Carbon Pricing Experiences in Asian Countries

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Contents

CPIs Breadth of Adoption in Asian Countries

National Jurisdiction	Carbon Tax		ETS	
	Status	Year	Status	Year
Brunei Darussalam	-	-	UC	-
China	-	-	✓	2021
Indonesia	S	2024	✓	2023
Japan	✓	2012	UC	
Kazakhstan	-	-	✓	2013
Korea	-	-	✓	2015
Malaysia	-	-	UC	-
Pakistan	-	-	UC	-
Singapore	✓	2019	-	-
Thailand	-	-	UC	-
Vietnam	-	-	S	-
Turkiye	-	-	UC	-

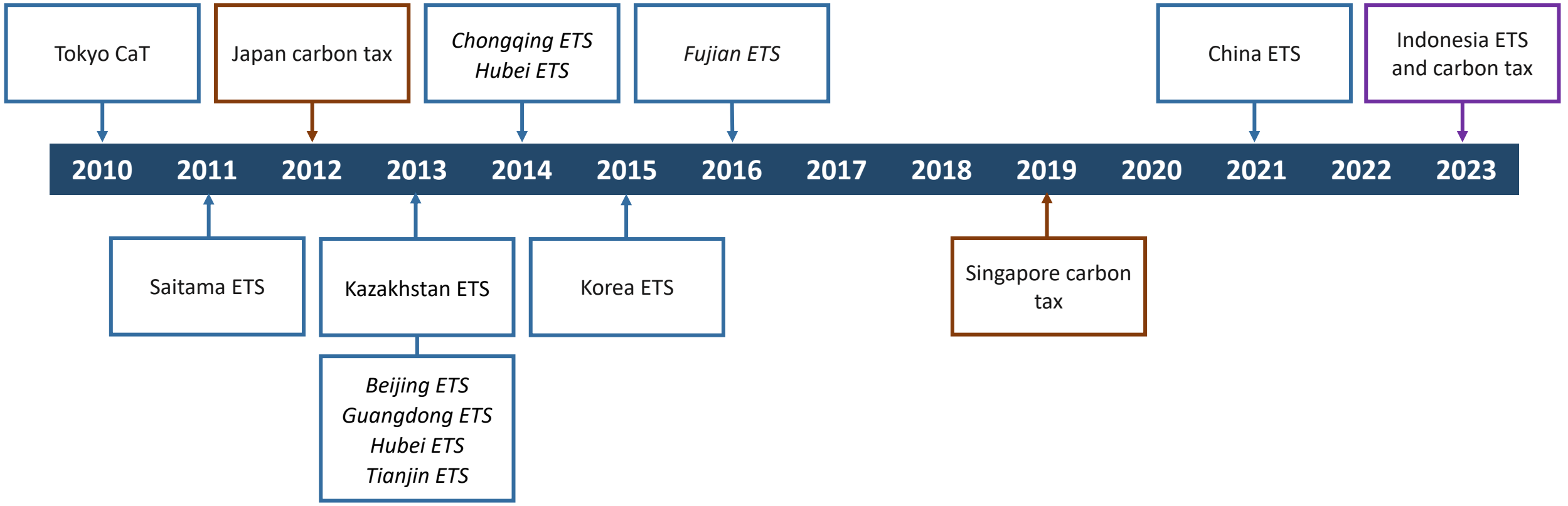
Source: based on data from World Bank Carbon Pricing Dashboard 2023; S = Scheduled, UC = Under Consideration

CPIs Breadth of Adoption in Asian Countries

Sub-National Jurisdiction	Carbon Tax		ETS	
	Status	Year	Status	Year
Beijing, China			✓	2013
Chongqing, China			✓	2014
Fujian, China			✓	2016
Guangdong, China			✓	2013
Hubei, China			✓	2014
Shanghai, China			✓	2013
Shenzhen, China			✓	2013
Tianjin, China			✓	2013
Taiwan	UC	-	UC	-
Saitama, Japan			✓	2011
Tokyo, Japan			✓	2010

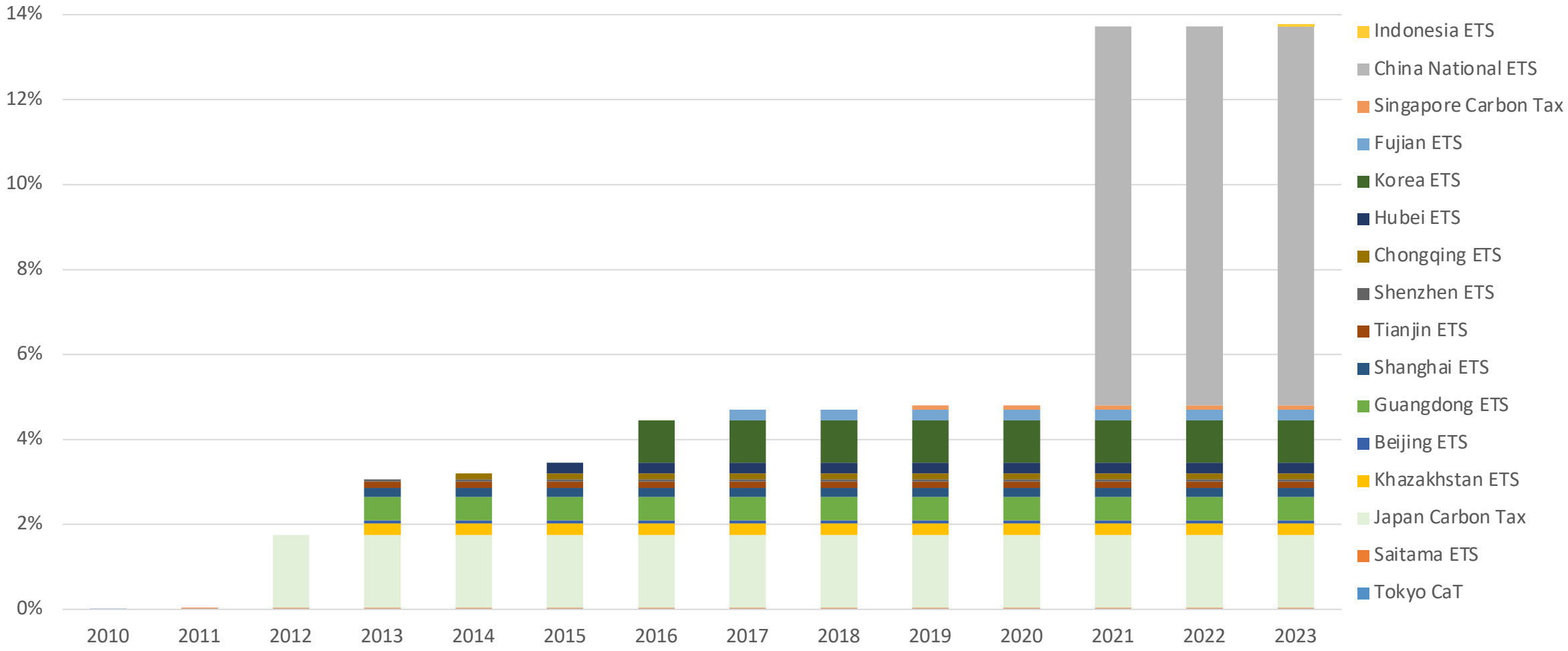
Source: based on data from World Bank Carbon Pricing Dashboard 2023; S = Scheduled, UC = Under Consideration

Timing of Adoption



Italics indicate sub-national jurisdictions

Share of Global GHG emissions covered by CPIs in Asian Countries (%)



Source: based on data from World Bank Carbon Pricing Dashboard 2023; National and Sub-national Jurisdiction

Implemented CPI
National Level

Jurisdiction	Type of CPI	Coverage (%) GHGs	Sectors/ Activities	Price (2022 USD/ tCO2e)	Offset	Population (2022; thousands)	Per Capita Income (2022; USD)	Total Emission (2021; MtCO2e)
China	ETS	31%	Power	8	To be determined	1,412,175	21,250	14,661
Indonesia	ETS	26%	Power	-	Allow offset, no limitation	275,501	14,250	1,153
Japan	Carbon tax	75%	Combustion of fossil fuel in all sectors, with some exemptions	2	Not allowed	125,124	48,470	1,153
Kazakhstan	ETS	46%	Power, Centralized Heating, Certain Industry	1	Allow offset	19,621	27,080	3,295
Korea	ETS	74%	Industry, Power, Buildings, Domestic Aviation, Public Sector, and Waste	11	Allow offset up to 5% of obligation	51,628	50,730	685
Singapore	Carbon tax	80%	All facilities; threshold of 25 ktCO2e GHG emissions	4	Will allow 5% offset starting 2024	5,637	107,030	64

Sources: based on World Bank Carbon Pricing Dashboard and World Bank data on population and GNI per capita

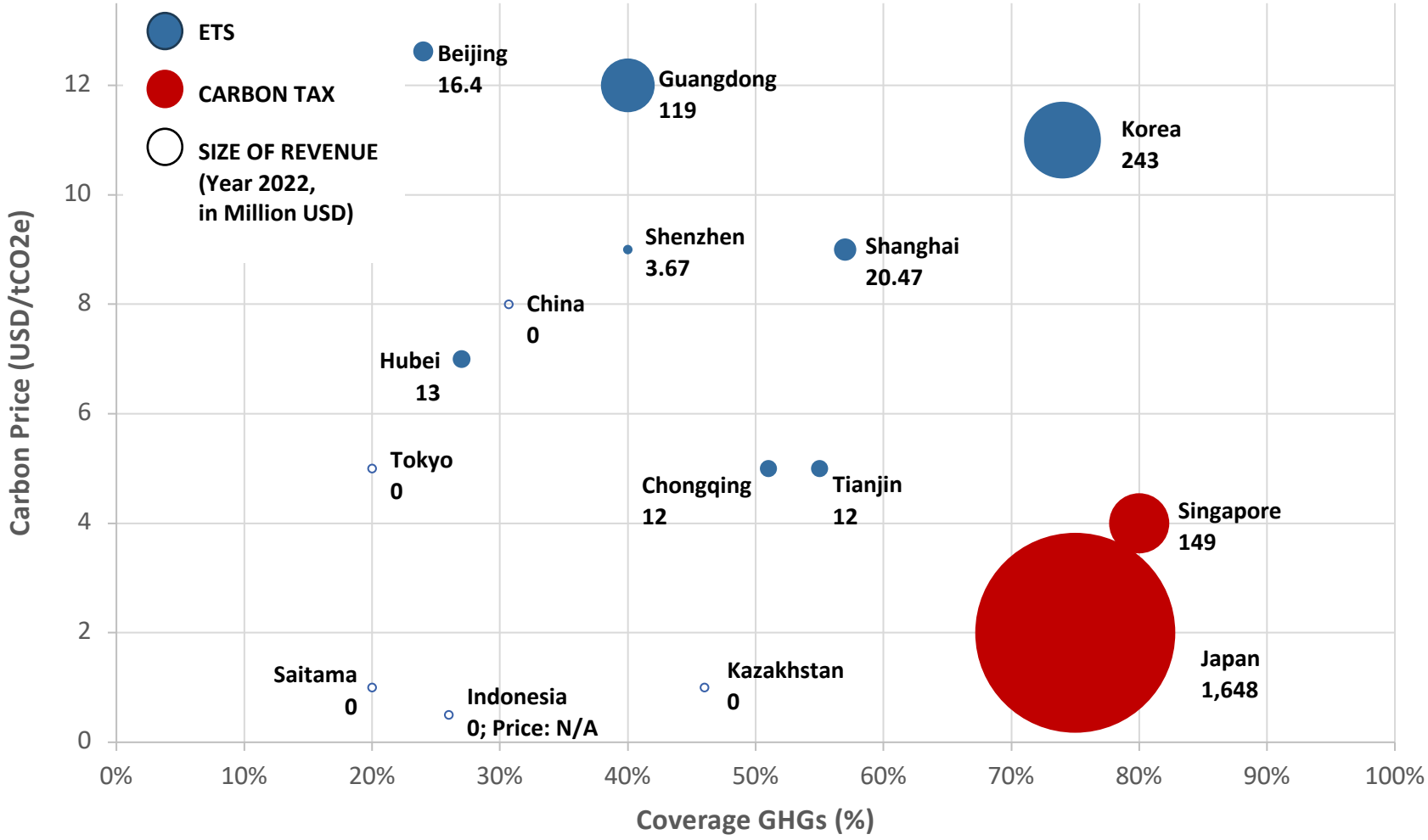
Planned CPI
National Level

Jurisdiction	Type of CPI	Coverage (%) GHGs	Sectors/ Activities	Price (2022 USD/ tCO2e)	Offset	Population (2022; thousands)	Per Capita Income (2022; USD)	Total Emission (2021; MtCO2e)
Indonesia	Carbon Tax	-	Coal-based Power Plant	2	Allow offset, no limitation	275,501	14,250	1,153
Japan	ETS	-	-		Will allow offset	125,124	48,470	1,153
Thailand	ETS	-	-	-	Will allow offset	71,697	20,070	265
Vietnam	ETS	Plan: 2023	-	-	Will allow offset	98,186	12,810	355

Sources: based on World Bank Carbon Pricing Dashboard and World Bank data on population and GNI per capita

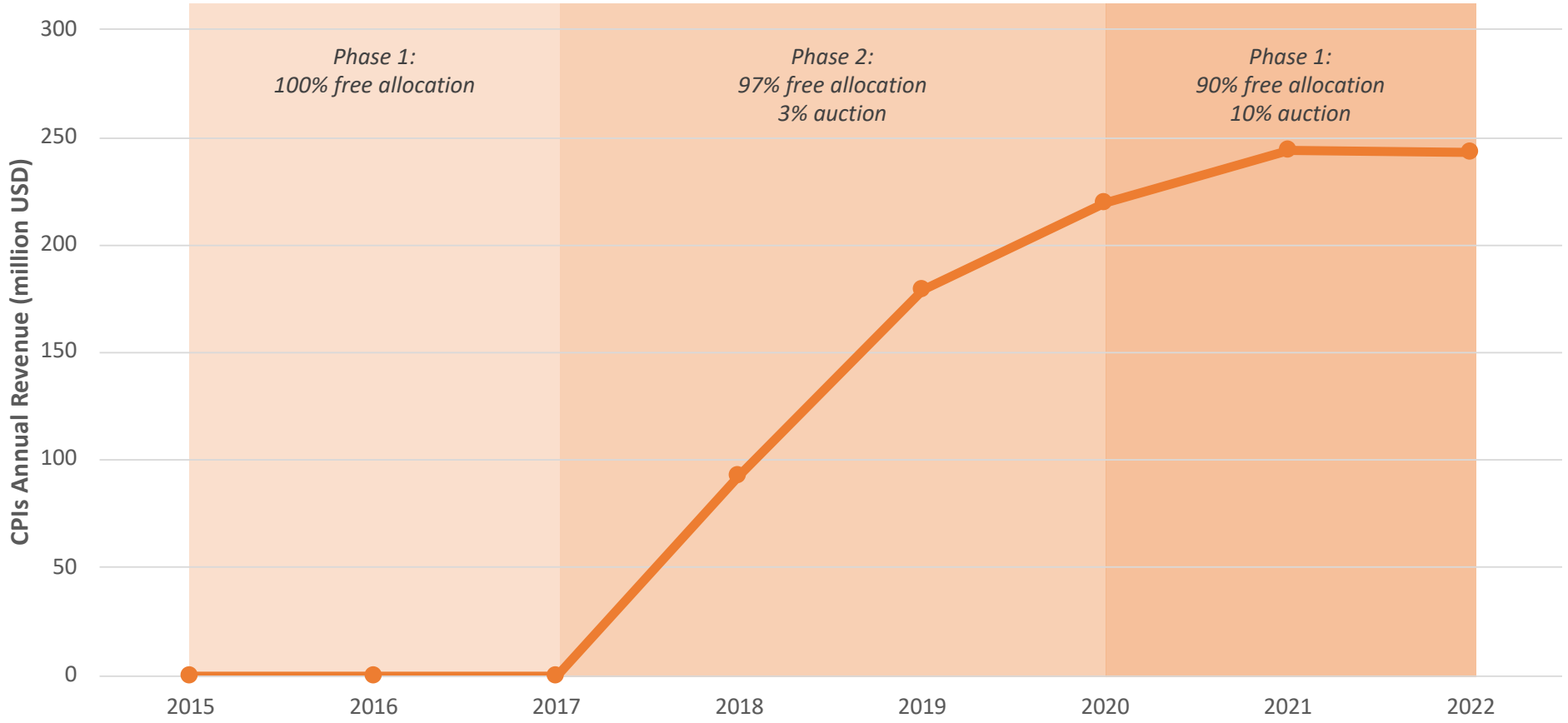
Revenue from CPIs

- Only three national-level CPIs generate revenue
- Almost all sub-national CPIs generate revenue



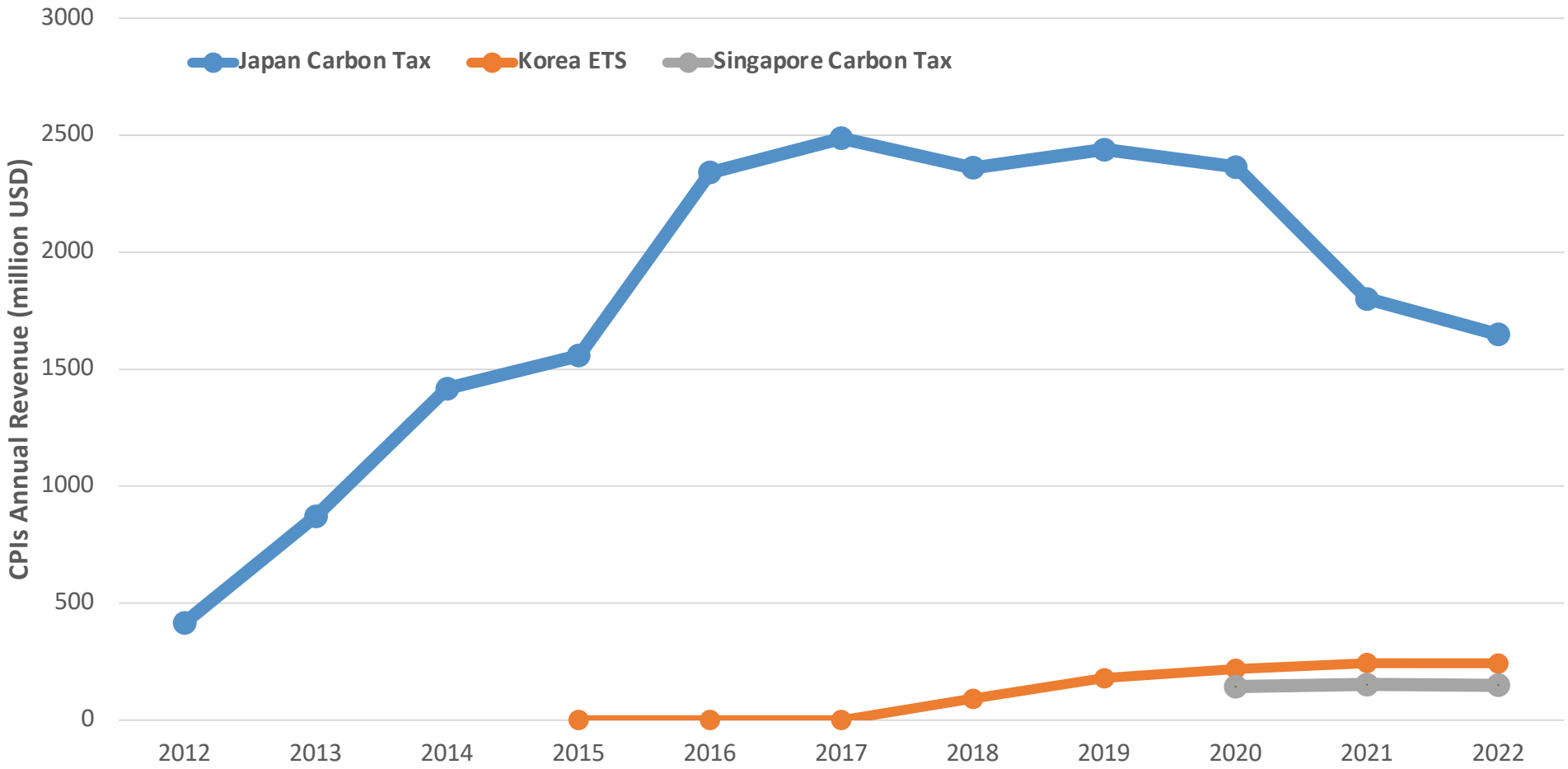
Source: based on World Bank Carbon Pricing Dashboard, 2023; International Carbon Action Partnership 2021

Implication of ETS System on Revenue: Korea's Phased Approach



Source: based on World Bank Carbon Pricing Dashboard, 2023; International Carbon Action Partnership 2021

Implication of ETS System on Revenue



Source: based on World Bank Carbon Pricing Dashboard, 2023; International Carbon Action Partnership 2021

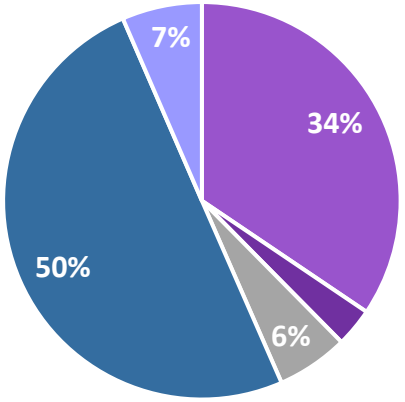
CPIs Revenue Use

Jurisdiction	Revenue Use
National	
Japan carbon tax	Fund renewable energy and energy efficiency programs through green subsidies and R&D support, related (for example) to lithium-ion batteries, distributed energy generation, and carbon capture and storage.
Korea ETS	Earmarked to fund climate response actions, including mitigation equipment, low-carbon innovation, and technology development for small- and mid-sized companies
Singapore carbon tax	Support decarbonization efforts, the transition to a green economy, and to cushion the impact on businesses and households
Sub-National	
Beijing, Chongqing, Fujian, Guangdong, Hubei, Shanghai, Shenzhen, & Tianjin	General Budget

Source: based on World Bank Carbon Pricing Dashboard, 2023; International Carbon Action Partnership 2021

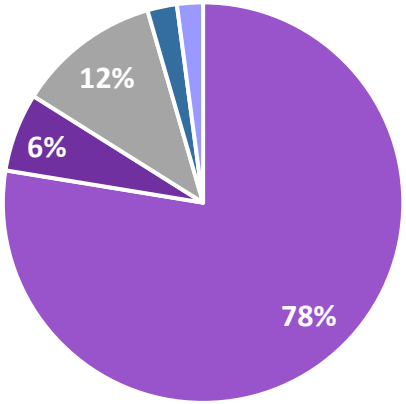
Source of Emission by Sector

Indonesia (2019)



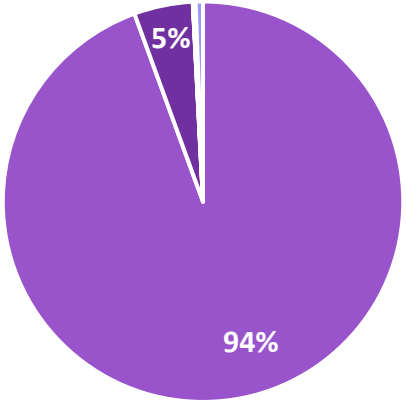
Source: based on BUR 3

Kazakhstan (2020)



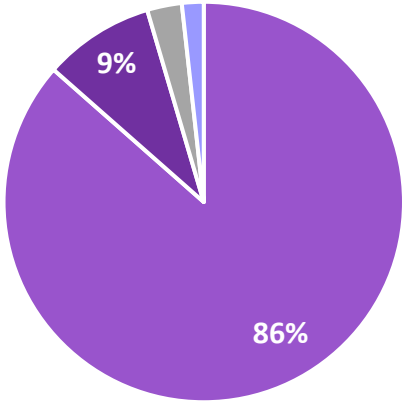
Source: based on BUR 5

Singapore (2018)



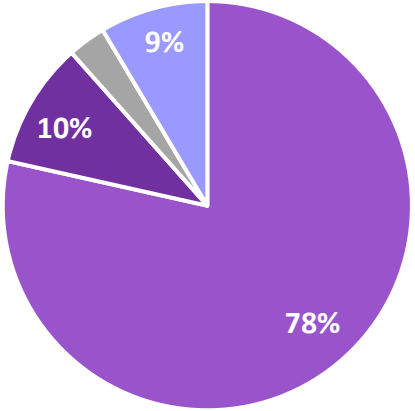
Source: based on BUR 5

Japan (2020) Excluding LULUCF



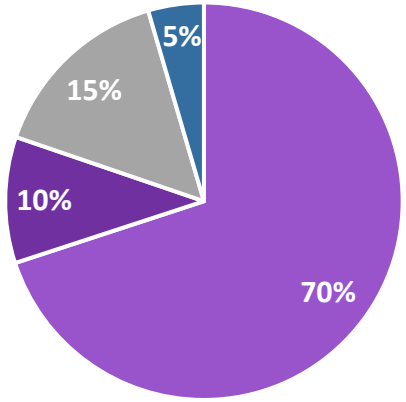
Source: based on BUR 5

Malaysia (2019) Excluding LULUCF



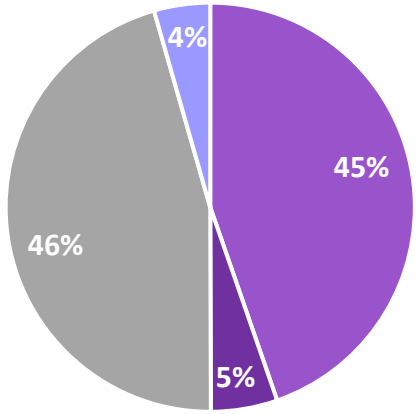
Source: based on BUR 4

Thailand (2019)



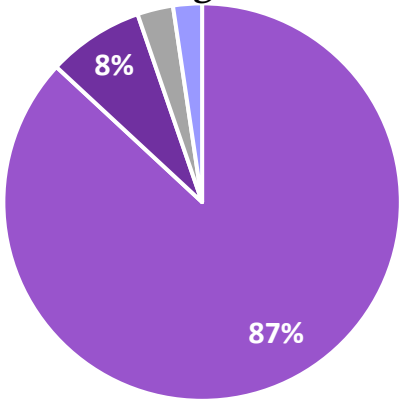
Source: based on BUR 3

Pakistan (2018) AFOLU combined



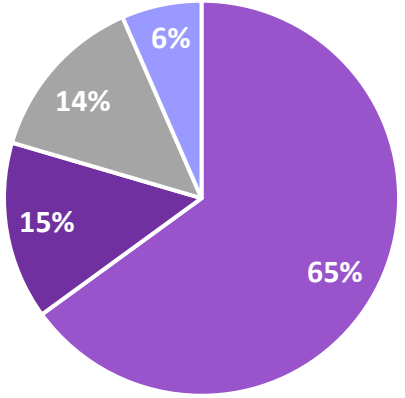
Source: based on BUR 1

Korea (2018) Excluding LULUCF



Source: based on BUR 4

Vietnam (2016) AFOLU combined



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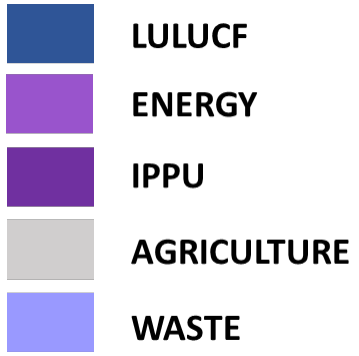
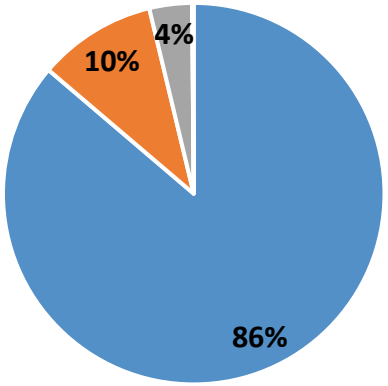


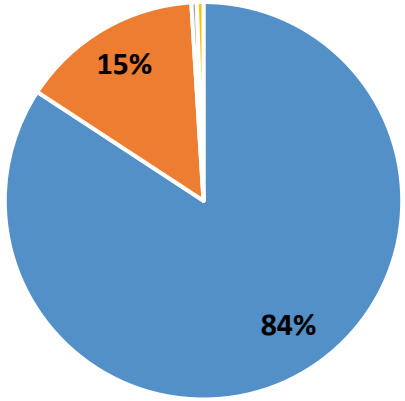
Source of Emission by Gasses

Indonesia (2019)



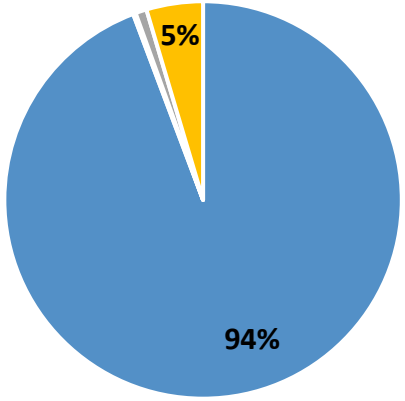
Source: based on BUR 3

Kazakhstan (2020)



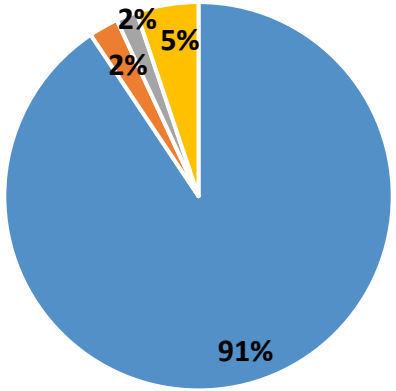
Source: based on BUR 5

Singapore (2018)



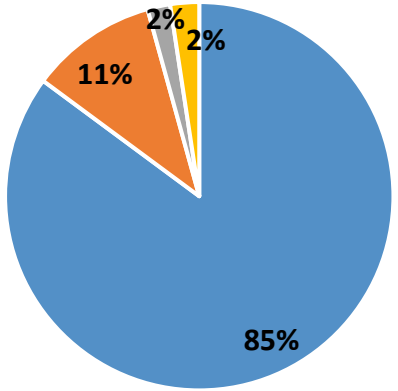
Source: based on BUR 5

Japan (2020) Excluding LULUCF



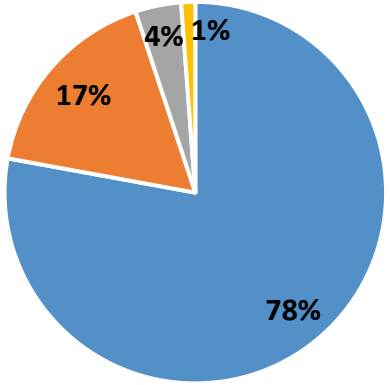
Source: based on BUR 5

Malaysia (2019) Excluding LULUCF



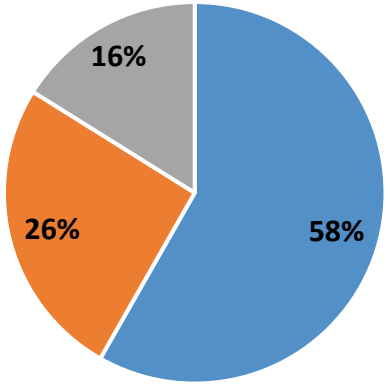
Source: based on BUR 4

Thailand (2019)



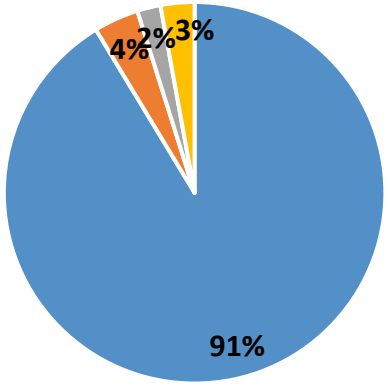
Source: based on BUR 3

Pakistan (2018)



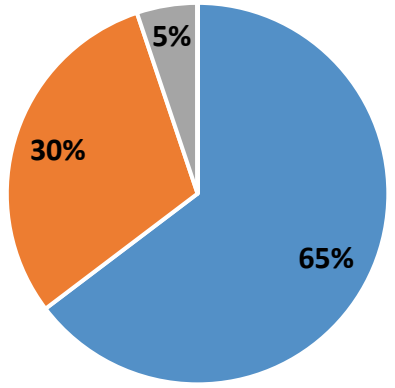
Source: based on BUR 1

Korea (2018) Excluding LULUCF

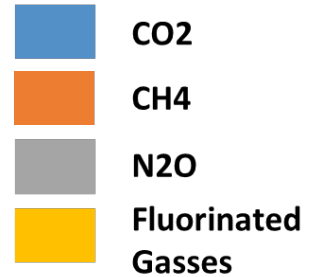


Source: based on BUR 4

Vietnam (2016)



Source: based on BUR 3

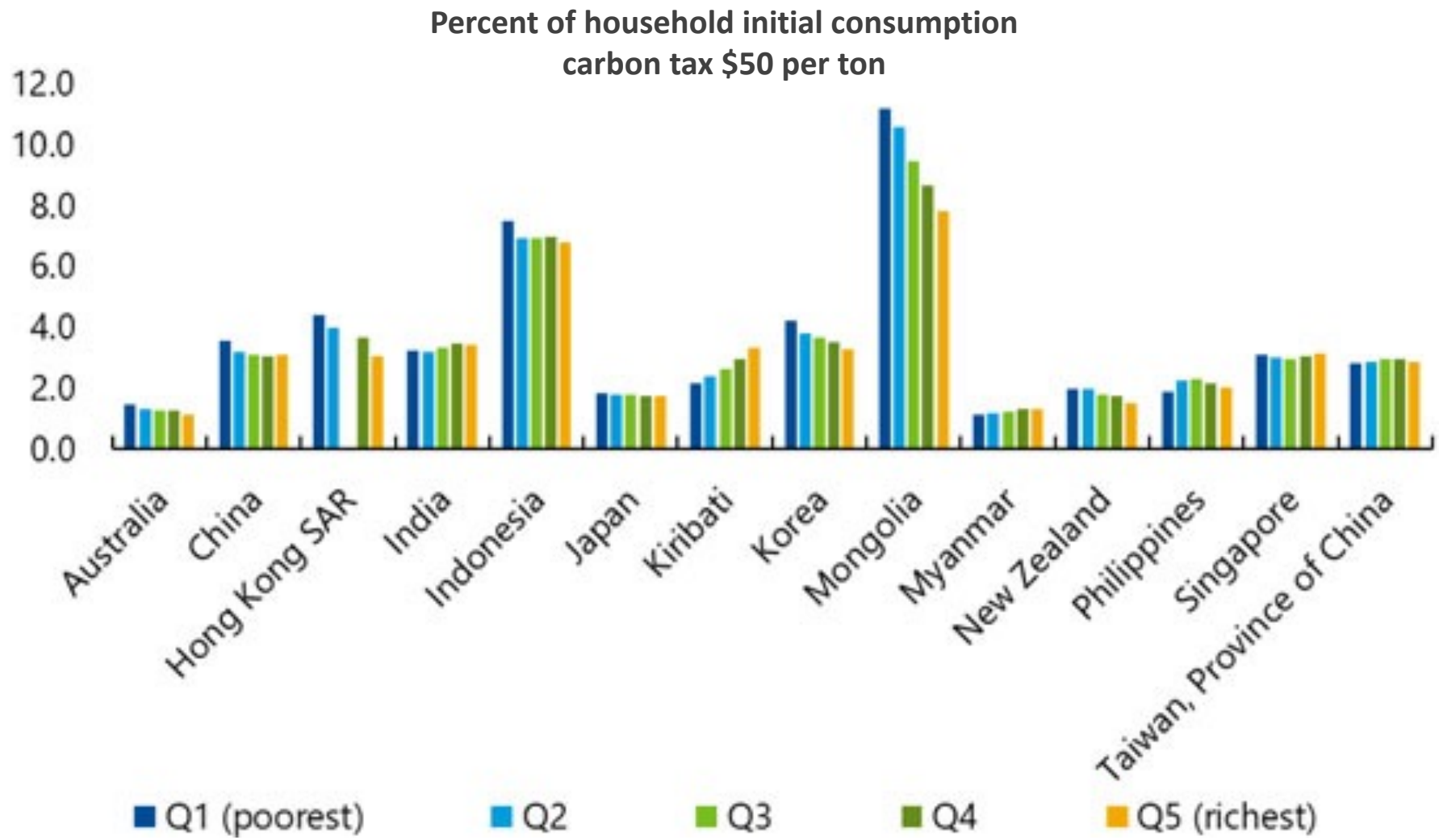


Implementation Considerations and Challenges

- Distributional effects
- Leakage and international competitiveness
- Legal constraints
- Complementary or counteracting policies
- Technical design capacity
- Technical implementation capacity

Carbon Tax Distributional Impacts: Burden of Higher Prices by Income Quintile

- **Regressive**:
  - Australia
  - China
  - Hong Kong SAR
  - Indonesia
  - Japan
  - Korea
  - Mongolia
  - New Zealand
- **Fairly proportional**:
  - Singapore
  - Taiwan
- **Progressive**:
  - India
  - Kiribati
  - Myanmar
  - Philippines



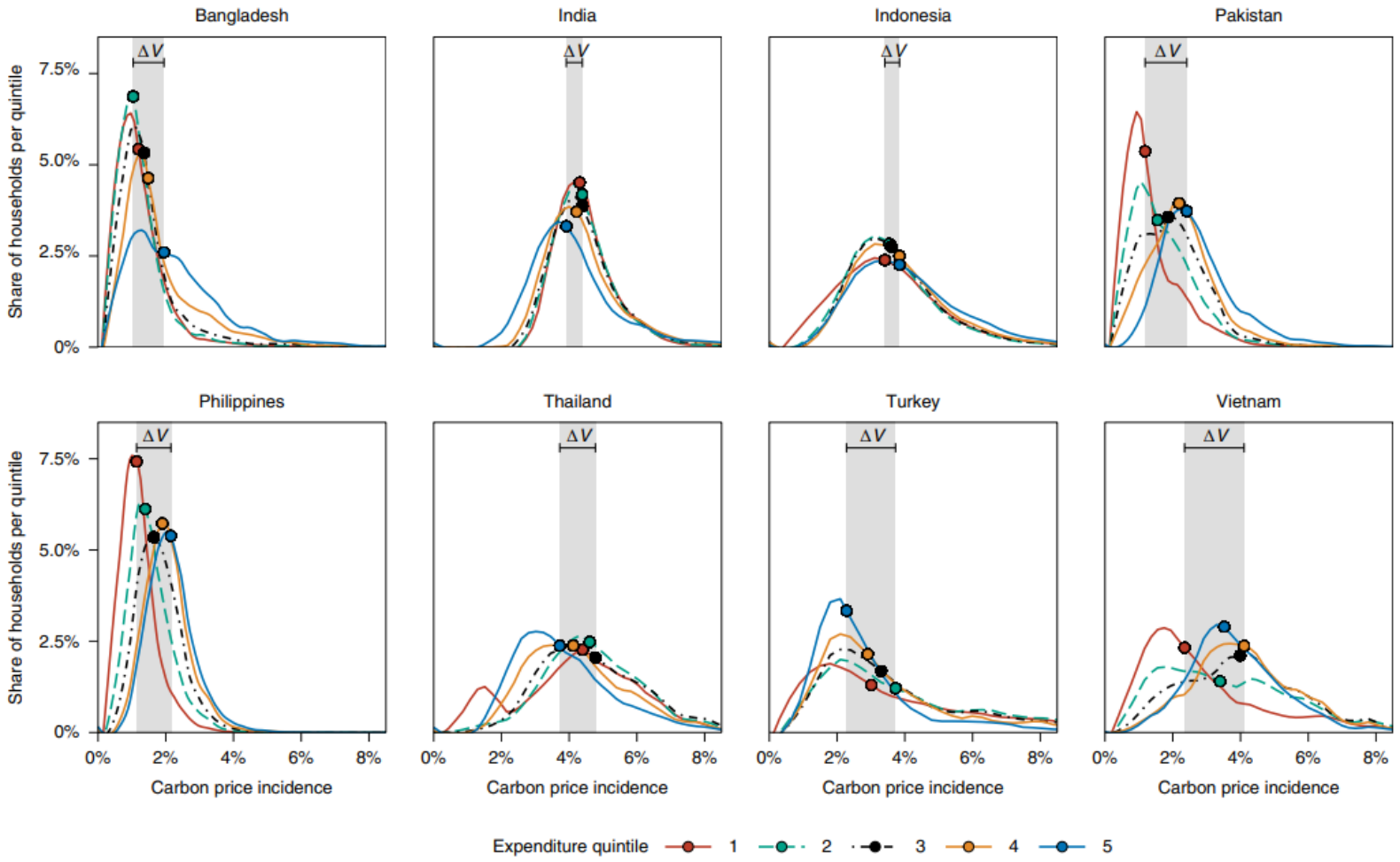
Sources: IMF Working Paper, 2022

Carbon Tax Distributional Impacts: Effect on the Poorest Households

Bangladesh, Pakistan, and Philippines: Increase 1% of total household expenditure

India and Thailand: Increase >4% of total household expenditure

Distributional Impact of Carbon Pricing in Developing Asia, carbon tax $40



Sources: Steckel et al., 2021

Japan Carbon Tax Case: Leakage and International Competitiveness

Concerns over international competitiveness drive strong political resistance in Japan, leading to:

- *reluctance to increase carbon tax rates*
- *obstacle to adoption of national ETS*

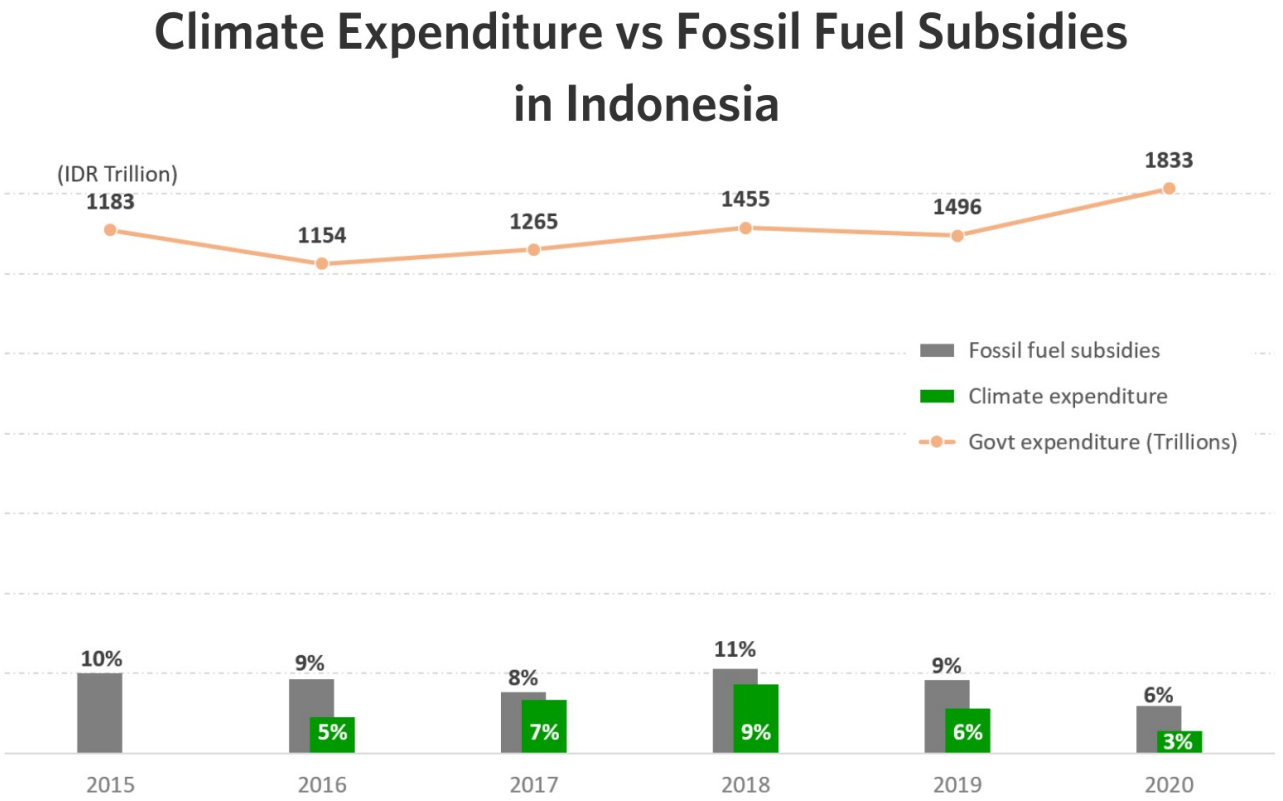
	Modeled impacts under USD 2.67 carbon tax		
	2012	2015	2020
Change in value (billion USD)			
Japan	-0.0112	-0.0436	-0.1532
China	0.0007	0.0030	0.0135
ASEAN	0.0003	0.0011	0.0044
World	-0.0017	-0.0080	-0.0291
Change in emissions (Mt CO2e)			
Japan	-0.0015	-0.0056	-0.0188
China	0.0013	0.0038	0.0116
ASEAN	0.0001	0.0003	0.0013

Source: Zhou et al., 2013

Sources: Gokhale, 2021; Arimura et al., 2021

Indonesia Carbon Pricing Case: Removing Fossil Fuel Subsidies

- Indonesia has set up a plan for introducing a Carbon Tax for Coal-Fired Power Plants at a rate of USD 2 per ton of CO_2 emissions.
- If a carbon tax were imposed on coal producers for each ton of CO_2 equivalent emitted during coal production, it would result in higher coal prices. But the price will be covered by the subsidy, which lead to increase in government budget allocation.
- It is hard to completely remove subsidies considering that the public, especially lower-income household, is highly dependent on fossil fuel subsidies.



Despite the subsidy reform of 2015, fossil fuel subsidies remain at 9% of the total state budget on average since 2015. By contrast, spending for climate action is 6% of the total state budget on average since 2016.

Sources: Akimaya & Dahl, 2022; Mafira, 2021

Challenges in Other Countries: Technical Capacity to Design

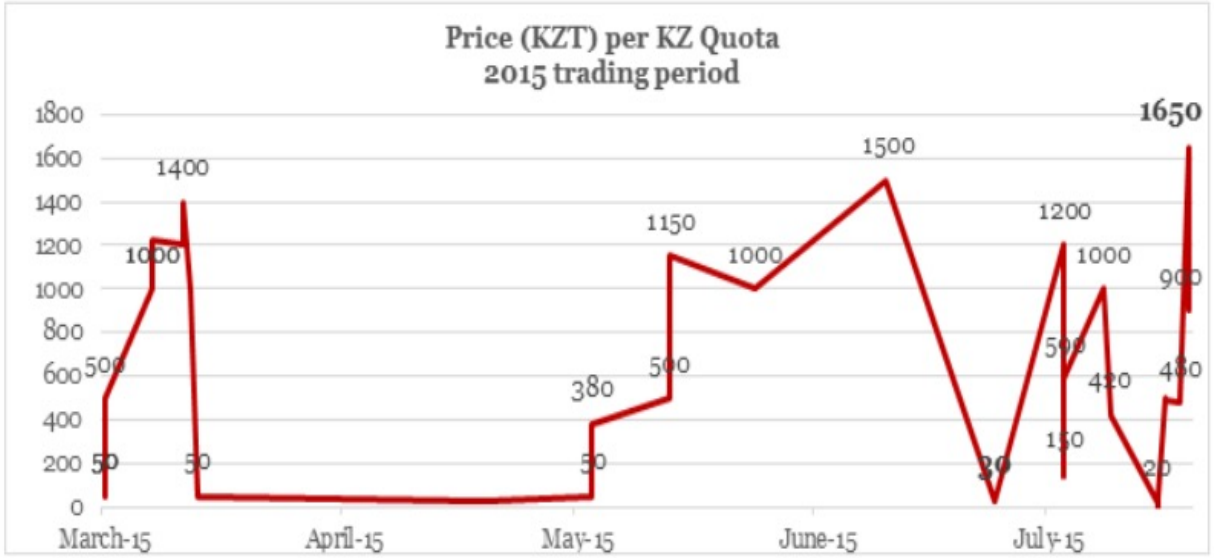
The crucial features of KazETS in the first two phase:

- Prohibiting the pass-on of CO_2 allowance costs or the costs of abatement to consumers' energy prices.
- Firms are not allowed to reduce energy production due to consideration of energy insecurity.

Faced with industry's opposition, the initial 77% ETS emission coverage turned into only 50% of total CO_2 emission in the phase 2.

After two phases of its national ETS implementation (2013; and 2014-2015), Kazakhstan ETS was suspended due to:

1. Lack of clarity on its future regulation,
2. Inconsistency of MRV, offset procedure, and allowance allocation methods,
3. Low trading activities, and
4. Price volatility.



$1=185 KZT (this is the exchange rate that was in effect during the 2015 trading period; from August 2015-2016 the average exchange rate has been closer to $1=335 KZT)

	March	April	May	June	July	August	Total
# of transactions	14	1	3	5	6	11	40
volume (tons)	739,600	24,700	370,300	111,629	188,305	549,388	1,983,922

Sources: Howie & Atakhanova, 2022; EDF, 2016

Challenges in Other Countries: Technical Capacity to Design

Pakistan

Pakistan is currently considering establishing an ETS to promote investment in low-carbon initiatives. However, several challenges for its establishment have been identified, which include the limited availability of data on GHG emissions and energy consumption at the facility level, lack of a regulatory framework for adopting CPI, and a deficiency of experience in implementing MRV system (UNFCCC & IGES, 2023).

Vietnam

Vietnam is currently still in the formulation stage on its carbon pricing instrument. The various existing studies are still very limited in discussing the important constraints of carbon pricing implementation also supported by the outdated data, which may affect the decision-making process for carbon pricing in Vietnam (Nam Do & Burke, 2021).

Korea ETS Case: Technical Capacity to Implement

At the beginning of the ETS implementation, Korea gave 100 percent free allocation and allowed companies to bank allowances for an unlimited period of time. Government also released some of the allowance credit reserve to the market.

The objective to this approach is to avoid a shortfall of emission supply and to stimulate the market.

The implications:
Hoarding allowances, combined with the banking ability, discourage firms to participate in ETS market.

Sources: ADB, 2018

The Korean ETS' 2015–2016 trading volume (in thousands ton)

	2015				2016			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
KAU	1			398	102	1647	1184	551
KCU		780		141	613	1408	100	59
KOC		1130	1913	1371	2294	1526	663	1113
Total	1	1910	1913	1910	3008	4581	1946	1723

KAU = Korean allowance unit;
KCU = Korean credit unit;
KOC = Korean offset credit

The trading activity in the Korean ETS market remained a tiny fraction of the overall quota due to lack of market participants. In 2015, trading represented just 0.8% of the total quota, and this increased to 1.6% in 2016.

Sources: Choi & Qi, 2019

CPI and Revenue Recycling

Increasing the carbon tax rate in Japan is hard as it receives strong opposition from groups of interest, as they bear the burden of the price increases and the issue of competitiveness.

On the other hand, Singapore aims to increase its carbon tax rate to USD 18/tCO2e in 2024-2025, USD 33/tCO2e in 2026-2027, and USD 36-66/tCO2e by 2030.

Singapore' strategies to gain political support:

- Allow purchase of high-quality international credit for offset
- Revenue Recycling: The carbon tax revenue collected are used to cushion the impact on businesses and households

Sources: Singapore National Environment, 2023

Simulation results for revenue recycling in Japan

		LMP	SSC	COR
2030	GDP	−0.59	−0.10	0.38
	Income	−0.83	−0.34	0.44
	Carbon tax revenue	10,287	10,651	10,364
	Rebated revenue	0	7,634	6,707
2050	GDP	−2.06	−1.44	−0.95
	Income	−2.93	−2.25	−1.51
	Carbon tax revenue	14,055	14,403	14,499
	Rebated revenue	0	8,509	7,480

GDP, Income → %
Carbon tax revenue and rebated revenue → billion yen

Scenario: BAU = Without Carbon Tax; LMP = Carbon tax + lump-sum rebate; SSC= Carbon tax + Social Security Cut; COR= Carbon tax + corporate tax cut

Sources: Asakawa et al., 2021

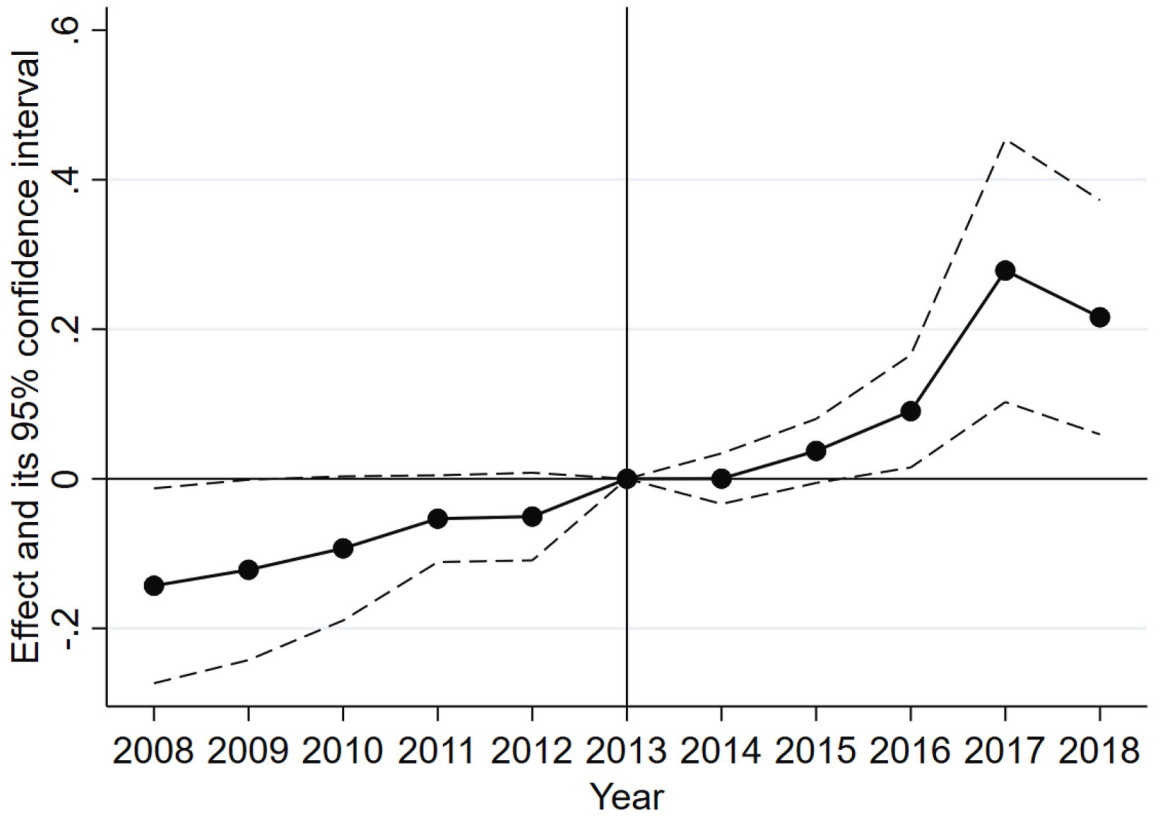
CPI Induced Technology Transfer

The ETS exerts a noteworthy influence on technological innovation, with technology transfer being a crucial element in this progress.

The DID (Difference-in-Differences) approach was utilized to examine if China's carbon ETS can enhance the technology transfer between cities using panel data in China from 2008 to 2018.

China's carbon ETS initiative has notably promoted the technology transfer between different provinces and cities, with a particularly pronounced impact on smaller and medium-sized cities.

Parallel trend test of carbon ETS on technology transfer



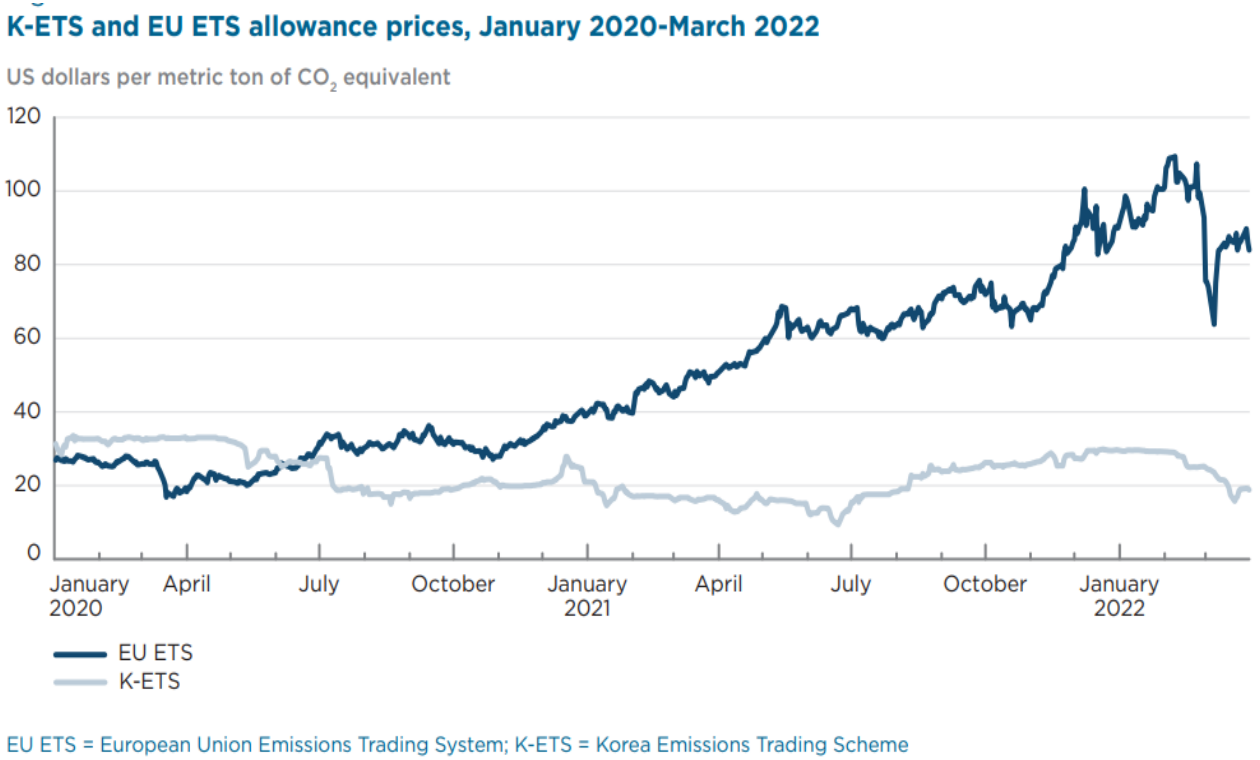
Sources: Cai et al., 2023; Ren et al., 2022

Co-benefit of CPI: Reduced vulnerability to CBAMs

Goods imported from all non-EU nations are subject to the CBAM, unless they already participate in the EU ETS or have their own ETS that is linked to the EU ETS (EU 2023, art 16). The burden of proof lies on the importer.

Jurisdiction with their own CPI are not exempt, but the home country price can be deducted from the CBAM obligation.

In the case of South Korea, a full exemption from the CBAM is unlikely given large carbon price difference, but still can obtain deduction.



Sources: Schott & Hogan, 2022

CPIs Challenges by Instrument Type

Design issue	Instrument	
	Carbon tax	ETS
Administration	Administration is more straightforward (for example, as extension of fuel taxes)	May not be practical for capacity constrained countries
Uncertainty: price	Price certainty can promote clean technology innovation and adoption	Price volatility can be problematic; price floors, and cap adjustments can limit price volatility
Uncertainty: emissions	Emissions uncertain but tax rate can be periodically adjusted	Certainty over emissions levels
Revenue: efficiency	Revenue usually accrues to finance ministry for general purposes (for example, cutting other taxes, general investment)	Free permit allocation may help with acceptability but lowers revenue; tendency for auctioned revenues to be earmarked
Revenue: distribution	Revenues can be recycled to make overall policy distribution neutral or progressive	Free allowance allocation or earmarking may limit opportunity for desirable distributional outcomes
Political economy	Can be politically challenging to implement new taxes; use of revenues and communications critical	Can be more politically acceptable than taxes, especially under free allocation
Competitiveness	Border carbon adjustment more robust than other measures (for example, threshold exemptions, output-based rebates)	Free allowances effective at modest abatement level; border adjustments (especially export rebate) subject to greater legal uncertainty
Price level and emissions alignment	Need to be estimated and adjusted periodically to align with emissions goals	Alignment of prices with targets is automatic if emissions caps consistent with mitigation goals
Compatibility with other instruments	Compatible with overlapping instruments (emissions decrease more with more policies)	Overlapping instruments reduce emissions price without affecting emissions though caps can be set or adjusted accordingly
Pricing broader GHGs	Amenable to tax or proxy taxes building off business tax regimes; feebate variants are sometimes appropriate (for example, forestry,	Less amenable to ETS; incorporating other sectors through offsets may increase emissions and is not cost effective
Global coordination regimes	Most natural instrument for international carbon price floor	Can comply with international price floor; mutually advantageous trades from linking ETSs but does not meet global emissions requirements

Green indicates an advantage of the instrument; orange indicates neither an advantage nor disadvantage; red indicates a disadvantage of the instrument

Sources: Parry et al., 2022

Thank you!

Questions or Comments:

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