the Protocol) to limit and reduce GHGs.

- Protocol was signed by President Clinton but not ratified by the US Senate because developing countries were not required to limit and reduce GHG emissions in accordance with agreed individual targets, while developed countries were.

- China and India signed and ratified the Kyoto Protocol. However, they were classified as developing countries under the Protocol, and thus did not have mandatory emissions reduction targets.

- The Paris Agreement (agreed at COP21 in 2015) effectively superseded the Kyoto Protocol.

- Paris Agreement is a legally binding international treaty on climate change that sets a clear goal to limit global warming to below 2 degrees Celsius — preferably 1.5 degrees — compared with pre-industrial levels.

Paris Agreement

- A defining feature of the *Paris Agreement* compared with the *Kyoto Protocol* is that it commits developed and developing countries to publicly communicate nationally determined contributions (NDCs) representing the action that each nation agrees to take to meet its international obligations to reduce GHGs
- The NDCs are determined by each nation. This method thus considers the status and development stage of state parties.
- The Paris Agreement works on a five-year cycle of increasingly ambitious climate action -- or, ratcheting up -- carried out by countries.
- Developed countries should facilitate climate change technology transfers and financial assistance to developing countries.
- The withdrawal by Trump of the U.S. (the second largest GHG emitter) from the Paris Agreement will weaken the global effort to combat climate change and will create uncertainty about international cooperation, but there are those who have stepped up to help fill the void (e.g., Bloomberg).

Taxation and the Paris Agreement

- **Carbon Pricing:** The Paris Agreement's goal of limiting global warming requires substantial reductions in greenhouse gas emissions. Many countries are using carbon pricing mechanisms, including carbon taxes, as a key policy tool to achieve these reductions.

- **National Strategies:** The Agreement allows countries to determine their own contributions (NDCs) to emissions reduction. Taxation policies, including carbon taxes, are often part of these national strategies.

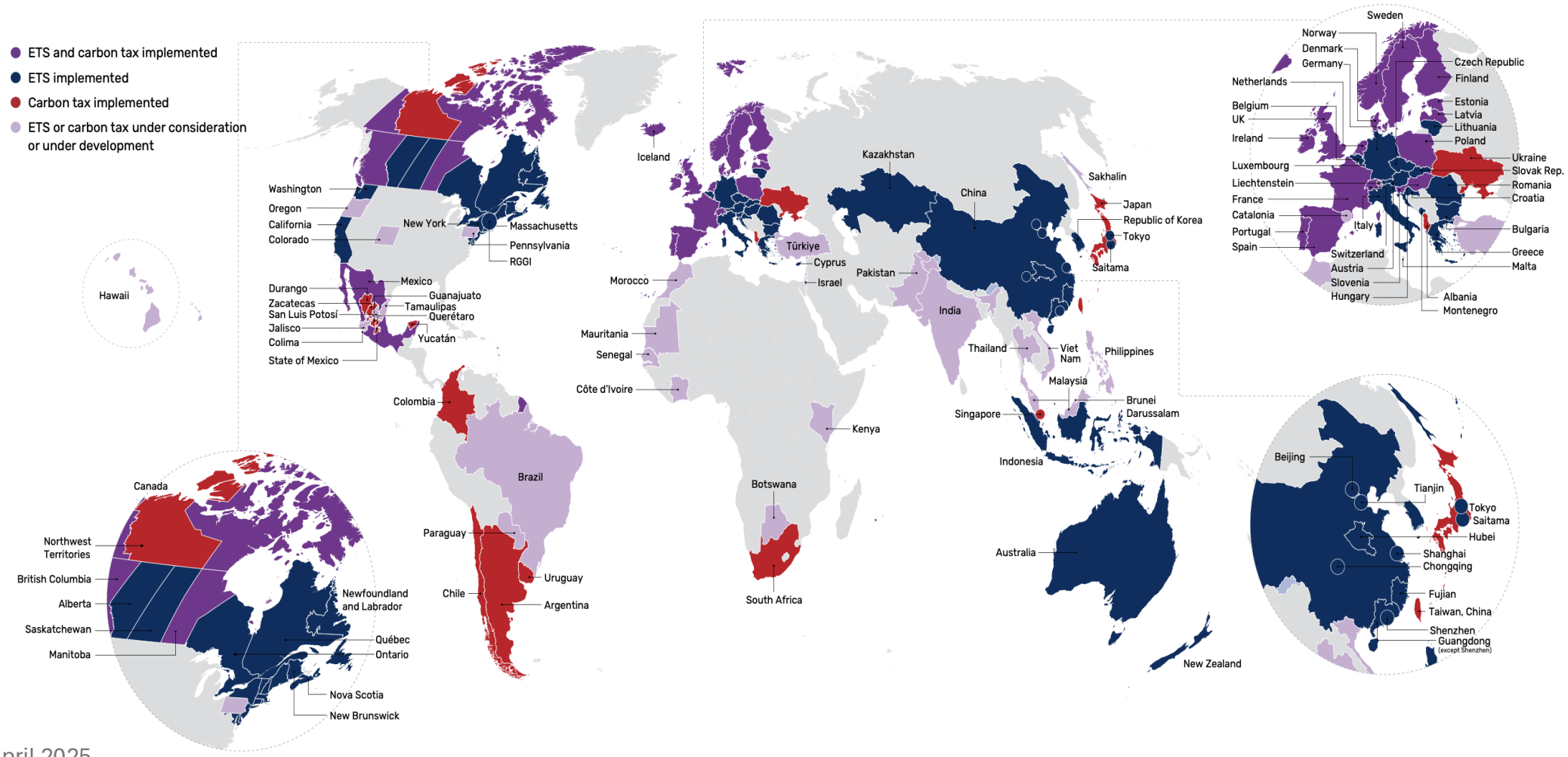
- **Incentivizing Change:** Carbon taxes (and tax subsidies to reduce GHGs) create financial reasons for businesses and individuals to shift to cleaner energy sources and invest in sustainable practices.

- **Revenue Generation:** Carbon taxes can also generate revenue for governments, which can be used to (1) fund further climate action, (2) invest in renewable energy, and/or (3) provide relief to households.

World Bank 2024 Map of Carbon Taxes and ETSs

FIGURE 4

Map of carbon taxes and ETSs



Types of Carbon Taxes and Their Design

- Carbon taxation can be imposed either

  (1) at the point of extraction or importation of fossil fuel (measured by carbon intensity of the fuel), or

  (2) at the point of emissions (as energy sources are burned and greenhouse gases are emitted).

- Taxing emissions directly aligns more closely with the goal of reducing greenhouse gases. Taxing fuel is generally easier to implement and administer, as it can be integrated into existing fuel excise tax systems.

- Carbon tax revenues for governments can be used as general revenue but have been more typically used to fund further climate action, invest in renewable energy, and/or provide relief to households (also referred to as the “carbon tax dividend”).

Various Countries' Carbon Tax Rates

- Sweden: One of the earliest and most prominent examples (1991).
- Canada: Implemented a national carbon pricing system with variations across provinces but removed the carbon tax on consumers on April 1, 2025. The carbon pricing systems for large industrial emitters in Canada will continue to operate.
- Some countries have carbon tax rates that are very low, sometimes less than US$1 or a few dollars per ton of CO2e.
- Many countries have carbon tax rates in the range of $20 to $50 per ton of CO2e. This range is more common in some European nations and other countries that have begun to implement carbon pricing.
- The highest carbon tax rates are often found in certain European countries. Switzerland and Sweden consistently have some of the highest rates exceeding $100 per ton of CO2e.
- Singapore's carbon tax rate started at S$5 per ton of CO2e and is currently S$25, scheduled to increase to S$50 and up to S$80 by 2030.

Emission Trading Systems (ETS) and *Carbon Pricing*

- “Carbon taxation" and "ETS" are distinct mechanisms, yet they both fall under the umbrella term ***carbon pricing*** because both aim to internalize the external cost of greenhouse gas emissions.

- Both make GHG emitters pay for the environmental damage they cause and create a financial incentive for businesses and individuals to reduce their carbon footprint.

- A **carbon tax** directly sets the price of carbon and emitters pay a fixed amount per ton of CO2e released (and, as noted above, there’s a wide range of various countries’ carbon tax rates).

- There are different types of **ETS**, but a typical type is a cap-and-trade system whereby the government sets a limit, or "cap," on the total amount of greenhouse gases that can be emitted within a specific period. This cap represents the total allowable emissions from all the entities covered by the ETS. This cap is often designed to decrease over time, ensuring a gradual reduction in overall emissions.

Emission Trading Systems (con’t)

- The governing body distributes or auctions emission allowances to the companies and facilities covered by the ETS.

- Each allowance permits the holder to emit a specific amount of greenhouse gases, typically one ton of CO2 equivalent.

- Allowances can be allocated for free. Initially, some allowances may be given by the government to companies to ease the transition. Thereafter, allowances are sold through auctions, generating revenue for the government.

- Companies that reduce their emissions below their allocated level can sell their surplus allowances to companies that exceed their limits. This creates a market for emission allowances, where the price is determined by supply and demand. This "trade" aspect allows emissions reductions to occur where they are most cost-effective.

EU Carbon Border Adjustment Mechanism ("CBAM")

- CBAM is a tariff (which is a tax) starting 1/1/2026 on the import of carbon intensive products into the EU; reporting during pre-tariff transition period is already underway

- Imposed on (i) iron and steel, (ii) cement, (iii) electricity, (iv) fertilizers, (v) aluminum, (vi) hydrogen.

- Companies importing covered goods produced outside the EU into the EU will have to purchase certificates equal to the GHG emissions generated producing of those goods.

- EC will calculate the price of CBAM certificates to reflect the average weekly price of ETS auction.

- Other countries considering a CBAM -- UK plans to implement a CBAM in 2027. Canada, Japan, Korea, Singapore, Israel, Cote d'Ivoire, Colombia, Mexico, Vietnam, South Africa, Brazil and the US.

US tax subsidies businesses for reduction of GHGs

- **Production Tax Credits (PTCs) and Investment Tax Credits (ITCs):** PTCs provide a credit per kilowatt-hour of electricity produced, while ITCs provide a credit based on a percentage of the investment in a project.

- **Transferability:** Allows businesses that cannot directly utilize the credits to transfer them to other taxpayers increasing the entities able to utilize the credits, in turn, increasing clean energy projects able to be funded.

- **Direct Pay:** The IRA also introduces "direct pay" options for certain tax-exempt entities, such as state and local governments, tribal governments, and non-profit organizations, allowing these entities to receive a direct payment from the Treasury Department instead of an un-useable tax credit.

- **Bonus Credits:** IRA includes several "bonus credits" that can increase the value of the base PTCs and ITCs. These bonuses are designed to incentivize specific outcomes, such as:

    - **Domestic Content Bonus:** Encourages the use of domestically produced components in clean energy projects. **Energy Community Bonus:** Provides additional support for projects located in communities with a history of fossil fuel reliance.

- **NOTE**: The IRA wasn't only about tax subsidies but also imposed a charge on methane emissions from certain oil and gas facilities.

US tax subsidies individuals for reduction of GHGs

- **Residential Clean Energy Credit:** This credit applies to homeowners who install clean energy technologies, such as: solar panels, etc.
- **Energy Efficient Home Improvements Credit:** This credit helps homeowners make energy-saving upgrades to their homes, such as insulation, energy-efficient windows and doors, etc.
- **Clean Vehicle Credit:** This credit provides incentives for purchasing new and used electric vehicles (EVs) with vehicle assembly location (in North America).

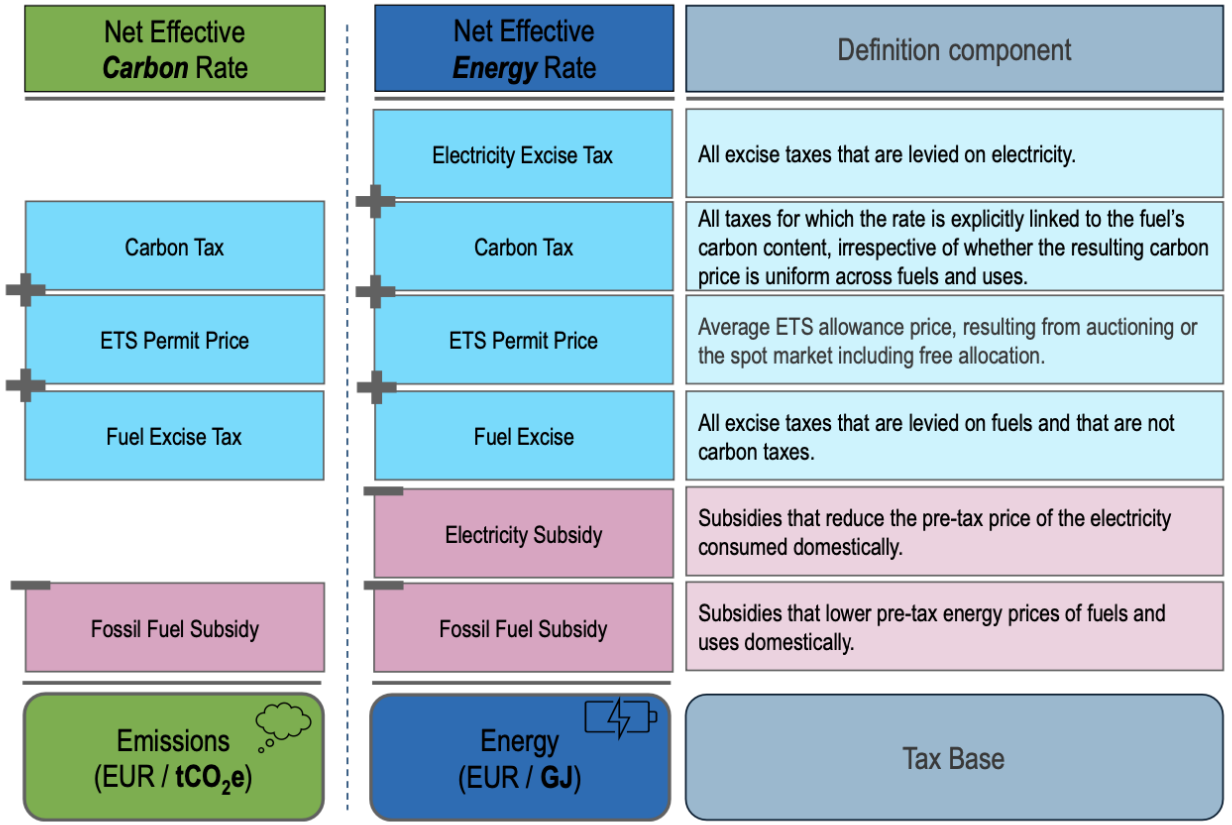
++++++++++++++++++++++++++*Revenue Loss and Possible Repeal*++++++++++++++++++++++++++++++

- Original forecast of revenue losses attributable to IRA climate tax credits was US$400 billion for ten years but this forecast has been increased to over US$1 trillion given uptake in the credits.
- Repeal of much of the IRA tax provisions is under discussion by the Trump Administration. Outcome is not clear given the support of many of tax credits by Congress, including Republicans in Congress.

Negative Climate Subsidies
(OECD – Pricing Greenhouse Gas Emissions 2024)

Figure 1.3. Net Effective Carbon and Net Effective Energy Rates: how they relate

The components and the different bases used



Source: Authors.

Pink boxes to the right represent countervailing subsidies like oil drilling tax depletion allowances or consumer electricity subsidies

"Good" Carbon Taxes
(Aligns with OECD, IMF, UN, and World Bank Guidance)

- **Clear, Predictable, & Stable Price Signal:** Provides predictable trajectory for carbon price, allowing taxpayers to plan long-term investments.
- **Broad Coverage & Comprehensive Scope:** Covers a wide range of greenhouse gases and sectors to ensure a consistent price signal and minimize loopholes.
- **Effective Revenue Recycling & Use:** Uses carbon tax revenue to: (1) reduce distorting taxes, (2) invest in clean energy and climate resilience and (3) provide targeted assistance to vulnerable populations.
- **Administrative Simplicity & Efficiency:** Is designed to be administratively simple and efficient, minimizing compliance costs and bureaucratic burdens.
- **International Coordination & Harmonization:** Is ideally part of a coordinated international effort to prevent carbon leakage and promote a level playing field.
- **Equity & Social Justice:** Addresses the potential regressive impacts on low-income households through targeted rebates or other forms of compensation.
- **Transparency & Accountability:** Clear reporting and monitoring of the carbon tax implementation and its environmental and economic impacts.

"Bad" Carbon Taxes
(Deviates from OECD, IMF, UN, and World Bank Guidance/Principles)

- **Narrow Coverage & Loopholes:**
  - Excludes significant emissions sources, creating loopholes and undermining effectiveness.
- **Volatile & Unpredictable Prices:**
  - Creates uncertainty and discourages long-term investments in clean technologies.
- **Lack of Revenue Recycling or Misuse:**
  - Fails to use revenue to mitigate negative impacts or promote clean energy transitions.
- **Administrative Complexity & Burdens:**
  - Imposes excessive compliance costs and burdens on businesses and individuals.
- **Unilateral Implementation & Carbon Leakage:**
  - Leads to carbon leakage and undermines competitiveness.
- **Regressive Impacts & Social Inequity:**
  - Disproportionately burdens low-income households and exacerbates social inequalities.
- **Lack of Transparency & Accountability:**
  - Hinders public trust and effective monitoring of the policy.