



# International Carbon Action Partnership

## EMISSIONS TRADING WORLDWIDE

### *Infographics*

### *Status Report 2022*

# Emissions Trading Worldwide

## *International Carbon Action Partnership (ICAP) Status Report 2022*

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# Infographics

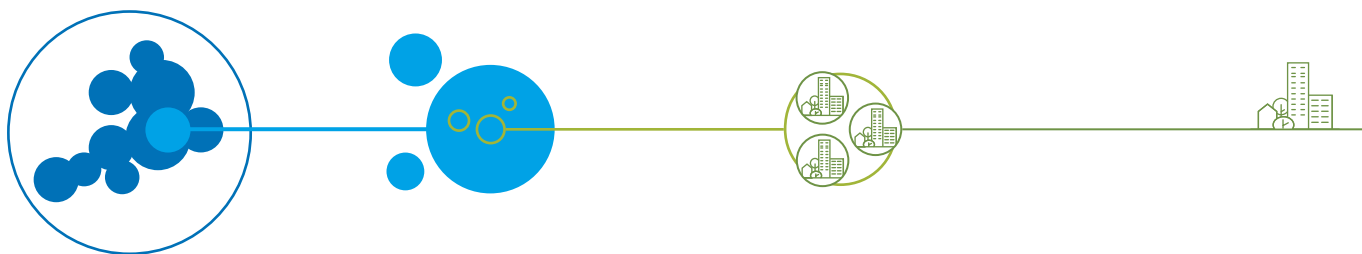


# From Supranational to Local

## *Emissions trading systems operate at every level of government*

This infographic demonstrates the diversity and complexity that exists with respect to the level of government at which emissions trading can be implemented. At one end of the spectrum, the EU ETS operates supranationally in all EU Member States plus Iceland, Liechtenstein, and Norway. At the other end, city-level ETSs are in operation, for example, in Shenzhen and Tokyo. Multiple ETSs may be in force in countries like Germany, where some emissions are covered by the EU ETS and others by the German National ETS. Similarly, the China

National ETS currently covers power sector emissions while other province- and city-level ETS pilots regulate emissions from a variety of sectors. In North America, many provincial or state-level ETSs exist, with some linked domestically or internationally. In the rest of ICAP Status Report 2022 you can find a wealth of information about these individual systems that are already in force as well as many others that are under development or consideration.



### *1 Supranational*

EU Member States  
+ Iceland  
+ Liechtenstein  
+ Norway

### *8 Countries*

China  
Germany  
Kazakhstan  
Mexico  
New Zealand  
Republic of Korea  
Switzerland  
United Kingdom

### *19 Provinces & States*

California  
Connecticut  
Delaware  
Fujian  
Guangdong  
Hubei  
Maine  
Maryland  
Massachusetts  
New Hampshire  
New Jersey  
New York  
Nova Scotia  
Oregon  
Québec  
Rhode Island  
Saitama Prefecture  
Vermont  
Virginia

### *6 Cities*

Beijing\*  
Chongqing\*  
Shanghai\*  
Shenzhen  
Tianjin\*  
Tokyo

\* Beijing, Chongqing, Shanghai and Tianjin are provincial-level municipalities in the Chinese administrative system.



JURISDICTIONS MAKING UP 55 %  
OF GLOBAL GDP ARE USING EMISSIONS TRADING

55%

1



ALMOST 1/3 OF THE GLOBAL POPULATION LIVES  
UNDER AN ETS IN FORCE

3



17%

OF GLOBAL GHG EMISSIONS ARE COVERED BY AN ETS

# Emissions Trading Worldwide

## The state of play of cap-and-trade in 2021

### Regional Greenhouse Gas Initiative (RGGI)

An ECR began operation in 2021. Pennsylvania released the final regulation to establish an ETS and to join RGGI.

- Connecticut
- Delaware
- Maine
- Maryland
- Massachusetts
- New Hampshire
- New Jersey
- New York
- Rhode Island
- Vermont
- Virginia

### Washington

#### Oregon Cap-and-Trade Program

Established a new Climate Protection Program including an ETS for fuel suppliers. The system's first compliance period is 2022-24.

### California Cap-and-Trade Program

Several important program changes were introduced: the introduction of a price ceiling with two price containment reserve tiers below it; reductions in the use of offset credits; and a steeper allowance cap decline through 2030.

### Mexican ETS Pilot Program

### Transportation and Climate Initiative (TCI-P)

### Québec Cap-and-Trade System

Began its fourth compliance period covering 2021-2023. New rules include amended price tiers for reserve allowances and reformed eligibility requirements for offset projects.

### Nova Scotia Cap-and-Trade Program

### Massachusetts Limits on Emissions from Electricity Generation



In force



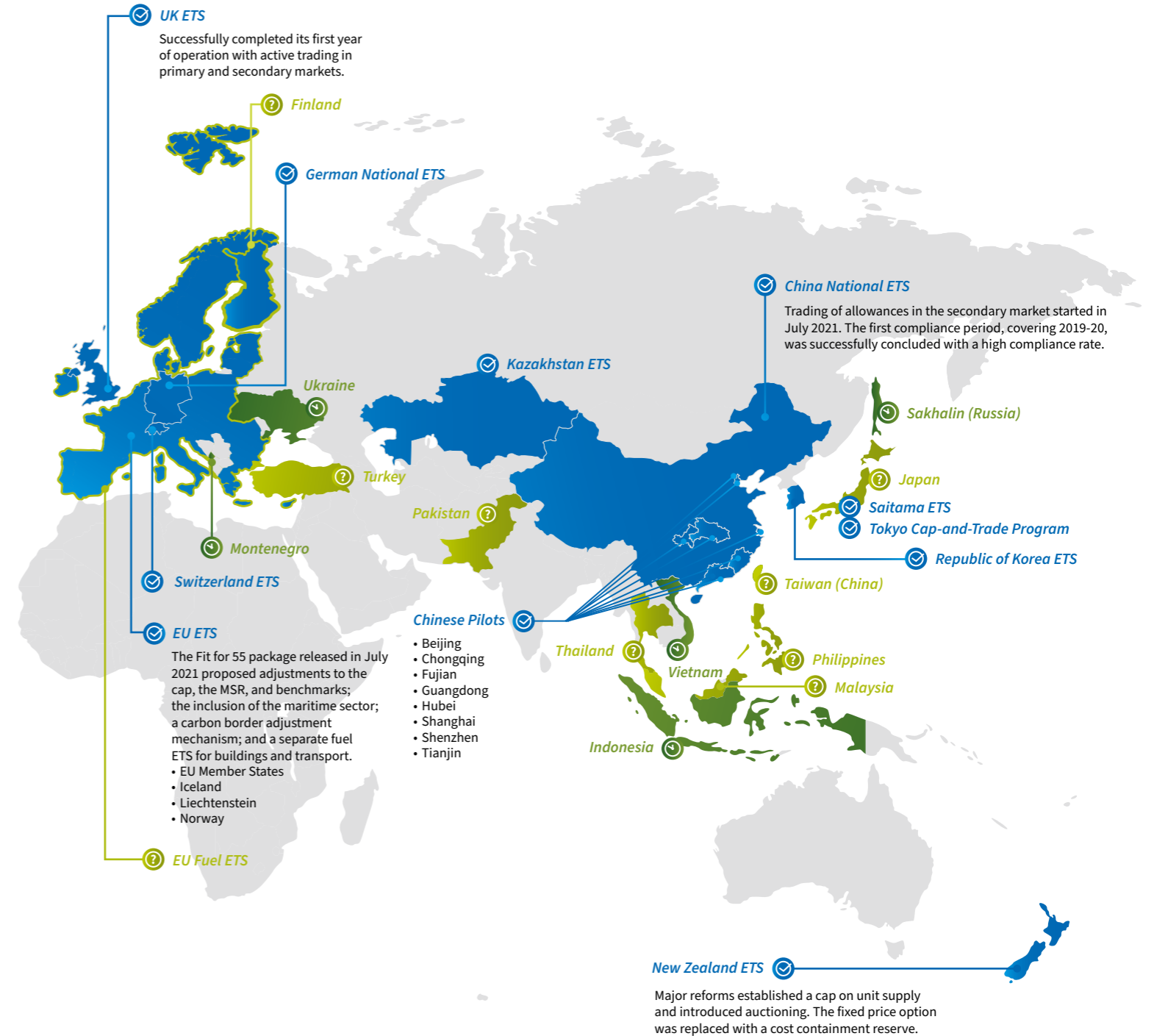
Under development



Under consideration

The ICAP ETS world map depicts emissions trading systems currently in force, under development or under consideration. As of January 2022, there are 25 ETSs in force. Another seven are under development and expected to be in operation in the next few years. These include ETSs in Colombia, Indonesia, and Vietnam. 15 jurisdictions including Brazil, Finland, and Japan are also considering the role an ETS can play in their climate change policy mix. If a jurisdiction has multiple

systems in force, it is depicted in blue, with the borders of the jurisdiction representing the layered systems (e.g. Germany and Guangdong). If, however, the jurisdiction has a system in force but is also considering an additional system, it is depicted in blue but also features a (light) green border (e.g. Finland). There is currently no jurisdiction with both an ETS in force and another system under development.

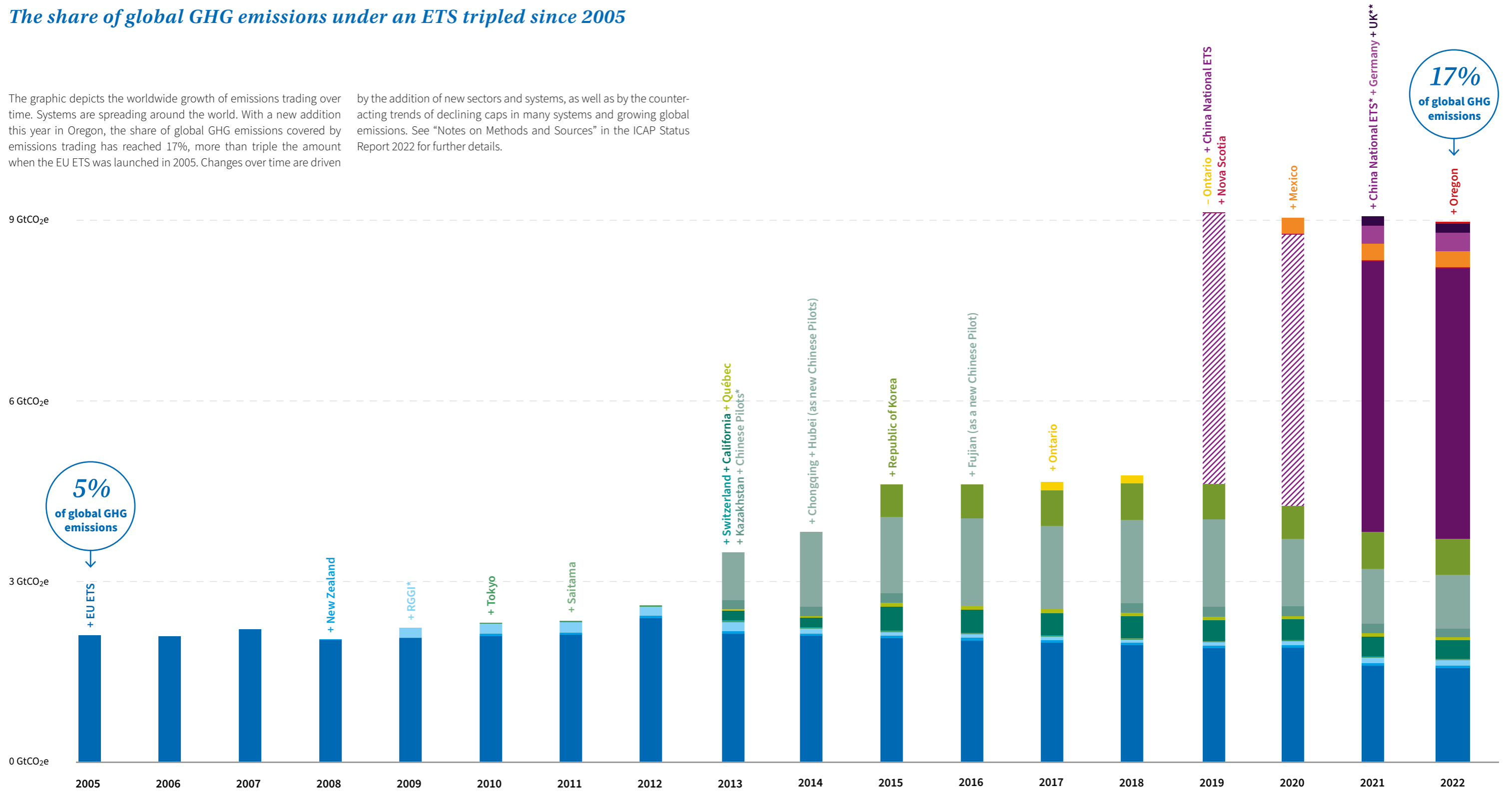


# Global Expansion of ETS

The share of global GHG emissions under an ETS tripled since 2005

The graphic depicts the worldwide growth of emissions trading over time. Systems are spreading around the world. With a new addition this year in Oregon, the share of global GHG emissions covered by emissions trading has reached 17%, more than triple the amount when the EU ETS was launched in 2005. Changes over time are driven

by the addition of new sectors and systems, as well as by the counter-acting trends of declining caps in many systems and growing global emissions. See “Notes on Methods and Sources” in the ICAP Status Report 2022 for further details.



\* RGGI includes New Jersey (as of 2020) and Virginia (as of 2021).

\* Beijing, Guangdong, Shanghai, Shenzhen, Tianjin

\* The Chinese National ETS came into force in 2021 but has retroactive compliance obligations in 2019 and 2020, indicated above by the striped bar

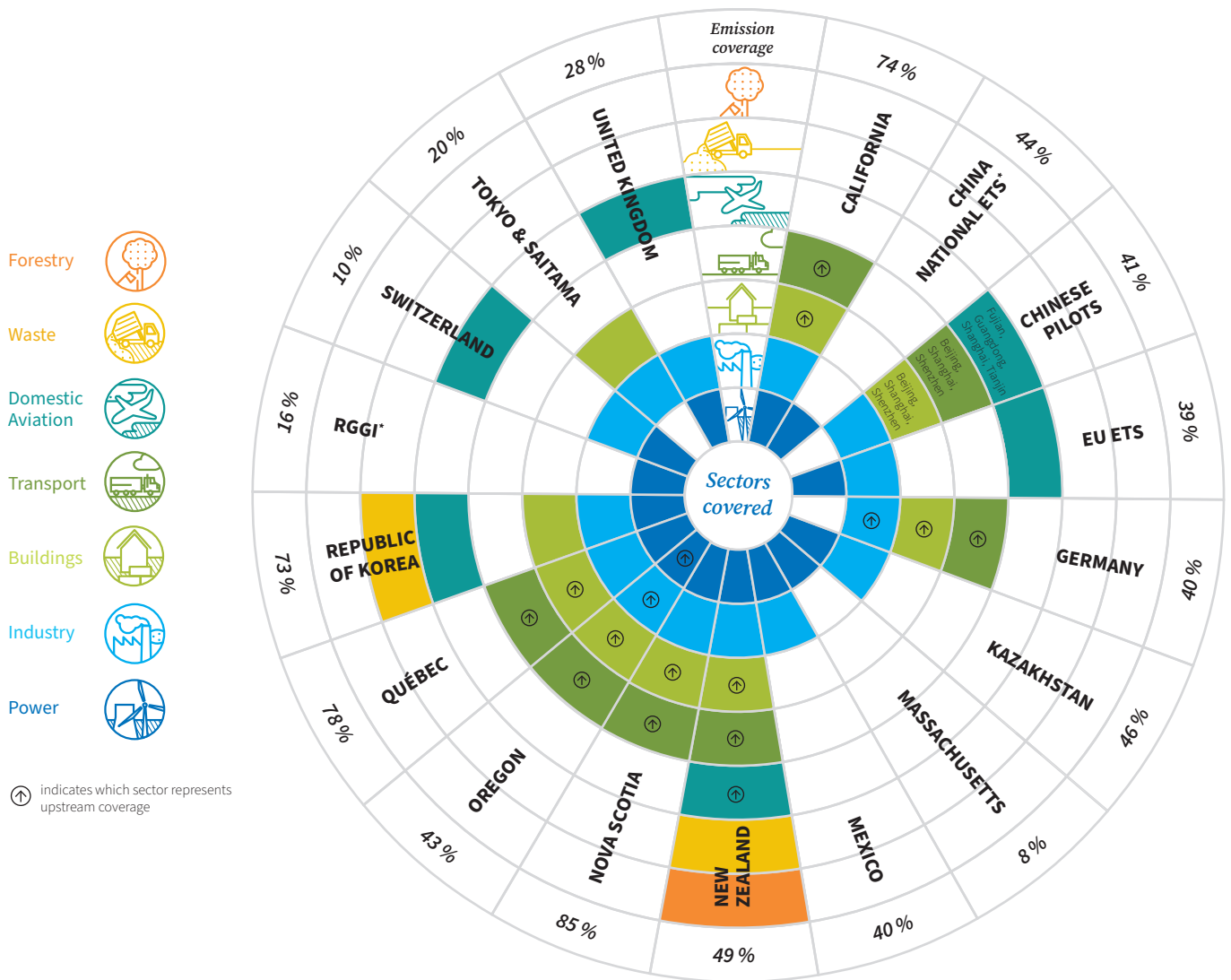
\*\* In 2021, the UK launched its own ETS which required an adjustment in the EU ETS cap.

# Sector Coverage

## Sectors covered by emissions trading across systems

The graphic shows sectors (types of economic activity) covered by an ETS in force in 2021. Systems are listed clockwise alphabetically, with the numbers in the outermost ring indicating the share of aggregate emissions covered by the system. Upstream coverage in a sector is indicated with an arrow. Sectors are considered covered when at least some entities in the sector have explicit compliance obligations. Typically, not all facilities in the sector are regulated

because of limits like inclusion thresholds. In addition, not all gases or processes of a given sector are covered. The jurisdictions' respective factsheets provide more information on system coverage. Note in particular that the coverage figures in the ETSs in China and for RGGI reflect CO<sub>2</sub> emissions only. The graphic includes only sectors which are covered by at least one ETS. See "Notes on Methods and Sources" for further details.



\* Coverage numbers reflects CO<sub>2</sub> emissions only



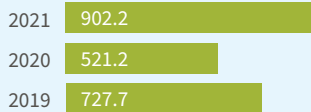
# Auctioning Revenue

## Emissions trading as an additional source of government revenue

Allowance auctions generate revenue that can be used in areas reflecting jurisdictional priorities. Jurisdictions have tended to use auction revenues to fund climate programs, including on energy efficiency, low-carbon transport, and clean and renewable energy. Revenues have also been used to support energy-intensive industries,

as well as to assist disadvantaged and low-income groups. The amount of revenue collected depends on the jurisdiction's size, ETS coverage, share of auctioned allowances and allowance prices. By the end of 2021, systems worldwide raised over USD 161 billion cumulatively. See "Notes on Methods and Sources" for further details.

### Québec



**\$4,387** million since 2013



### UK

**\$5,928** million since 2021

### EU ETS



**\$117,554** million since 2013



### Nova Scotia

**\$57** million since 2020

### Germany

**\$8,497** million since 2021

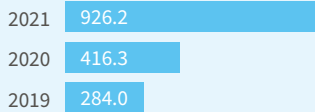
### Korea



**\$668** million since 2019



### RGGI



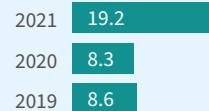
**\$4,702** million since 2008



### Massachusetts

**\$71** million since 2018

### Switzerland



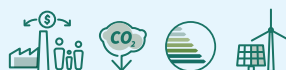
**\$64** million since 2014



### California



**\$18,230** million since 2013



### Chinese Pilots

**\$255** million since 2013

### New Zealand

**\$937** million since 2021

- Energy efficiency
- Clean/Renewable energy
- Direct assistance to industry and low-income communities
- GHG reduction programs
- Low-carbon innovation
- Innovation in CCS
- General budget
- Public/Low-carbon transport

total **\$161** billion since 2008

# Different Shapes of ETS

## A comparative look at key metrics in selected systems

The axes on each graph correspond to a specific metric. **Coverage** shows the share of the jurisdiction's GHG emissions covered under the ETS, except in China and RGGI where it represents CO<sub>2</sub> emissions only. **Allowance price** is measured in USD per metric tonne of CO<sub>2</sub>e and averaged over 2021. **Auction share**, expressed as a share of the 2021 cap, denotes

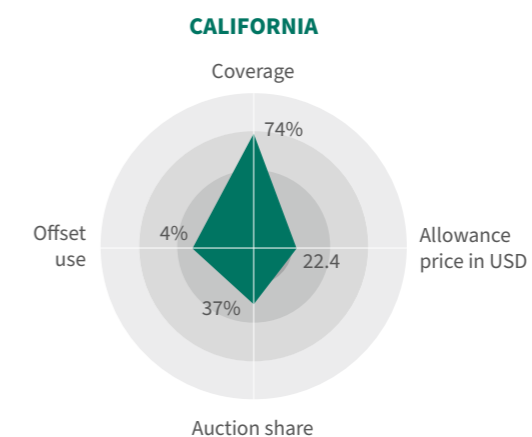
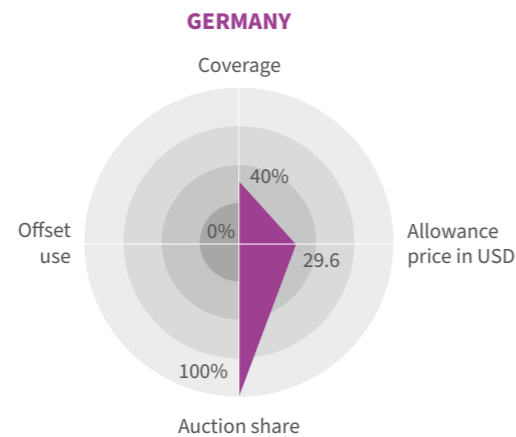
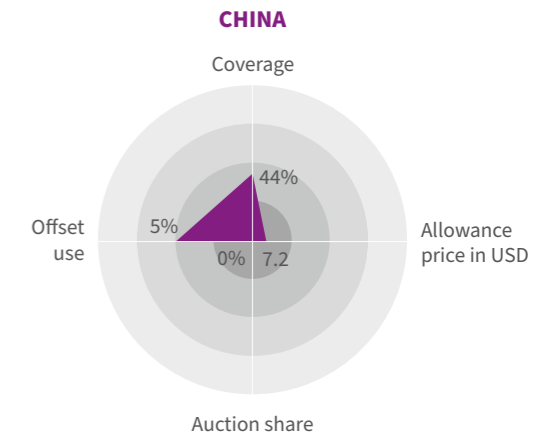
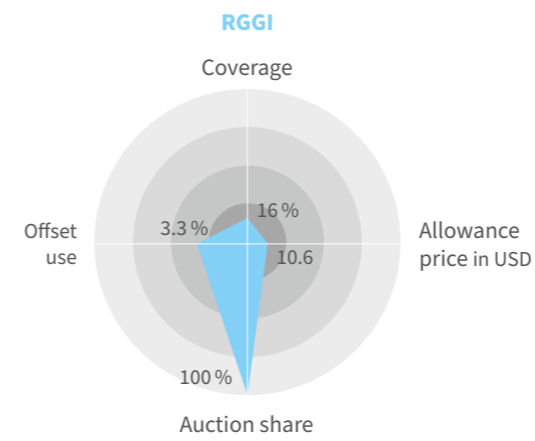
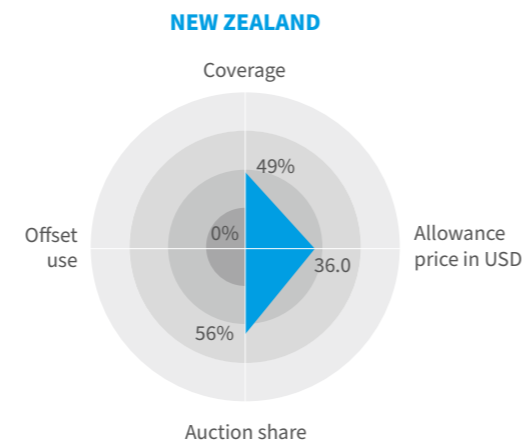
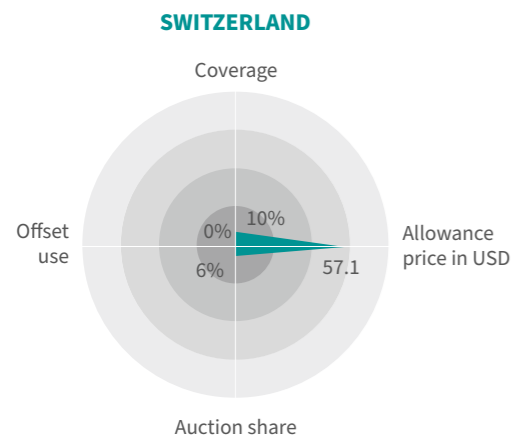
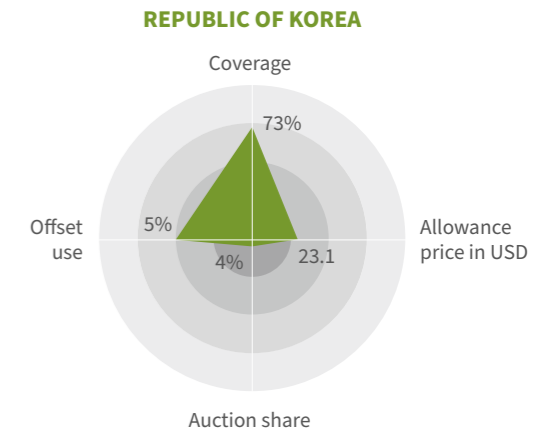
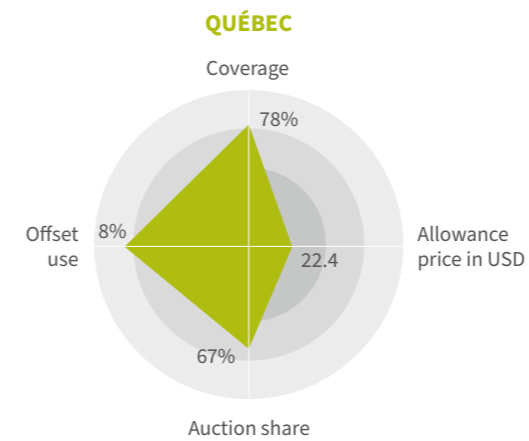
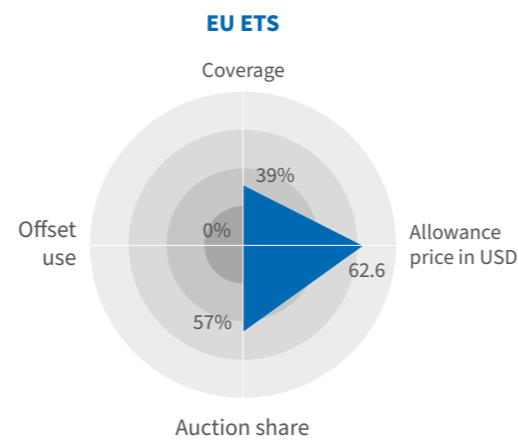
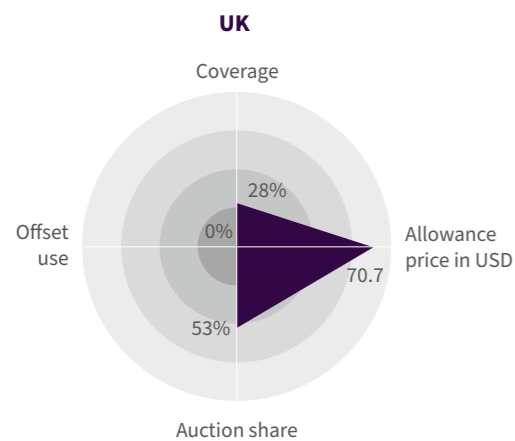
the share of allowances that were auctioned and generated revenues for the jurisdiction's government. **Offset use** indicates the share of a compliance entity's obligations that can be met using approved offsets. To aid comparison, the axes share the same scale across graphs. See "Notes on Methods and Sources" in the ICAP Status Report 2022 for further details.

**Coverage**  
Share of jurisdiction emissions covered by the ETS (0-100%)

**Allowance price**  
Average USD price over 2021 per tonne of CO<sub>2</sub>e (USD 0-80)

**Auction share**  
Share of allowances not allocated for free (0-100%)

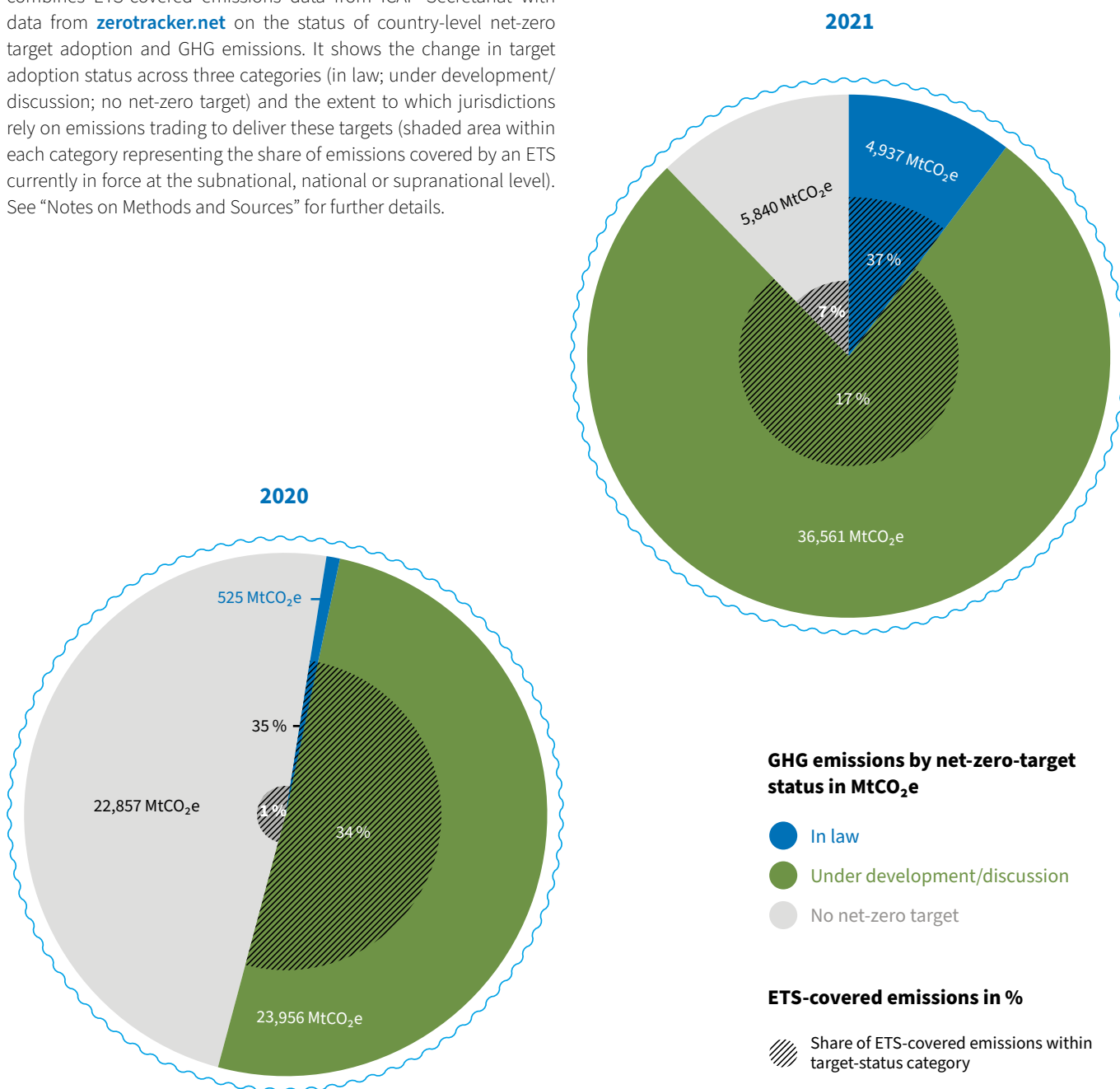
**Offset use**  
Share of compliance obligations which can be met using offsets (0-10%)



# Net-Zero Targets and ETS

## *ETS as an important policy instrument for the net-zero transition*

Around the world an increasing number of jurisdictions, representing an ever-greater share of global GHG emissions, are adopting mid-century net-zero emissions targets to limit global warming. Emissions trading is an important component of the climate policy portfolios aimed at achieving these targets. This infographic combines ETS-covered emissions data from ICAP Secretariat with data from [zerotracker.net](https://zerotracker.net) on the status of country-level net-zero target adoption and GHG emissions. It shows the change in target adoption status across three categories (in law; under development/discussion; no net-zero target) and the extent to which jurisdictions rely on emissions trading to deliver these targets (shaded area within each category representing the share of emissions covered by an ETS currently in force at the subnational, national or supranational level). See “Notes on Methods and Sources” for further details.

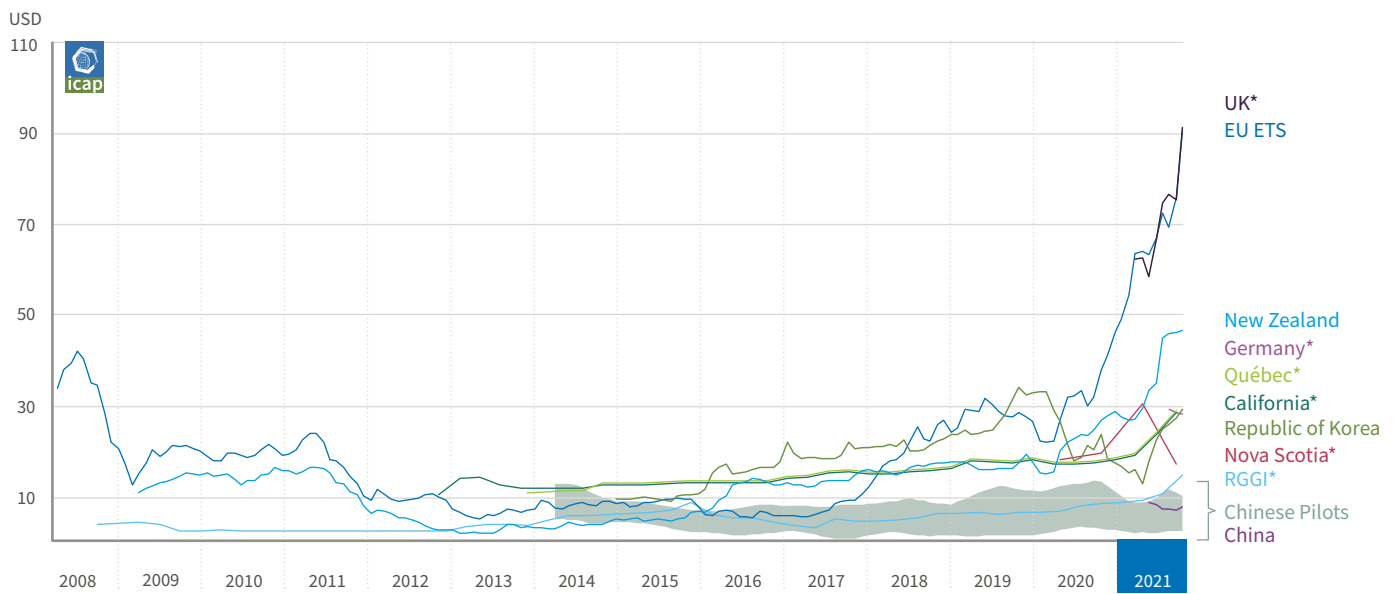
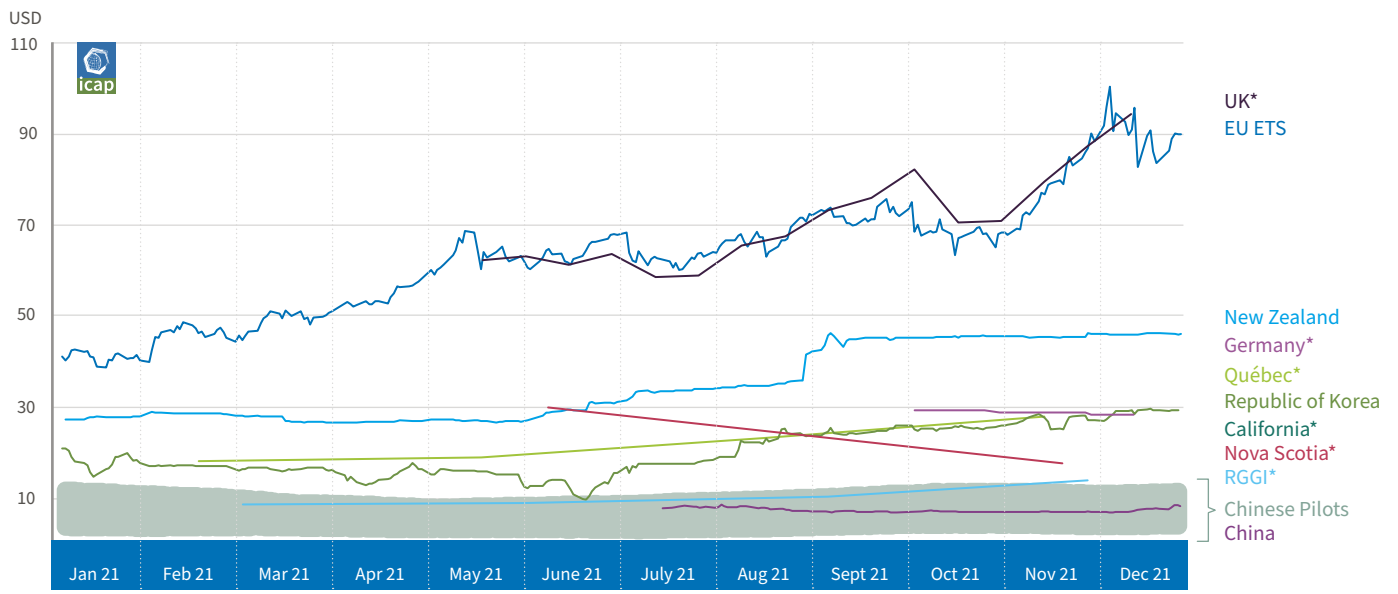


# Allowance Price Developments

## 2021 in a longer historical context

This infographic uses data from the ICAP Allowance Price Explorer to visualize developments allowance markets in 2021 (top panel) and in a long historical context since 2008 (bottom panel). Both the short- and long-term price developments are driven by changes in current and expected future scarcity of allowances, due to variations in general economic conditions, revisions to the rules of the systems (including those governing offsets and market stability mechanisms), and interactions with other climate and energy policies. Prices in the top panel

are the daily observations in the systems with secondary market data, and the clearing prices in the systems with primary market data on the day of the auction/sale. In the bottom panel, daily observations are averaged over the calendar month. In both panels, observations in non-USD currencies are converted to USD using monthly exchange rate data from the IMF. The shaded areas indicate the range of prices observed in the Chinese pilot ETSS. See “Notes on Methods and Sources” for further details.



\* primary market prices

# Notes on methods and sources

## General notes

1. The report draws on a range of sources, including official ETS information and statements from governments and public authorities, data submitted to the UNFCCC, or where available, other official reporting, and information provided by ICAP members and observers, contributing authors or in-country/native experts from our network. Information on emitting sectors is based on jurisdiction-specific data sources; therefore, categories are not necessarily consistent across jurisdictions.
2. Data in the report represent the current situation as of January 2022, unless otherwise noted.
3. Where 2022 data is not yet available, we use the most recently available data. The covered emissions graph in the factsheets shows the latest year for which both verified emissions data and inventory data are available.
4. For the purpose of this report, emissions trading systems (ETS) include mandatory cap-and-trade systems for GHGs. Systems that regulate other gases (e.g., other air pollutants) or trade other units (e.g., energy-efficiency certificates), other market-based instruments (e.g., carbon taxes, baseline-and-crediting systems) and voluntary programs do not fall under the scope of this report.
5. We use metric tonnes throughout the report, unless otherwise indicated.
6. Emissions coverage as reported in the factsheets refers to the verified emissions of entities under the ETS in a jurisdiction as a proportion of that jurisdiction's inventory emissions. When this value is not available, an equivalent value provided by the jurisdiction, or the cap of the system, is used.
7. Average allowance prices are the mean of the allowance prices between 1 January 2021 and 31 December 2021. Values are taken from the infographic Allowance Price Developments (see below).
8. All monetary values in national currency units are converted to USD using the annual average exchange rates provided by the international financial statistics of the IMF. For monetary values that are fixed over multiple years the value reported in USD uses the most recent year's exchange rates.
9. Overall GHG emissions, the sum of the emissions categories, and the corresponding percentages reported in the factsheets may not add up exactly, due to rounding.
10. The following criteria are used to determine the three ETS status categories:
  - a. In force: ETS is in force with implementation established in the relevant regulation or legislation.
  - b. Under development: A mandate for an ETS is established and ETS rules are currently being drafted.
  - c. Under consideration: ETS is being considered as a potential mitigation instrument, the government or other relevant authorities have publicly sent signals towards the development of an ETS.

## Notes on infographics

For the infographics “From Supranational to Local”, “Emissions Trading Worldwide” and “Sector Coverage”, we draw on data contained in the factsheets, the online version of the ICAP ETS Map (<https://icapcarbonaction.com/en/ets-map>), as well as news articles from the ICAP Secretariat. For infographics involving quantitative data the following sources and methods were used:

### FROM SUPRANATIONAL TO LOCAL

1. Jurisdictions' shares of global GDP and world population are calculated based on the latest annual data available before the Status Report's editorial cut-off date in February 2022. They typically cover 2019 or 2020 data. The total population of jurisdictions with an ETS in force and the total GDP of their respective economies are calculated as a share of world population and global GDP. The share of global GHG emissions covered by an ETS in force is calculated using the process described in note 5 under “Global Expansion of ETS” below. In cases where the 2021 cap data were not available, estimates based on most recent data were used. Specific sources and figures are available upon request from [info@icapcarbonaction.com](mailto:info@icapcarbonaction.com).








## GLOBAL EXPANSION OF ETS

1. Whenever available, we use the official and most recent cap data. When those data are unavailable or when systems operate without a cap, the estimates of covered emissions in the regulated sectors are used instead.
2. EU ETS cap in 2021 was revised down to reflect the UK leaving the system. It includes emissions covered under the aviation sector cap of the EU ETS, which in 2012 amounted to 210 MtCO<sub>2</sub>e and from 2013 to 2021 has been around 38 MtCO<sub>2</sub>e per year. For more details, see the EU ETS factsheet.
3. China National ETS started operating in 2021. In early January 2021, the Ministry of Ecology and Environment (MEE) published key ETS policy documents, along with an announcement that regulated entities will need to surrender allowances pertaining to their 2019–2020 emissions in 2021. The infographic reflects the start date of the Chinese National ETS in 2021, while also indicating the retroactive coverage of the system in 2019 and 2020. When official data were not available, the caps for the China National ETS and Chinese Pilots were estimated values provided by domestic ETS experts.
4. There are two cases where an existing and a scheduled system regulate the same emissions. In those cases, we made the following assumptions:
  - a. Massachusetts ETS & RGGI: Massachusetts' system covers the same emissions as RGGI, so the Massachusetts system is excluded from the infographic to avoid double counting.
  - b. China National ETS & Pilots: According to the China National ETS rules, Chinese Pilots that had already allocated allowances for 2019 and/or 2020 for the power sector remained under the pilots for those years. This implies the power sector entities subject to overlapping regulation were covered under the pilots where appropriate and moved to the national ETS thereafter. Accordingly, the infographic reduces the Chinese Pilots' cap in 2020–2022 based on the latest estimates provided by domestic ETS experts.
5. Global emissions data refer to GHG emissions in CO<sub>2</sub>e excluding LULUCF and are obtained from
  - a. Olivier and Peters (2020) for 2005–2019 which is available at [https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and\\_total-greenhouse-gas-emissions-2020-report\\_4331.pdf](https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and_total-greenhouse-gas-emissions-2020-report_4331.pdf)
  - b. Rhodium Group for 2020 which is available at <https://rhg.com/research/preliminary-2020-global-greenhouse-gas-emissions-estimates/>

To obtain estimates of global GHG emissions in 2021 and 2022, we have deviated from our usual assumption of using recent growth rates of GHG emissions, as this would imply continued decline in emissions which is inconsistent with the recovery of CO<sub>2</sub> emissions to pre-pandemic levels in many individual countries. Instead, we have assumed that emissions return to 2019 levels and remain there in 2021 and 2022. Percentages of global emissions covered are rounded to the nearest full percentage. They are slightly above 5% and 17% in 2005 and 2022, respectively.
6. For the German National ETS, we assume that the cap will approximately equal the sum of emissions from transport, residential and commercial/institutional sectors in 2018 from Umweltbundesamt (2020): Nationale Trendtabellen für die deutsche Berichterstattung atmosphärischer Emissionen 1990–2018. URL: <https://www.umweltbundesamt.de/themen/klima-energie/treibhausgas-emissionen>.

## SECTOR COVERAGE

1. For the purposes of this infographic, the following sector definitions are used:

SECTOR	DEFINITIONS
Power	 Emissions from the combustion of fossil fuels for electricity generation, as well as large-scale centralized heat production.
Industry	 Emissions from industrial activity, typically covering both energy emissions (e.g. from burning fossil fuels in furnaces), as well as process emissions (e.g. in the case of cement production). In the case of Kazakhstan, this also comprises extractive industries such as oil and gas mining.
Domestic Aviation	 Emissions from fossil fuel combustion for flights arriving and departing within the jurisdiction ('domestic') which are not regulated by the International Civil Aviation Organization (ICAO).
Transport	 Emissions from fossil fuel combustion for transport with the exception of aviation (domestic and international) and international maritime transport. Coverage usually is upstream with fuel distributors facing compliance obligations.
Buildings	 Emissions originating from buildings. With upstream coverage, distributors of heating fuels face compliance obligations and all consumers are exposed to the carbon price. With downstream coverage, emissions of large buildings are regulated. In this case, emissions originating from other sectors (e.g. power production) may also be attributed to buildings to incentivize demand reduction and shifting towards cleaner sources of supply
Forestry	 Emissions and removals resulting from forest land use, including forest management/harvest, deforestation and re/afforestation activities.
Waste	 Emissions from waste disposal and management (e.g. methane from anaerobic decomposition in landfills).

2. Agriculture is a major source of biological emissions; however, the sector does not yet face direct compliance obligations under any existing ETS. Currently, in New Zealand, agricultural emissions must be monitored and reported under the ETS, and some offset programs (e.g. California) allow for offset projects in the sector.
3. In most cases, emissions coverage of the different systems corresponds to the value that is reported in the relevant factsheets. In the case of the Chinese pilots, the coverage was calculated by adding the most recent reported caps of all the pilots and dividing that number by the sum of the most recent reported emissions in the pilots. Note that sector coverage differs across Chinese pilots as indicated in the relevant slice of the infographic. A limited number of heat plants which are below the inclusion threshold in China National ETS continue to be covered under Chinese pilots where applicable but this is not shown in the infographic. In the case of China National ETS the coverage figure (44% of total CO<sub>2</sub> emissions) is a jurisdiction-provided estimate, which is likely to be conservative.

## AUCTIONING REVENUE

1. Auction revenues for the 19 systems (including the eight Chinese pilots reported as a group) were calculated using data from the European Commission; ICE and UK Department for Business, Energy & Industrial Strategy; German Environment Agency; ICE and Swiss Emissions Registry; California Air Resources Board; Québec Ministry of Sustainable Development, Environment, and Fight Against Climate Change; Nova Scotia Environment; Regional Greenhouse Gas Initiative; New Zealand Ministry for the Environment; Massachusetts Department of Environmental Protection; Ecoeye as well as from the factsheets of the Chinese pilot systems (links available upon request, [info@icapcarbonaction.com](mailto:info@icapcarbonaction.com)). There have been minor revisions to historical revenue figures due to the consolidation of exchange rate concepts used in converting revenues in national currencies to USD. Specifically, annual average exchange rates from the IMF are now used consistently across jurisdictions and over time.

2. Auction revenue for the EU ETS includes revenue from the domestic aviation sector.
3. For the California cap-and-trade system, the proceeds from consignment auctions are excluded.
4. For the Québec cap-and-trade system, joint auctions involve currency conversion for part of the proceeds. The rate and transaction fees on the date of conversion can affect the amount deposited to the Green Fund. As a result, the product of the number of permits sold and the settlement price may slightly differ from the actual amount deposited.
5. The Massachusetts quarterly reports are published by Potomac Economics, which is the official market monitor for the Massachusetts Department of Environmental Protection.

## DIFFERENT SHAPES OF ETS

1. **Coverage:** The figure indicates the percentage of the jurisdiction's total GHG emissions that is covered by the ETS. The data are taken from the factsheets and refer to the latest emissions coverage figures available for each system. For the China National ETS and RGGI, coverage values represent the share of CO<sub>2</sub> emissions covered by the ETS in the aggregate CO<sub>2</sub> emissions of these jurisdictions. In the case of China National ETS the coverage figure (44 % of total CO<sub>2</sub> emissions) is a jurisdiction-provided estimate, which is likely to be conservative. Additional jurisdiction-specific information on coverage figures can be found in the relevant factsheet.
2. **Allowance Price:** The figure provides the average auction settlement price in USD over 2021 per tonne of CO<sub>2</sub>e. The prices in EU and Swiss ETSs differ despite the linkage between the two systems because the jurisdictions do not hold joint auctions. Where necessary local currency prices were converted using the annual average exchange rate as published in the IMF Financial Statistics. For additional information on sources of allowance prices and exchange rates see <https://icapcarbonaction.com/en/documentation-allowance-price-explorer>.
3. **Auction share:** This figure indicates the share that is not allocated for free but must be acquired either at an auction or otherwise for the latest year where information is available. The consignment auctions in California are not included in calculating the auction share. Until 2026 German ETS allowances are sold at a fixed price rather than in an auction. In the case of the New Zealand ETS, the reported figure is calculated by dividing the allowances available in the four 2022 auctions by the 2022 cap. The estimated percentage of auctioned allowances for the California and Québec cap-and-trade systems are calculated based on the vintage year, not by the year when allowances were (or would actually be) auctioned. Additional jurisdiction-specific information on auction share figures can be found in the relevant factsheet.
4. **Offset Use:** This figure provides the share of a compliance entity's obligations which can be met using offsets for the latest year where information is available. Additional jurisdiction-specific information on offset use figures can be found in the relevant factsheet.

## NET-ZERO TARGETS AND ETS

1. Information on the status of net-zero target development and GHG emissions in 2020 and 2021 are drawn from zerotracker.net and its predecessor ec.europa.eu/netzerotracker. We focus only on country-level targets plus the EU as a supranational entity whose net-zero target "in law" is assumed to apply to all 27 Member States. This source contains a higher-resolution characterization of target status than our three categories. For simplicity, we aggregate all net-zero targets that are not in law or absent into a single category "under development/discussion". We categorize Norway's legislated 95 % GHG emissions reduction target by 2050 as a net-zero target "in law". Our categorization of "in law", "under development/discussion" and "no net-zero target" is accurate as of 01 Feb 2022 for 2021, and 10 Mar 2021 for 2020.
2. Data on ETS-covered emissions are from jurisdiction factsheets. The aggregate emissions figure is obtained by adding together country-level emissions from zerotracker.net to maintain consistency but has the implication that 1) the aggregate emissions figure is an amalgamation of data from different years as reported at source; and 2) it remains constant from 2020 to 2021.



## ALLOWANCE PRICE DEVELOPMENTS

1. An allowance represents the right to emit one tonne of CO<sub>2</sub>e in the jurisdiction(s) that accept(s) it for compliance. However, allowances from different systems cannot be treated as a single commodity because of differences in system design. Allowance prices are not directly comparable across systems.
2. The top panel of the infographic displays the daily allowance prices in 2021, while the bottom panel presents the monthly average allowance prices between March 2008 and December 2021 using data from the ICAP Allowance Price Explorer, except for Germany (see note below). For additional information on sources of allowance prices and exchange rates see <https://icapcarbonaction.com/en/documentation-allowance-price-explorer>.
3. All data are in USD and are converted using the average exchange rate of the corresponding month as reported by the IMF.
4. The data for the UK, Quebec, California, Nova Scotia and RGGI are from the primary market. For these systems the observations from two successive auctions are connected linearly. The data for the remaining systems, except Germany, are secondary market prices. They reflect settlement prices and do not capture intra-day trade variation. German ETS allowances are sold at a fixed price in the initial years of the system. The fixed price increases annually until 2026 when trading begins in earnest. In 2021, the fixed price in the German ETS is equal to EUR 25 so the variation in the series reflects the changes in the EUR-USD exchange rate.
5. RGGI allowance prices are in short tonnes and have been converted to metric tonnes for the purposes of this infographic.
6. Where allowances have a limited vintage, the time series data compile these vintages in a way that reflects the compliance cycle.
7. The price range for the Chinese Pilot ETSs was determined as follows: 1) We computed the monthly average prices in USD; 2) For a given month, we determined the minimum and maximum prices across Chinese Pilots; 3) We applied a six-month moving average to smooth out the variability in maximum and minimum prices; 4) We shaded the region between the smooth series.

# List of acronyms

<b>AB</b>	Assembly Bill	<b>EPE</b>	Empresa de Pesquisa Energética (Energy Research Corporation)
<b>APCR</b>	Allowance Price Containment Reserve	<b>EQC</b>	Environmental Quality Commission
<b>ARP</b>	Auction Reserve Price	<b>ESR</b>	European Effort Sharing Regulation
<b>ASSET</b>	Advanced Technologies Promotion Subsidy Scheme with Emission Reduction Targets	<b>ETS</b>	Emissions Trading System or Emissions Trading Scheme
<b>BAU</b>	Business as Usual	<b>EU</b>	European Union
<b>BECCS</b>	Bioenergy with Carbon Capture and Storage	<b>EU ETS</b>	European Union Emissions Trading System
<b>CAD</b>	Canadian Dollar	<b>EUR</b>	Euro
<b>CARB</b>	California Air Resources Board	<b>FFCER</b>	Fujian Forestry Certified Emission Reduction
<b>CBAM</b>	Carbon Border Adjustment Mechanism	<b>FY</b>	Fiscal Year
<b>CCA</b>	Climate Commitment Act	<b>GBP</b>	British Pound Sterling
<b>CCER</b>	Chinese Certified Emission Reduction	<b>GDP</b>	Gross Domestic Product
<b>CCI</b>	Community Climate Investments	<b>GGPPA</b>	Greenhouse Gas Pollution Pricing Act
<b>CCM</b>	Cost Containment Mechanism	<b>GHG</b>	Greenhouse Gas
<b>CCR</b>	Cost Containment Reserve	<b>GIR</b>	Greenhouse Gas Inventory and Research Center of Korea
<b>CDM</b>	Clean Development Mechanism	<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation)
<b>CDR</b>	Carbon Dioxide Removal	<b>HB</b>	House Bill
<b>CEEX</b>	China Emissions Exchange	<b>HBEA</b>	Hubei Emission Allowance
<b>CEP</b>	Clean Energy Plan	<b>HFCs</b>	Hydrofluorocarbons
<b>CER</b>	Certified Emission Reduction	<b>HFC-23</b>	Fluoroform
<b>CHF</b>	Swiss Franc	<b>ICAO</b>	International Civil Aviation Organization
<b>CITSS</b>	Compliance Instrument Tracking System Service	<b>ICAP</b>	International Carbon Action Partnership
<b>CLEF</b>	Carbon Leakage Exposure Factor	<b>ICE</b>	Intercontinental Exchange
<b>CNY</b>	Chinese Yuan Renminbi	<b>IEA</b>	International Energy Agency
<b>CO<sub>2</sub></b>	Carbon Dioxide	<b>IMF</b>	International Monetary Fund
<b>COP26</b>	26th Conference of the Parties	<b>IMO</b>	International Maritime Organization
<b>CORSIA</b>	Carbon Offsetting and Reduction Scheme	<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>COVID-19</b>	2019 novel coronavirus	<b>ITMOs</b>	Internationally Transferred Mitigation Outcomes
<b>CPA</b>	Carbon Pricing in the Americas	<b>JCM</b>	Joint Crediting Mechanism
<b>CPP</b>	Climate Protection Program	<b>JI</b>	Joint Implementation
<b>CPS</b>	Carbon Price Support	<b>JPY</b>	Japanese Yen
<b>CQCER</b>	Chongqing Certified Emissions Reduction	<b>KASA</b>	Kementerian Alam Sekitar Dan Air (Malaysian Ministry of Environment and Water)
<b>DAC</b>	Direct Air Capture	<b>KAU</b>	Koran Allowance Unit
<b>DACCS</b>	Direct Air Carbon Capture and Storage	<b>KAZ ETS</b>	Kazakhstan Emissions Trading Scheme
<b>DEBS</b>	Direct Environmental Benefits	<b>KCU</b>	Korean Credit Unit
<b>DEE</b>	Department of Ecology and Environment	<b>K-ETS</b>	Korean Emissions Trading System
<b>DENR</b>	Department of Environment and Natural Resources	<b>KOC</b>	Korean Offset Credit
<b>DEQ</b>	Department of Environmental Quality	<b>KRW</b>	South Korean Won
<b>DHC</b>	District Heating and Cooling	<b>KRX</b>	Korea Exchange
<b>DRC</b>	Development and Reform Commission	<b>kWh</b>	Kilowatt hour
<b>ECR</b>	Emissions Containment Reserve	<b>KZT</b>	Kazakhstani Tenge
<b>EEB</b>	Ecology and Environment Bureau	<b>LL</b>	Local Law
<b>EEC</b>	Eastern Economic Corridor	<b>LPG</b>	Liquefied Petroleum Gas
<b>EEX</b>	European Exchange	<b>LT-LEDS</b>	Long-term Low GHG Emission Development Strategy
<b>EITE</b>	Emission-Intensive and Trade-Exposed		

<b>LULUCF</b>	Land Use, Land-Use Change and Forestry	<b>RGGI</b>	RGGI CO <sub>2</sub> Allowance Tracking System
<b>m<sup>2</sup></b>	Square Metre	<b>COATS</b>	
<b>MassDEP</b>	Massachusetts Department of Environmental Protection	<b>SAM</b>	Supply Adjustment Mechanism
<b>MEE</b>	Ministry of Ecology and Environment	<b>SB</b>	Senate Bill
<b>METI</b>	Ministry of Economy, Trade and Industry	<b>SEEE</b>	Shanghai Environmental and Energy Exchange
<b>MoCC</b>	Ministry of Climate Change	<b>SEMARNAT</b>	Secretaría del Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural Resources of Mexico)
<b>MOE</b>	Ministry of Environment	<b>SF<sub>6</sub></b>	Sulfur Fluoride
<b>MOEF</b>	Ministry of Economy and Finance	<b>SHEA</b>	Shanghai Emission Allowance
<b>MONRE</b>	Ministry of Natural Resources and Environment	<b>SHEAF</b>	Shanghai Emission Allowance Forward
<b>MRV</b>	Monitoring, Reporting and Verification	<b>tce</b>	Tonne of Coal equivalent
<b>MSR</b>	Market Stability Reserve	<b>TCI</b>	Transportation and Climate Initiative
<b>MtCO<sub>2</sub></b>	Million Tonnes of Carbon Dioxide	<b>TCI-P</b>	Transportation and Climate Initiative Program
<b>MtCO<sub>2</sub>e</b>	Million Tonnes of Carbon Dioxide equivalent	<b>tCO<sub>2</sub></b>	Tonne of Carbon Dioxide
<b>MW</b>	Megawatt	<b>tCO<sub>2</sub>e</b>	Tonne of Carbon Dioxide equivalent
<b>MXN</b>	Mexican Peso	<b>TEPA</b>	Taiwanese Environmental Protection Administration
<b>N<sub>2</sub>O</b>	Nitrous Oxide	<b>TGO</b>	Thailand Greenhouse Gas Management Organization
<b>NC</b>	North Carolina	<b>TMG</b>	Tokyo Metropolitan Government
<b>NCM</b>	National Crediting Mechanism	<b>TMS</b>	Target Management System
<b>NDC</b>	Nationally Determined Contribution	<b>TNAC</b>	Total Number of Allowances in Circulation
<b>NDRC</b>	National Development Reform Commission	<b>UK</b>	United Kingdom
<b>nEHS</b>	Nationales Emissionshandelssystem (German National ETS)	<b>UKA</b>	UK Allowance
<b>NETs</b>	Negative Emissions Technologies	<b>UK ETS</b>	UK Emissions Trading Scheme
<b>NER</b>	New Entrants' Reserve	<b>UN</b>	United Nations
<b>NF<sub>3</sub></b>	Nitrogen Trifluoride	<b>UNDP</b>	United Nations Development Program
<b>NO<sub>x</sub></b>	Nitrogen Oxide	<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>NYC</b>	New York City	<b>US</b>	United States
<b>NZ</b>	New Zealand	<b>USD</b>	US Dollar
<b>NZ ETS</b>	New Zealand Emissions Trading Scheme	<b>US EPA</b>	US Environment Protection Agency
<b>NZD</b>	New Zealand Dollar	<b>VCM</b>	Voluntary Carbon Markets
<b>NZU</b>	New Zealand Unit	<b>WCI</b>	Western Climate Initiative
<b>NZX</b>	New Zealand Exchange		
<b>OBPS</b>	Output-Based Pricing System		
<b>OTC</b>	Over-the-Counter		
<b>PDR</b>	People's Democratic Republic		
<b>PFCs</b>	Perfluorocarbons		
<b>PHCER</b>	Pu Hui Certified Emission Reductions		
<b>PMR</b>	Partnership for Market Readiness		
<b>PNCTE</b>	Programa Nacional de Cupos Transables de Emisión de Gases de Efecto Invernadero (National Program of Greenhouse Gas Tradable Emission Quotas)		
<b>RAC</b>	Rulemaking Advisory Committee		
<b>RENE</b>	Registro Nacional de Emisiones (Mexico National Emissions Register)		
<b>RGGI</b>	Regional Greenhouse Gas Initiative		

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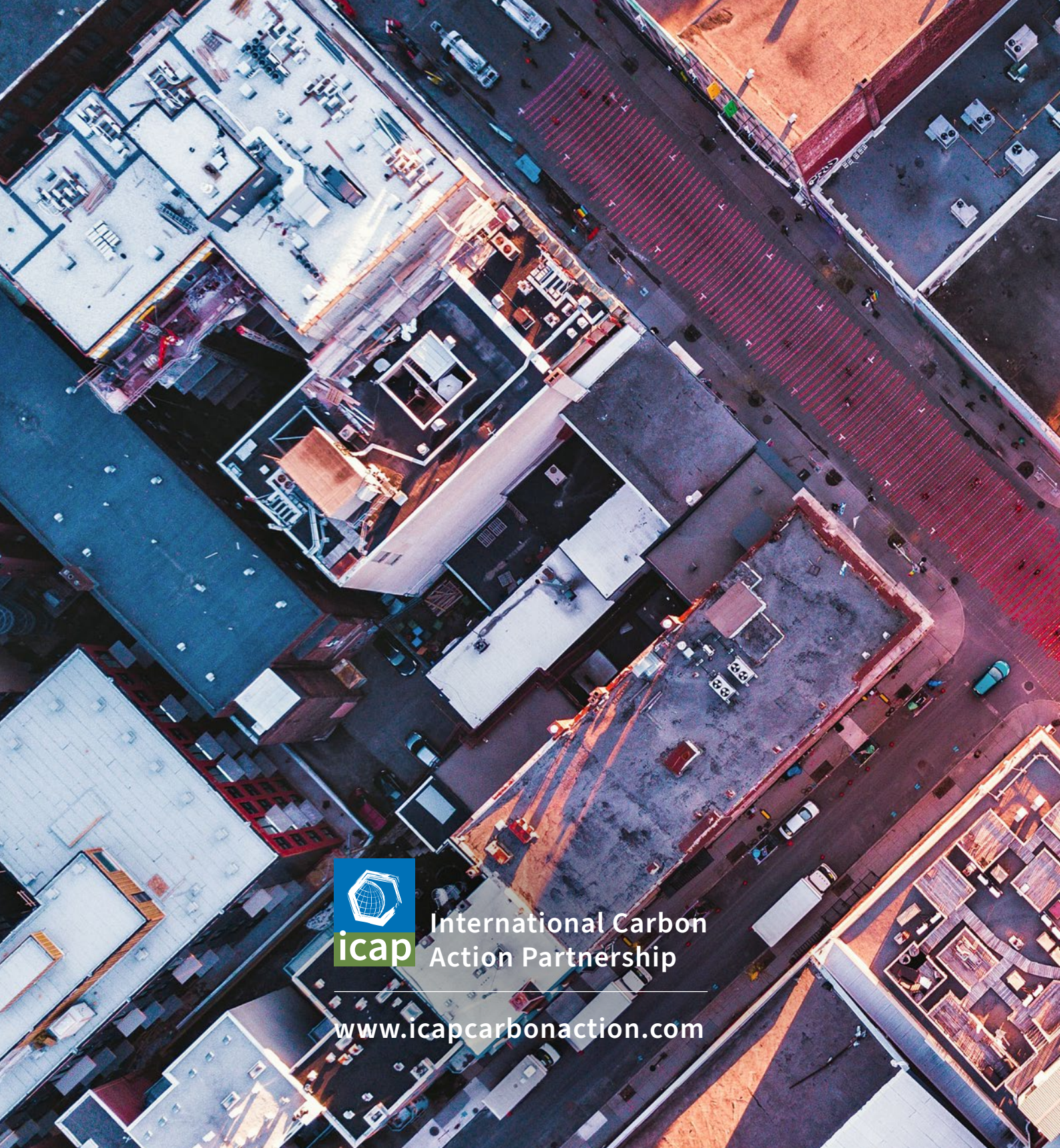
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