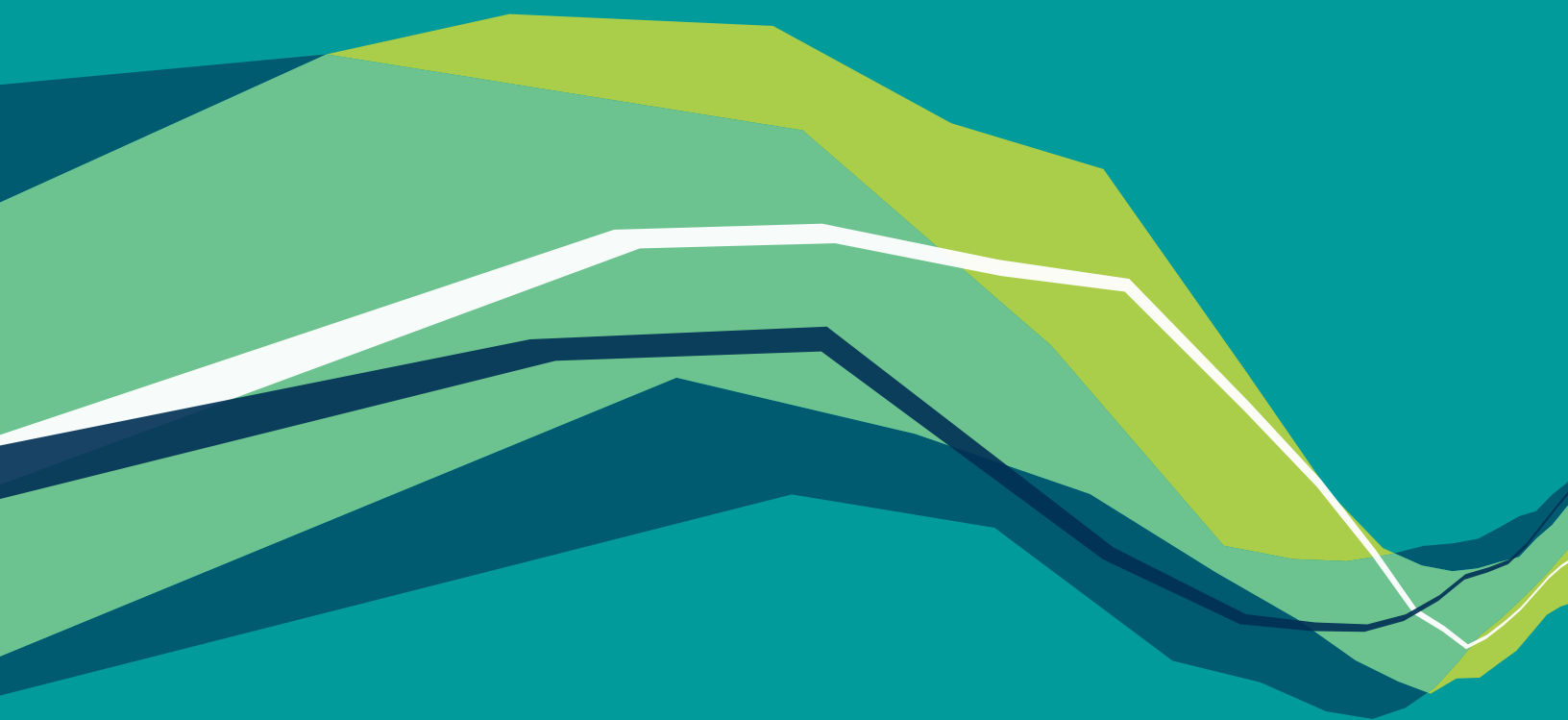




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State and Trends of Carbon Pricing 2020

Washington DC, May 2020



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International Carbon
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| Foreword

It is hard to focus on anything other than the current global health crisis. COVID-19 has upended our societies and the loss of normalcy, human connection and the economic toll is not to be underestimated. Unfortunately, even after countries embark on the path to recovery after this crisis, the threat of climate change remains. Bush fires raged across California and Australia at the beginning of this year, the coral reef suffered a third mass bleaching in five years and Antarctica experienced the first known heatwave.

In the last year, growing public and investor pressure has moved climate change further up the agenda. As a result, we saw increased attention and efforts to address climate change around the world. More than 70 countries have committed to working toward net zero emissions by 2050 and to enhance their international climate pledges under the Paris Agreement. How these government and private sector pledges will be translated into action will be crucial in ensuring we can confine global warming to below two degrees Celsius. An effective carbon price is one tool that can help both countries and companies to successfully decarbonize economies and supply chains. Encouragingly, as more ambitious climate pledges are taken, many of these programs and strategies are factoring in the role and potential for carbon pricing and carbon markets.

While we may understand the economic theory of carbon pricing: make something more expensive and we will use less of it – the ramifications of shifting to a low-carbon economy will likely require a significant restructure of our economies and societies. The low-carbon transition must have public support and be socially just. Carefully planning these policies, including carbon pricing, and proactive communication on the benefits they can bring to our communities, workers and environment, will be critical. Emissions reductions can bring significant health benefits, while revenue generated from a carbon price needs to be focused on long term solutions. These carbon revenues can be used support other development policies to meet critical infrastructure and education. Furthermore, as traditional means of business and production may be disrupted when these climate policies ramp up, a plan to support these communities will also be important.

Each year, we at the World Bank prepare this report to update readers on the developments in carbon pricing around the world. In this year's report we also look at the role and use of crediting mechanisms. Over recent years, there has been a surge of public and private interest in carbon credits as part of a broader decarbonization portfolio. Countries are increasingly pairing their domestic carbon taxes and carbon markets with a crediting mechanism to stimulate action and investments in certain sectors, while giving governments and businesses some flexibility in tackling emissions in hard to abate sectors. Companies are also purchasing credits on the voluntary market in line with growing investor and consumer awareness of climate action. Internationally, credits will also play a key role in reducing emissions from airlines with the international aviation offset scheme – CORSIA – coming into effect this year. However, robust standards are critical to ensuring these credits have environmental integrity.

The World Bank is committed to supporting countries as they assess and put carbon pricing policies in place. A well-designed carbon price embedded in a broader package of climate, energy and development policies and measures remains critical to solving the climate challenge and advancing the achievement of sustainable development aspirations.

Bernice Van Bronkhorst,
Climate Change Global Director, World Bank Group

List of abbreviations and acronyms

°C	Degrees Celsius	DC	District of Columbia
ABM	Adaption Benefit Mechanism	EBRD	European Bank for Reconstruction and Development
ACCU	Australia Carbon Credit Unit	ECR	Emissions Containment Reserve
ACR	American Carbon Registry	EPS	Emissions Performance Standard
ADB	Asian Development Bank	ERF	Emissions Reduction Fund
BAU	Business as usual	ERPA	Emission Reductions Payment Agreement
BC	British Columbia	ERU	Emission Reductions Unit
BFCER	Beijing Forestry Certified Emission Reduction	ETS	Emissions Trading System
CAR	Clean Air Rule	EU	European Union
CCER	Chinese certified emission reductions	EUA	European Union Allowance
CCF	Climate Cent Foundation	FFCER	Fujian Forestry Certified Emission Reduction
CCIR	Carbon Competitive Incentive Regulation	FCPF	Forest Carbon Partnership Facility
CCR	Cost Containment Reserve	FSB-TCFD	Financial Stability Board-Task Force on Climate-related Financial Disclosures
CCS	Carbon capture and storage	GCF	Green Climate Fund
CCU	Carbon capture and utilization	GEC	Global Environment Centre Foundation
CDM	Clean Development Mechanism	GGIRCA	Greenhouse Gas Industrial Reporting and Control Act
CER	Certified Emission Reduction	GHG	Greenhouse gas
CFI	Carbon Farming Initiative	GtCO₂e	Gigaton of carbon dioxide equivalent
Ci-Dev	Carbon Initiative for Development	HB	House Bill
CO₂	Carbon dioxide	HFC	Hydrofluorocarbon
CO₂e	Carbon dioxide equivalent	ICAO	International Civil Aviation Organization
COP	Conference of the Parties	IEA	International Energy Agency
CORSIA	Carbon Offset and Reduction Scheme for International Aviation		
CPA	Component Project Activities		
CPLC	Carbon Pricing Leadership Coalition		
CRT	Climate Reserve Tonne		

IMF	International Monetary Fund	RBCF	Results-based Climate Finance
IMO	International Maritime Organization	REDD	Reducing Emissions from Deforestation and Forest Degradation
IPCC	Intergovernmental Panel on Climate Change	REDD+	Extends REDD by including sustainable forest management, conservation of forests, and enhancement of carbon sinks
ISFL	Initiative for Sustainable Forest Landscapes	RGGI	Regional Greenhouse Gas Initiative
ITMO	Internationally Transferred Mitigation Outcome	ROC	Registry Offset Credits
J-VER	Japan Verified Emission Reduction	SB	Senate Bill
JCM	Joint Crediting Mechanism	SCF	Standardized Crediting Framework
JI	Joint Implementation	SDG	Sustainable Development Goal
Klik	Climate Protection and Carbon Offset Foundation	SD VISTA	Sustainable Development Verified Impact Standard
KOC	Korean Offset Credits	SEMARNAT	Secretariat of Environment and Natural Resources
ktCO₂e	Kiloton of carbon dioxide equivalent	t	Ton (note that, unless specified otherwise, ton in this report refers to a metric ton = 1,000 kg)
MDB	Multilateral development bank	TAB	Technical Advisory Board
MoU	Memorandum of understanding	TCAF	Transformative Carbon Asset Facility
MRV	Monitoring, Reporting and Verification	TCFD	Task Force on Climate-related Financial Disclosures
MSR	Market stability reserve	TCI	Transportation and Climate Initiative
MtCO₂e	Megaton of carbon dioxide equivalent	tCO₂	Ton of carbon dioxide
N₂O	Nitrous oxide	tCO₂e	Ton of carbon dioxide equivalent
NACAG	Nitric Acid Action Group	TIER	Technology Innovation and Emissions Reduction
NACAP	Nitric Acid Climate Auctions Program	TMG	Tokyo Metropolitan Government
NDC	Nationally Determined Contribution	UK	United Kingdom
NDRC	National Development and Reform Commission	UN	United Nations
NWT	Northwest Territories	UNFCCC	United Nations Framework Convention on Climate Change
NZU	New Zealand Unit	USA	United States of America
OBPS	Output-Based Pricing System	VCS	Verified Carbon Standard
OMGE	Overall Mitigation in Global Emissions	VCU	Verified Carbon Unit
OPR	Offset Project Registry	VER	Verified Emissions Reduction
PAF	Pilot Auction Facility	WTO	World Trade Organization
PFC	Perfluorocarbon		
PHCER	Pu Hui Certified Emission Reduction		
PMR	Partnership for Market Readiness		
PoA	Programme of Activities		

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Executive summary

Domestic carbon pricing initiatives have been strengthened as jurisdictions around the world adopt more ambitious mitigation targets and introduce associated policy tools. This is particularly crucial as 2020 and 2021 are critical years for countries to ramp up their emission reduction pledges under the Paris Agreement, with many countries, regions and cities in the past year declaring a “climate emergency”.

Restrictions due to the COVID-19 pandemic have led to a global economic downturn, with implications for climate action more broadly. The economic crisis triggered by COVID-19 has led to large shifts in energy consumption and consumer behavior, challenging the economic foundations of many countries. As communities start to bounce back and conversations turn to recovery and stimulus packages, countries should consider how measures can be designed to best support a transition to a low-carbon economy. Measures for kickstarting economies could be designed in such a way that they generate jobs and infrastructure that support the transition to net zero emissions by the mid-century.

The pandemic is testing the resilience of carbon pricing initiatives. Prices in some established ETSs have fallen in line with reduced economic activity resulting from COVID-19 restrictions. Furthermore, some jurisdictions have delayed measures to

strengthen their carbon pricing instruments and have extended compliance deadlines due to the restrictions. Key meetings—most notably COP 26—as well as international aviation and maritime meetings, have been postponed, delaying decisions on the rules around international transactions and markets. Additionally, COVID-19 has led to increased uncertainty for the demand for international credits with airlines questioning the impact of COVID-19 on their offsetting obligations under the Carbon Offset and Reduction Scheme for International Aviation (CORSIA).

Despite the social and economic upheaval, many jurisdictions and private entities are accelerating their efforts on climate action. COP 25 highlighted the urgency and need to ramp up ambition as Parties work on updating their nationally determined contributions (NDCs). Furthermore, the Chilean COP presidency announced that 120 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are working towards achieving net zero CO₂ emissions by 2050 as part of the Climate Ambition Alliance. As of April 1, 2020, Denmark, France, New Zealand, Sweden and the UK have built on this pledge and enshrined a net zero CO₂ emissions target into legislation, while Suriname and Bhutan are already carbon negative.¹ In addition, 15 subnational regions, 398 cities, 786 businesses and 16 investors have also indicated that they are working towards achieving net zero emission targets.²

¹ Source: Energy and Climate Intelligence Unit, *Net Zero Tracker*, April 1, 2020, <https://eciu.net/netzerotracker>.

² Source: UNFCCC, *Annex I: Enhanced Ambition in National Climate Plans*, December 11, 2019, <https://s3-sa-east-1.amazonaws.com/cop25.cl/documents/eng/1312+Annex+Alliance+ENGLISH.pdf>.

In 2019, the carbon pricing story has been one of expansion, with jurisdictions broadening their carbon pricing coverage to increase their climate ambition.

More jurisdictions have started to consider complementary carbon pricing initiatives beyond the coverage of their existing carbon pricing systems to reach mitigation targets. For example, in Europe, Germany, Austria, and Luxembourg are planning carbon pricing for sectors not included in the European Union Emissions Trading System (EU ETS), and the EU's Green Deal with its commitment to reach carbon neutrality by 2050, has strengthened the case for wider coverage of carbon pricing. Secondly, the reach of existing carbon pricing initiatives is growing. More sectors and gases are being covered by a carbon price and thresholds are being lowered to regulate more companies, including in Chile, Iceland, New Zealand and Switzerland. To achieve net zero, many jurisdictions are increasing the use of crediting mechanisms and results-based climate finance (RBCF). Finally, with carbon border adjustments back on the table in Europe, countries may be incentivized to proactively implement their own carbon pricing initiatives.

As foreshadowed in last year's report, the growth in the number of carbon pricing initiatives is largely taking place in the Americas.

Mostly driven by Canada's federal carbon pricing approach, 2019 saw a flurry of subnational initiatives emerge across the provinces and territories, complemented by the federal carbon pricing backstop policies. This year also marked the start of the pilot phase of Mexico's national carbon market, representing the first emissions trading system (ETS) in Latin America.

Carbon pricing initiatives are expanding across national and state lines, with increased cooperation among jurisdictions to align their carbon markets.

In Europe, the Swiss ETS and the EU ETS became linked on January 1, 2020, allowing covered entities in the Swiss ETS to be able to use allowances from the EU ETS for compliance, and vice versa. Following its departure from the EU and ultimately the EU ETS, the UK is considering implementing its own ETS and linking it to the EU ETS.³

Similarly, in the US, the Regional Greenhouse Gas Initiative (RGGI), a collection of Northeastern states with a regional carbon market for the power sector, has expanded to include New Jersey and Virginia. Pennsylvania is interested in joining RGGI, and its inclusion would significantly increase the size of the carbon market and bring a major fossil fuel state into the initiative. Similarly, a group of ten Northeastern states in the US is moving forward with a cap-and-invest program for its transport sector.

There are now 61 carbon pricing initiatives in place or scheduled for implementation,

consisting of 31 ETSs and 30 carbon taxes (Figure ES.1), covering 12 gigatons of carbon dioxide equivalent (GtCO₂e) or about 22 percent of global GHG emissions (Figure ES.2). This is an increase compared to 2019, in which 20 percent of global GHG emissions were covered by ETSs and carbon taxes that were implemented or scheduled for implementation. The rise in GHG emission coverage is largely the result of the Mexico pilot ETS and New Brunswick carbon tax being legislated and launched, as well as the upcoming implementation of the Germany ETS and Virginia ETS.

Governments raised more than \$45 billion from carbon pricing in 2019.

2019 saw a slower yearly increase in revenues than 2018 (US\$1 billion compared to US\$11 billion) largely as a consequence of the EU ETS price stabilization in 2019. Almost half of the revenues were dedicated to environmental or broader development projects, and more than 40 percent went to the general budget. The remaining share was dedicated to tax cuts and direct transfers.⁴

Despite carbon prices increasing in many jurisdictions, they remain substantially lower than those needed to be consistent with the Paris Agreement.

The High-Level Commission on Carbon Prices estimated that carbon prices of at least US\$40–80/tCO₂ by 2020 and US\$50–100/tCO₂ by 2030 are required to cost-effectively reduce emissions in line with the temperature goals of the Paris Agreement.⁵ As of today, less than 5 percent of GHG emissions currently covered by a carbon price are within this range⁶ with about half of covered

³ Source: Government of the United Kingdom, *Legislation for a UK Emissions Trading System*, March 11, 2020, <https://www.gov.uk/government/publications/legislation-for-a-uk-emissions-trading-system/legislation-for-a-uk-emissions-trading-system>.

⁴ Source: I4CE, *Global Carbon Account 2020*, <https://www.i4ce.org/download/global-carbon-account-in-2020>

⁵ Source: CPLC, *Report of the High-Level Commission on Carbon Prices*, May 29, 2017.

⁶ Source: CPLC, *Report of the High-Level Commission on Carbon Prices*, May 29, 2017.

emissions priced at less than US\$10/tCO₂e, and the IMF calculates the global average carbon price is only US\$2/tCO₂.⁷ The appropriate carbon price will be determined by local conditions, the role the carbon pricing instrument should play, as well as the impact of other climate policies and technological progress. Equally, jurisdictions may choose to implement a tax or an ETS with an initially low price that rises over time as companies become familiar with the new pricing policy. Nevertheless, prices remain too low—similar to those reported in the previous two years.

A wide range of public and private sector actors are pushing forward with decarbonization strategies through international cooperation.

Modeling has shown that cooperation through Article 6 of the Paris Agreement could reduce the cost of implementing NDCs by about half—equivalent to a savings of US\$250 billion in 2030—or reduce global GHG emissions by an additional 50 percent compared to countries acting alone.⁸ However, there is slow progress on finalizing the rules for such international cooperation under Article 6 as it covers a number of issues not easily resolved, including the transition of Kyoto Protocol credits, a levy on transfers of mitigation outcomes to fund adaptation effort in more vulnerable countries, and how to deliver on an overall mitigation of global emissions. Nonetheless, pilots are starting to provide useful insights on how international cooperation can yield robust emissions outcomes and the infrastructure requirements to track these activities.

The past few years saw a surge of interest in crediting, with forestry at the forefront. 42 percent of the crediting market over the past five years stems from forestry. In line with a broader interest in nature-based solutions, this may be partly driven by the significant potential for these projects to reduce emissions cost effectively and their ability to generate additional co-benefits. However, traditional crediting activities in the industrial gases, renewables and fugitive emission sectors still make up a large share of the market.

Crediting activity is starting to shift beyond projects generated from the Kyoto mechanisms.

Crediting has often been dominated by the Clean Development Mechanism (CDM). However, following the crash of the CDM market price in 2012, crediting activity stabilized. Companies remain active in the voluntary market, with credits from independent crediting mechanisms responsible for almost two-thirds of all credits issued in 2019. Equally, governments are developing domestic crediting mechanisms. Not only do these projects generate local benefits but also give companies some flexibility in complying with the domestic carbon pricing regulations. Only two nationally operated mechanisms (in Japan and the Republic of Korea) source international mitigation outcomes. Ongoing discussions around the baseline for the CORSIA, the international aviation offset mechanism that mandates international airlines to surrender eligible emissions reduction credits, may also increase demand for crediting.

Greater transparency and agreement on robust standards for crediting mechanisms are needed to ensure environmental integrity.

The upswing in the number of regional, national, subnational and independent crediting mechanisms also brings the challenge of ensuring consistency across the various mechanisms and that each credit generated represents a ton of CO₂e mitigated. The environmental integrity of emissions savings and the avoidance of double counting are key to the credibility of systems.

A growing number of companies are using internal carbon pricing to reduce emissions across their value chains. In 2019, about 1,600 companies disclosed that they currently use internal carbon pricing or that they anticipate doing so within two years.⁹ With an increasing number of companies committing to net zero targets and growing investor pressure, the use of internal carbon pricing to reduce supply chain emissions is likely to grow in the future.

⁷ Source: IMF, *Putting a Price on Pollution*, Finance & Development 56(4), December, 2019.

⁸ Source: IETA, *The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges*, September 2019, https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

⁹ Source: CDP, *CDP Disclosure 2019*, <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>

Box ES.1 / Carbon pricing in numbers



61 carbon pricing initiatives
implemented/scheduled



31 ETS and
30 carbon taxes



46 national,
32 subnational
jurisdictions



Covering **12 GtCO₂e**
(22% of global GHG emissions)



US\$45 billion raised in
carbon pricing revenues in 2019

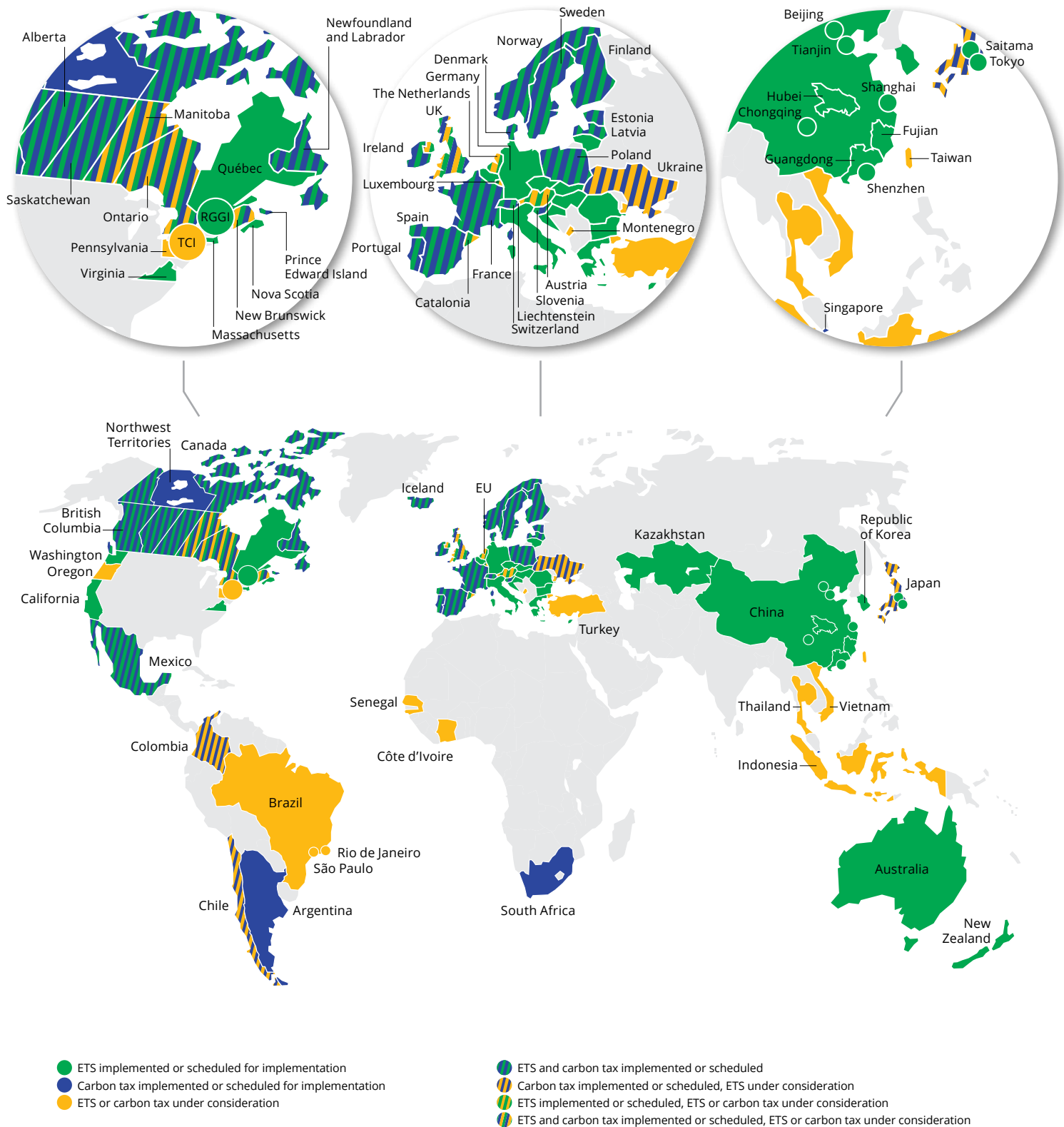


More than **14,500** registered crediting
projects to date, generating almost
4 billion tCO₂e of cumulative carbon credits



Forestry sector credits make up **42%**
of all credits issued in last five years

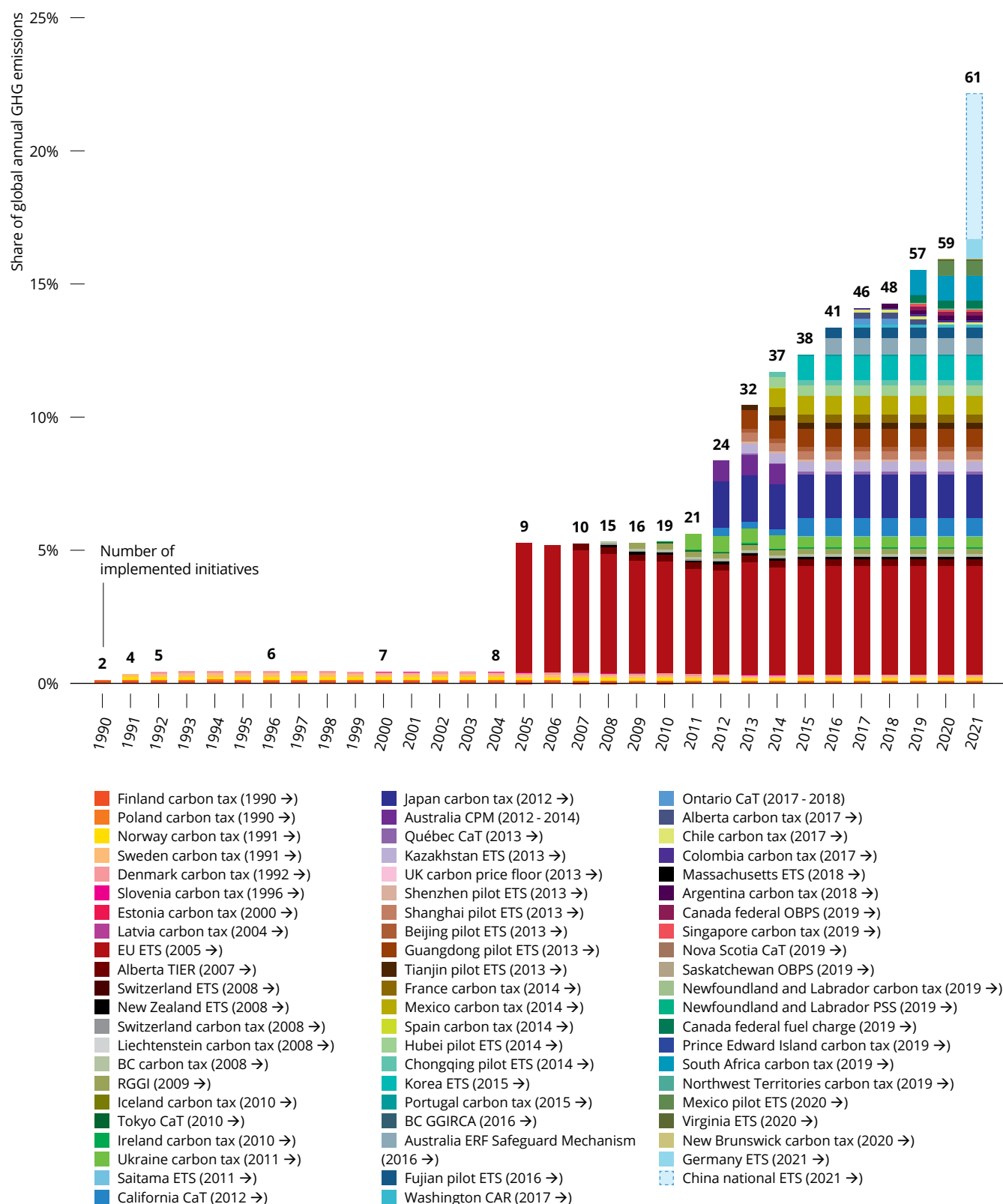
Figure ES.1 / Carbon pricing initiatives implemented, scheduled for implementation and under consideration (ETS and carbon tax)



The large circles represent cooperation initiatives on carbon pricing between subnational jurisdictions. The small circles represent carbon pricing initiatives in cities.

Note: Carbon pricing initiatives are considered "scheduled for implementation" once they have been formally adopted through legislation and have an official, planned start date. Carbon pricing initiatives are considered "under consideration" if the government has announced its intention to work towards the implementation of a carbon pricing initiative and this has been formally confirmed by official government sources. The carbon pricing initiatives have been classified in ETSs and carbon taxes according to how they operate technically. ETS not only refers to cap-and-trade systems, but also baseline-and-credit systems as seen in British Columbia and baseline-and-offset systems as seen in Australia. The authors recognize that other classifications are possible.

Figure ES.2 / Share of global emissions covered by carbon pricing initiatives (ETS and carbon tax)



Note: Only the introduction or removal of an ETS or carbon tax is shown. Emissions are presented as a share of global GHG emissions from (EDGAR) version 5.0 including biofuels emissions. Annual changes in GHG emissions are not shown in the graph from 2015 onwards. In 2020, the Technology Innovation and Emissions Reduction Regulation (TIER) replaced the Alberta Carbon Competitiveness Incentive Regulation, which in 2018 had replaced the Alberta Specified Gas Emitters Regulation. The information on the China national ETS represents early unofficial estimates based on the announcement of China's National Development and Reform Commission on the launch of the national ETS of December 2017.

Figure ES.3 / Prices in implemented carbon pricing initiatives

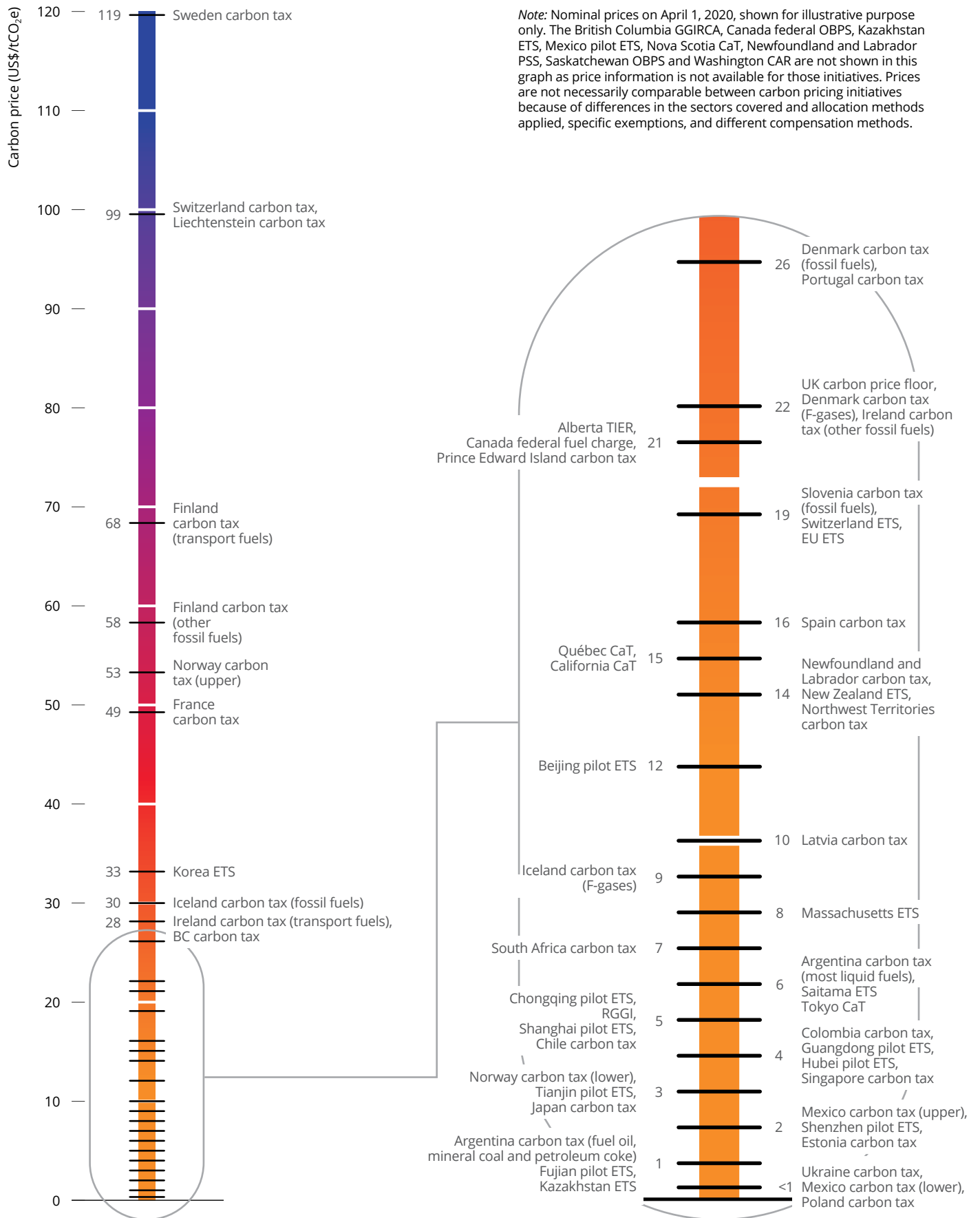
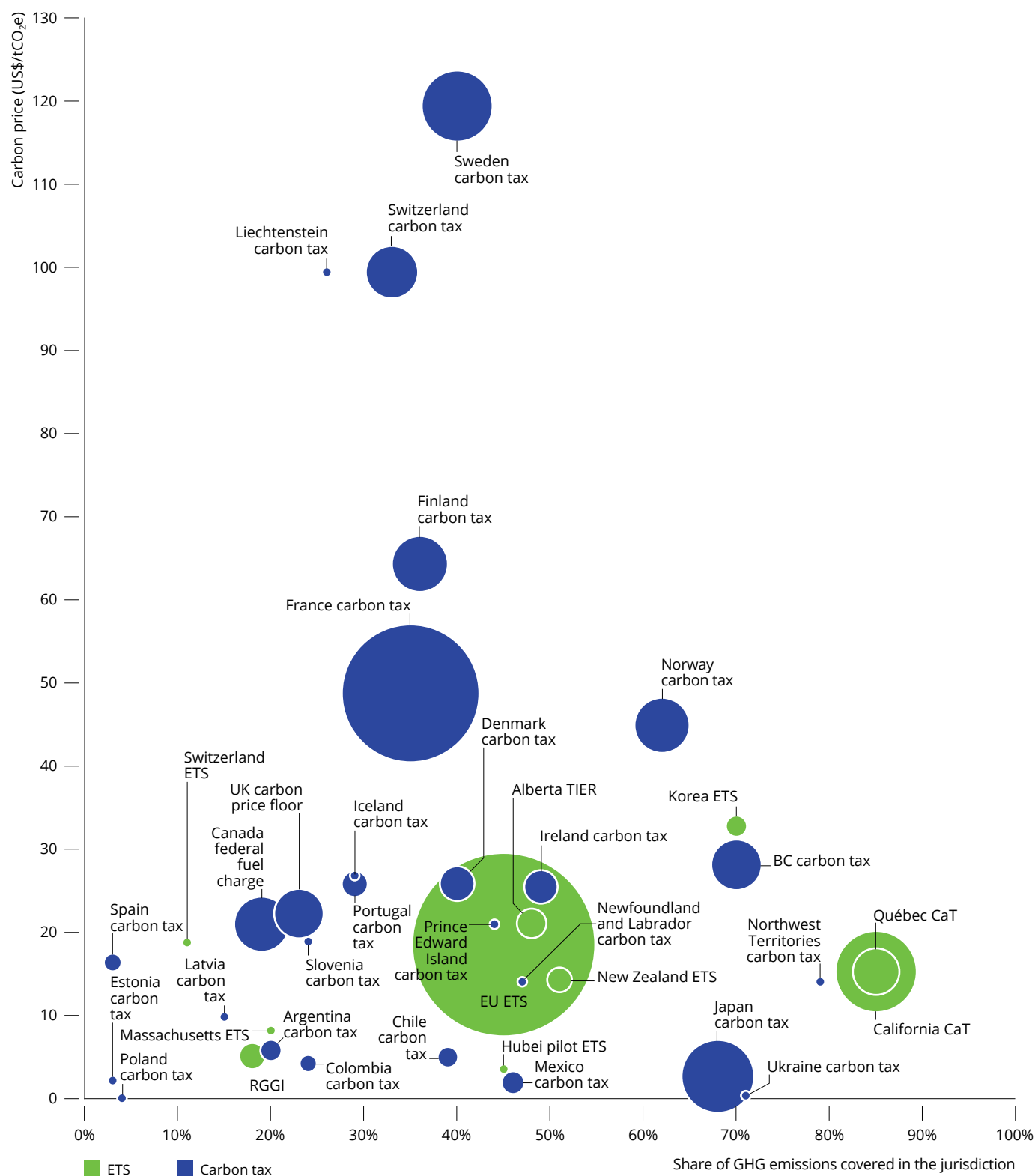


Figure ES.4 / Carbon price, share of emissions covered and carbon pricing revenues of implemented carbon pricing initiatives



Note: Government revenues from carbon taxes, auctioned allowances and direct payments to meet compliance obligations. The size of the circles is proportional to the amount of government revenues except for initiatives with government revenues below US\$100 million in 2019; the circles of these initiatives have an equal size. For illustrative purposes only, the nominal prices on April 1, 2020 and the coverages in 2020 are shown. The carbon tax rate applied in Argentina, Finland, Ireland, Mexico and Norway varies with the fossil fuel type and use. The carbon tax rate applied in Denmark and Iceland varies with the GHG type. The graph shows the average carbon tax rate weighted by the amount of emissions covered at the different tax rates in those jurisdictions. The middle point of each circle corresponds to the price and coverage of that initiative.

1

Introduction



1

Introduction

2019 saw a significant number of countries, regions and cities declaring a “climate emergency”.¹⁰ The year closed at 1.1°C above pre-industrial averages, making it the second-warmest year observed—second only to the record set in 2016.¹¹ Sea levels are rising at an alarming rate, and the devastating impacts of climate change are more visible than ever with wildfires ravaging Australia, Siberia and other Arctic regions.¹² International coordination, political will, financial support, and swift policy responses are all necessary to meet the urgent call for climate action in a just and inclusive manner, and yet are so far inadequate. In this context, well-designed carbon pricing initiatives can play an essential role in delivering a resilient and low-carbon future. At the same time, social unrest has been spreading across the world, which led to the 25th Conference of the Parties (COP 25) having to move from Santiago, Chile to Madrid, Spain only a month prior to its start. This unrest, driven primarily by an increasing cost of living, highlights the challenges countries will face in the necessary transition to a low-carbon economy.

The turbulent period for climate action and carbon pricing continued into 2020 with the COVID-19 pandemic. The ripple effect could be felt across the world as countries implemented quarantine measures. This has led to a drop in economic activity, putting the resilience of carbon pricing initiatives to unexpected shocks to the test. The COVID-19 restrictions have also delayed key meetings, most

notably COP 26, which was originally scheduled for November 2020 and is now postponed until 2021.¹³ However, the impact COVID-19 might have on carbon pricing initiatives, and more broadly on national climate change programs and global appetite for climate action is yet to be seen—is yet to be seen and is beyond the scope of this report.

“Imposing a price on carbon sends a financial signal to investors that low-carbon investments are valuable today and will be even more valuable in the future.”

Philippe Le Houérou,
Chief Executive Officer of International Finance Corporation.¹⁴

This report covers the latest developments and trends in carbon pricing initiatives around the world.¹⁵ It provides detailed updates to carbon pricing initiatives (either in operation or those coming online), and flags broader issues in the design of—and debate over—these instruments.

10 Source: Climate Emergency Declaration, *Climate Emergency Declarations in 1,482 Jurisdictions and Local Governments Cover 820 Million Citizens*, April 2, 2020, <https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/>.

11 Source: WMO, *WMO Statement on the State of the Global Climate in 2019, 2020*, https://library.wmo.int/doc_num.php?explnum_id=10211.

12 Source: Ibid.

13 Source: UNFCCC, *COP26 Postpone - UN Climate Press Release*, April 1, 2020, <https://unfccc.int/news/cop26-postponed>.

14 Source: Thomson Reuters, *Carbon pricing: It pays not to pollute*, February 20, 2020, <https://news.trust.org/item/20200220112250-mf592>.

15 This report covers developments from January 1, 2019 until April 1, 2020.

A notable addition to this year's edition is the section on carbon crediting mechanisms, as they have started to occupy a substantial part of the market in recent years. These mechanisms provide the opportunity for public and private participation in generating credits to be used for offsets and climate finance globally and serve as an important option for reducing emissions.

“We can avoid this bleak future, and we know what we have to do—reduce emissions, offset what cannot be reduced, and adapt to new climate realities. No individual or institution can stand on the sideline.”

*Kristalina Georgieva,
Managing Director of the International Monetary Fund.¹⁶*

For the purpose of this report, carbon pricing refers to initiatives that put an explicit price on greenhouse gas (GHG) emissions expressed in a monetary unit per ton of carbon dioxide equivalent (tCO₂e). This includes carbon taxes, ETSs, carbon crediting mechanisms, and results-based climate

finance (RBCF). In this report, five types of carbon pricing are canvassed:

- Carbon taxes cover taxes, levies and excise duties that explicitly state a price on carbon.
- ETSs refer to policy instruments where covered entities face compliance obligations for their GHG emissions and can trade emission units to meet these obligations. The two main forms of an ETS are: cap-and-trade and baseline-and-credit. In the former, a total cap is set on the number of emissions for a certain section of the economy, and emissions units are either auctioned off or allocated according to set criteria. Regulated emitters must surrender an emissions unit per ton of emissions. However, they have the option of reducing their own emissions or trading allowances. Under a baseline-and-credit system, baselines are set for regulated emitters. Emitters with emissions above their designated baseline need to surrender credits for emission above their baseline. Emitters that have reduced their emissions below their baseline receive credits for these emission reductions, which they can sell to other emitters.
- Carbon crediting mechanisms are initiatives that issue tradable emission units to actors that voluntarily implement emission reduction activities that are additional to business-as-usual operations. This is in contrast to ETSs where actors have mandatory obligations. However, crediting units can be linked to carbon taxes or ETSs if policymakers choose to give regulated emitters an alternative means of compliance.

¹⁶ Source: IMF, *The Adaptive Age*, December 2019, <https://www.imf.org/external/pubs/ft/fandd/2019/12/climate-change-and-the-age-of-adaptation-georgieva.htm#author>.

- RBCF is a form of climate finance where funds are disbursed by the provider of climate finance to the recipient upon achievement of a pre-agreed set of climate results. A form of RBCF is the voluntary purchase of carbon credits for non-compliance purposes.
- This report also covers internal carbon pricing, which refers to the practice within organizations of assigning a monetary value to GHG emissions in their policy analyses and decision making.
- While policies that implicitly price GHG emissions—such as the removal of fossil fuel subsidies, internal discovery of abatement costs and fuel taxation—can be important for mitigation and were explored in the 2019 edition of the State and Trends of Carbon Pricing, they are not covered in this year's edition.

Section 2 of this report provides an overview of recent developments in domestic carbon pricing initiatives at the regional, national, and subnational levels and highlights trends occurring across these jurisdictions.

Section 3 is a deep-dive on carbon crediting mechanisms. This section analyzes important trends in crediting and provides information on the major international, independent and regional, national and subnational crediting mechanisms. Section 4 summarizes the latest developments in international cooperation on carbon pricing, including the status

of the implementation of the Paris Agreement and NDCs, Article 6 pilots, RBCF projects and progress on carbon pricing in the context of the international

“I have been saying we need to make progress on carbon pricing, shift taxation from income to carbon, ensure no new coal plants are built after 2020, and end the allocation of taxpayers’ money for perverse fossil fuel subsidies.”

*Antonio Guterres,
Secretary General of the United Nations.¹⁷*

aviation and international maritime sectors. Section 5 reports on how companies are using internal carbon pricing to integrate climate-related financial risks and opportunities into their decision making with other instruments.

¹⁷ Source: UN Secretary-General, *Secretary-General's Remarks at Opening Ceremony of UN Climate Change Conference COP25 [as Delivered]*, December 2, 2019, <https://www.un.org/sg/en/content/sg/statement/2019-12-02/secretary-generals-remarks-opening-ceremony-of-un-climate-change-conference-cop25-delivered>.

2

Regional, national and subnational carbon pricing initiatives

US\$45 billion

raised in carbon pricing revenues in 2019, with more than half going into environmental or developmental projects

A number of jurisdictions have expanded the scope of their existing carbon pricing initiatives to include more facilities, sectors and gases. Others have reduced the share of fossil fuel exemptions to raise their ambition

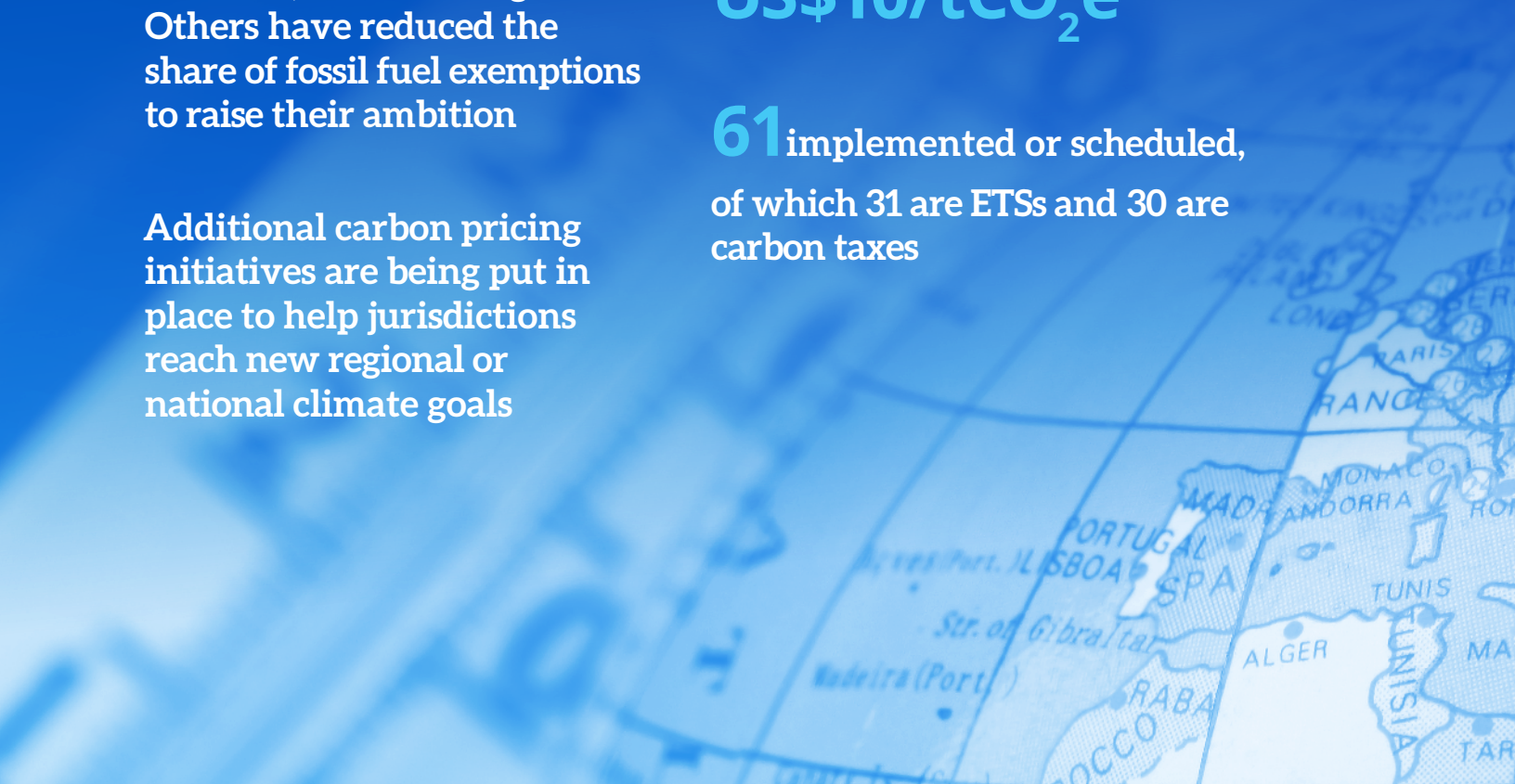
Additional carbon pricing initiatives are being put in place to help jurisdictions reach new regional or national climate goals

Upcoming carbon pricing initiatives in Germany, Mexico, Virginia and New Brunswick increases global GHG emissions coverage to **22%**

Carbon prices range from less than US\$1/tCO₂e to US\$119/tCO₂e, with almost half of the covered emissions priced at less than

US\$10/tCO₂e

61 implemented or scheduled, of which 31 are ETSs and 30 are carbon taxes



2

Regional, national and subnational carbon pricing initiatives

2.1 Recent developments, future and emerging trends

2019 saw the largest number of carbon pricing initiatives being launched in a single year with ten initiatives entering into force—equal to the total number of carbon pricing initiatives being launched in the previous three years combined. In 2019, South Africa became the first country in Africa to put a price on carbon, and Singapore's carbon tax also marked the first time a country in Asia introduced a carbon tax. The other new carbon pricing initiatives can be found in Canada, where most Canadian provinces and territories introduced new initiatives in response to the federal government's Pan-Canadian Approach to Pricing Carbon Pollution. Furthermore, Canada's federal backstop system—which includes an ETS and a fuel charge similar to a carbon tax—has been imposed on provinces and territories that do not opt into the system, or that do not put in place a sufficiently ambitious carbon pricing mechanism.

2020 also saw the first ETS in Latin America when Mexico launched its pilot ETS. The three-year pilot will test the ETS design, covering 37 percent of national emissions, before transitioning to a fully operational ETS. New Brunswick also launched a carbon tax in line with the federal minimum carbon price in Canada. China continues toward the implementation of its national ETS and is building stakeholder capacity for its simulation phase. Meanwhile, the Chinese ETS pilots continue to expand and refine their systems to align with the national ETS. Many more carbon pricing initiatives are also under consideration, including a possible carbon market in Indonesia, Montenegro

and several US states, such as Pennsylvania, New Mexico, North Carolina and Oregon. New York City is also considering an ETS for the building sector.

Additional carbon pricing initiatives are being put in place to help jurisdictions reach more ambitious regional or national climate goals. In Europe, the EU Green Deal and its commitment to reach carbon neutrality by 2050 strengthened the case for more ambitious climate action and a wider application of carbon pricing. Several countries announced new climate targets and plans to start exploring national carbon pricing initiatives to complement the EU ETS by covering new sectors. Germany intends to launch a domestic carbon market for heat and road transport in 2021. Luxembourg is also planning to introduce a carbon tax in 2021 for sectors not included in the EU ETS. Similarly, Austria presented plans to introduce a carbon price for non-ETS sectors with the form of the carbon pricing initiative yet to be determined.

Other jurisdictions are extending existing carbon pricing initiatives to cover additional sectors. New Zealand is planning to price GHG emissions from agriculture by 2025 in line with New Zealand's commitment to be at carbon net-zero by 2050. The power and domestic aviation sectors were included in the Swiss ETS to align with the scope of the EU ETS after reaching a linking agreement. In China, the Tianjin pilot ETS now covers the building materials, papermaking and domestic aviation sectors. While the national Chinese ETS will only cover the power sector initially, monitoring, reporting and verification (MRV) obligations are being rolled out to other sectors to facilitate their gradual inclusion in the carbon market.

The scope of existing carbon pricing instruments is also expanding, by the introduction of additional rates, broadening inclusion criteria for emitters and phasing out exemptions. Iceland added a tax rate on F-gases effective as of January 1, 2020 to encourage companies to reduce GHG emissions. In Chile, the carbon tax compliance thresholds were adjusted in 2020 and are now based on the amount of emissions an entity produces per year. This change means that additional emitters previously not covered under the compliance thresholds based on thermal capacity are now included. New Zealand announced plans to phase down free allowances for the industrial sector, canceled and replaced units from the first commitment period of the Kyoto Protocol (as they were obsolete since 2015) and changed penalties for non-compliance to introduce a new allowance surrender penalty. In addition to phasing out coal exemptions, Portugal has also started phasing out exemptions for fuel oil and natural gas used to generate electricity by installations under the EU ETS. Norway, in order to increase its climate ambition, abolished carbon tax exemptions for natural gas and liquefied petroleum gas for certain industrial processes and for fuels used on fishing vessels. Similarly, Sweden removed the partial exemption for diesel used in mining and reduced exemptions for fuels used to generate heat in cogeneration facilities that fall under the EU ETS.

As a result of newly launched carbon pricing initiatives and reforms, governments raised nearly US\$45 billion in carbon pricing revenues in 2019 globally, US\$1 billion more than in 2019 (Figure 2.5). These consist of revenues from carbon taxes, auctioned allowances and direct payments to meet compliance obligations.¹⁸ Almost half of the revenues were commitments to environmental or broader development projects, while more than 40 percent went to the general budget. The remaining share was dedicated to tax cuts and direct transfers.¹⁹ While revenue increased by US\$1 billion, this was modest compared with the US\$11 billion increase

seen in 2018 and is largely a consequence of the EU allowance (EUA) price stabilization in 2019. The largest contribution to the increase in global revenues is due to the federal fuel charge (i.e. carbon tax backstop component) coming into effect in Canada. A larger share of auctioning in Québec and a price increase following changes to the New Zealand ETS also increased total revenue.

Carbon prices increased in many jurisdictions but still vary widely from US\$1/tCO₂e to US\$119/tCO₂e (Figure 2.3). The largest price increases over the past year occurred in Asia, with jumps in the Korean ETS and the Chinese pilots driven by scarce trading and a reduced allowance shortage from increased production, respectively.²⁰ In the lead up to the link with the EU ETS, prices in Switzerland tripled, moving up to EU allowance prices, and Portugal's carbon tax rate almost doubled to €24/tCO₂e (US\$26/tCO₂e), as part of an annual update based on the price in the EU ETS.

Despite ongoing developments, most carbon prices are low, with almost half of the covered emissions priced at less than US\$10/tCO₂e (Figure 2.3). The High-Level Commission on Carbon Prices estimated that carbon prices of at least US\$40–80/tCO₂ by 2020 and US\$50–100/tCO₂ by 2030 are required to cost-effectively reduce emissions in line with the temperature goals of the Paris Agreement,²¹ while the IEA Sustainable Development Scenario states that a carbon price ranging between US\$75/tCO₂ and US\$100/tCO₂ is needed stay on track with a Paris-compatible trajectory.²² Ultimately, the carbon price needed for jurisdictions to be aligned with the Paris Agreement will depend on local circumstances and the role of carbon pricing in a broader policy package. Complementary policies—such as public transport investments and urban planning—will also be necessary, alongside technological progress and innovation. Nevertheless, as of today, carbon prices are still falling well short: less than 5 percent of GHG emissions under a carbon price are within the estimated 2020 price range (see Figure 2.3).

18 Direct payments are government revenues obtained from companies paying a fixed price to the government to cover their compliance obligations under an ETS, e.g. payment into the compliance fund under the Alberta CCIR, which is now replaced by the Alberta TIER, or direct purchases of emission allowances from the government for compliance under New Zealand ETS.

19 Source: I4CE, *Global Carbon Account 2020*, May 12, 2020, <https://www.i4ce.org/download/global-carbon-account-2020>

20 Prices on April 1, 2020 compared to prices on April 1, 2019.

21 Source: CPLC, *Report of the High-Level Commission on Carbon Prices*, May 29, 2017.

22 Source: IEA, *World Energy Outlook 2019*, November 13, 2019.

At the time of publication, the emergency measures in response to COVID-19 and resultant economic downturn have started to depress prices in carbon markets (see Box 2.1). As allowance prices are a function of supply and demand, this is to be expected. With the reduced economic activity leading to a drop in emissions, demand for allowances, and thereby the allowance price, has fallen. However, many

carbon markets have also incorporated market stability mechanisms, like an allowance reserve and/or price floors, to give an added layer of price predictability. Such mechanisms may become increasingly prominent features of carbon market designs to deal with economic downturns or other shocks.²³ A few jurisdictions have also seen delays in the implementation of parts of their carbon tax policy.

Box 2.1 / COVID-19 impacts on carbon pricing

Measures taken in response to COVID-19 have affected carbon pricing initiatives in various ways. An overview of carbon pricing developments related to COVID-19 until April 1, 2020 is provided below.

The economic downturn caused by COVID-19 has seen a decline in allowances prices in various ETSs. This is to be expected with allowances prices being a function of demand and supply. The EU ETS allowance prices decreased in the first quarter of 2020 to €17/tCO₂e (US\$19/tCO₂e) compared to around €25/tCO₂e (US\$27/tCO₂e) over 2019. Similarly, allowance prices in the California-Québec carbon market dropped below the 2020 auction reserve price of US\$17/tCO₂e.

The COVID-19 pandemic has also affected prices in various carbon taxes. Newfoundland and Labrador had planned to raise its carbon tax to CAN\$30/tCO₂e (US\$21/tCO₂e) on April 1, 2020, but this has been delayed until further notice due to impacts of COVID-19. Similarly, British Columbia froze its carbon tax rate at CAN\$40/tCO₂e (US\$28/tCO₂e), postponing its decision to increase it to CAN\$45/tCO₂e (US\$40/tCO₂e) until further notice. It also increased and expanded the British Columbia climate action tax credit to provide income support for its residents.

COVID-19 has also led to a change in decisions and timelines related to various carbon pricing initiatives. Norway reversed its decision to directly remove certain exemptions for natural gas and liquefied petroleum gas for specified industrial processes due to COVID-19 and plans a stepwise removal of these exemptions instead. In Switzerland, an allowance auction was canceled and the compliance deadline for installations in its ETS was extended as the emission trading registry was closed due to COVID-19. In Manitoba, the suspension of the Legislative Assembly has delayed the implementation of its own carbon pricing system. More broadly in Canada, the pandemic has led to court hearings on the federal carbon pricing approach being delayed.

Internationally, the COVID-19 restrictions have delayed various key meetings and increased uncertainty on the international carbon market. Most notably, COP 26 was postponed until 2021, as well as international aviation and maritime meetings that would have a bearing on the rules around international transactions and carbon markets. In addition, COVID-19 has led to increased uncertainty on the demand for international credits with airlines questioning the impact of COVID-19 on their offsetting obligations under the Carbon Offset and Reduction Scheme for International Aviation (CORSIA).

23 Source: ICAP, *Emissions Trading Worldwide: Status Report 2020*, 2020, https://icapcarbonaction.com/en/?option=com_attach&task=download&id=677.

When introducing carbon pricing policies or increasing prices, the political and local context are important.

New policies or policy reform may stoke or exacerbate broader issues within the community. For instance, the protests following a reform of energy prices in Ecuador and an increase in public transport prices in Chile fed into broader concerns about the effectiveness of governments and inadequate political responses to inequality in those countries. This does not mean that carbon pricing or climate action in and of itself will trigger social unrest. Rather, it highlights the sensitivity over policies that affect basic commodity prices. It also indicates that political and governance considerations, including stakeholder consultations, revenue use and the co-benefits of carbon pricing—not to mention the narratives and ways in which governments communicate about carbon pricing—are as important as technical considerations on the coverage and enforcement of these policies.

Increased cooperation continues across jurisdictions at all levels around the world.

Building on last year's progress, regional initiatives in the US have expanded. RGGI welcomed New Jersey

back after its departure from the initiative in 2011. Two other states—Virginia and Pennsylvania—are exploring linking to RGGI. Maine, New Hampshire and New York State also joined the Transportation and Climate Initiative (TCI) process, a group of now 12 Northeastern states (11 states and Washington DC) considering a carbon pricing mechanism for their transport sector. Across the Atlantic, the link between the Switzerland ETS and the EU ETS came into effect on January 1, 2020. Following its departure from the EU, the UK is now developing a standalone ETS but is considering a link to the EU ETS. The linkage route provides a viable pathway for jurisdictions to develop an ETS through building on pre-existing ETS design elements already in place in other jurisdictions, and increases the liquidity of these new carbon markets.

Finally, in a positive sign of climate mainstreaming beyond environmental ministries, the newly formed Coalition of Finance Ministers for Climate Action launched the Santiago Action Plan late in 2019. The plan promotes national climate action through fiscal policy and the use of public finance as explained in Box 2.2.

Box 2.2 / Coalition of Finance Ministers for Climate Action

In April 2019, governments from over 20 countries collectively launched the Coalition of Finance Ministers for Climate Action,²⁴ aimed at driving stronger collaborative action on the climate challenge, while recognizing the unique capacity of the world's finance ministers to address it. The Coalition aims to help countries mobilize and align the financial resources required to implement their national climate action plans; establish best practices such as climate budgeting and strategies for green investment and procurement; and factor climate risks into members' economic planning. The Coalition also endorsed the Helsinki Principles, which promote national climate action, especially through fiscal policy and the use of public finance. Since its launch, over fifty countries have endorsed these principles and committed to fighting the climate crisis together.

24 For more, see: https://www.cape4financeministry.org/coalition_of_finance_ministers

Proposals on carbon border adjustments in Europe have started to shake up global climate and trade discussions.

As part of the EU's Green Deal and the EU's commitment to reach carbon neutrality by 2050, discussions have started on introducing a carbon border adjustment mechanism (Box 2.3) for selected sectors where the risk of carbon leakage is highest. While no jurisdiction has introduced such a measure

to date, the policy would form an alternative to current measures of addressing carbon leakage risks due to the EU ETS for those sectors. Details on what an adjustment mechanism might look are expected by 2021 at the earliest. The proposal has also sparked conversations in neighboring jurisdictions and trading partners about their respective climate policies and protecting industrial competitiveness.

Box 2.3 / Carbon border adjustment mechanisms

The Paris Agreement creates an expectation of universal and increasingly ambitious climate action. However, the scope and stringency of mitigation measures, including carbon pricing policies, will differ across national and state borders. There is also a concern that these differences may shift production and emissions to regions with less stringent climate measures. To date, countries have addressed both the environmental and competitiveness risks through purely domestic measures. Carbon border adjustment mechanisms offer an alternative method to establish a level playing field between goods produced within a jurisdiction and imported goods in terms of the cost of GHG emissions associated with the production of these goods. This could help increase support for domestic climate action but also incentivize other countries to implement their own climate policies.

The mechanisms aim to address competitiveness concerns and avoid carbon leakage due to the difference in climate policy costs faced by companies operating in the same market. In theory, the carbon border adjustment would shield emissions-intensive, trade-exposed industries from competition from cheaper imports originating in countries with less stringent climate policies, while still maintaining the incentive for those industries to reduce their emissions. In general, the adjustment mechanism can take two forms—either tariffs on goods imported from jurisdictions where companies face a lower or no carbon cost, or rebates on the carbon costs of goods exported to markets where companies are competing with others that do not fall under equally stringent climate policies. When integrated into an ETS, a carbon border adjustment proposal may require importers to surrender sufficient allowances to cover the embedded GHG emissions from the production of their goods. Alternatively, it could be imposed as a jurisdiction-wide tax, targeting both foreign and domestic producers, or as an import levy.

While this option has been repeatedly discussed in carbon pricing literature, it has not yet been implemented in practice. Analysis has shown that carbon border adjustments are theoretically effective in addressing carbon leakage while maintaining environmental effectiveness.²⁵ However, implementation is hindered by practical feasibility, administrative hurdles of calculating the carbon intensity of imported goods, and incompatibility with World Trade Organization (WTO) rules. Nonetheless, studies have shown that there are various pathways to overcoming these barriers through careful design and implementation.²⁶

25 Source: World Bank, *State and Trends of Carbon Pricing*, September 2015, <http://documents.worldbank.org/curated/en/636161467995665933/pdf/99533-REVISED-PUB-P153405-Box393205B.pdf>.

26 Source: Climate Strategies, *Designing Border Carbon Adjustments for Enhanced Climate Action*, December 2017, https://climatestrategies.org/wp-content/uploads/2017/12/CS_report-Dec-2017-4.pdf; Stephanie Monjon and Philippe Quirion, "A Border Adjustment for the EU ETS: Reconciling WTO Rules and Capacity to Tackle Carbon Leakage," *Climate Policy* Vol 11, Issue 5 (September 2011): 1212–1225.

Figure 2.1 / Carbon pricing initiatives implemented, scheduled for implementation and under consideration (ETS and carbon tax)

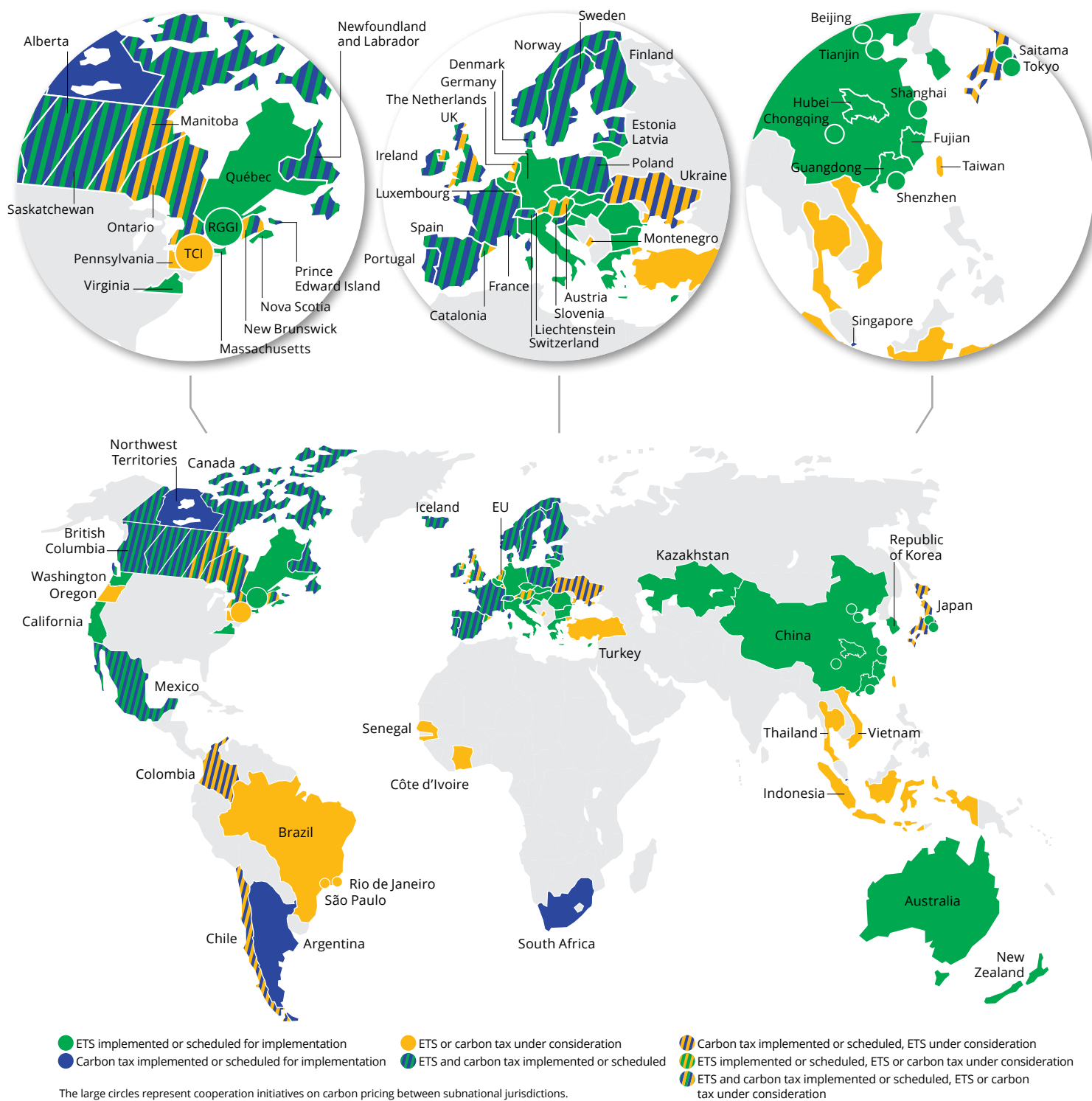
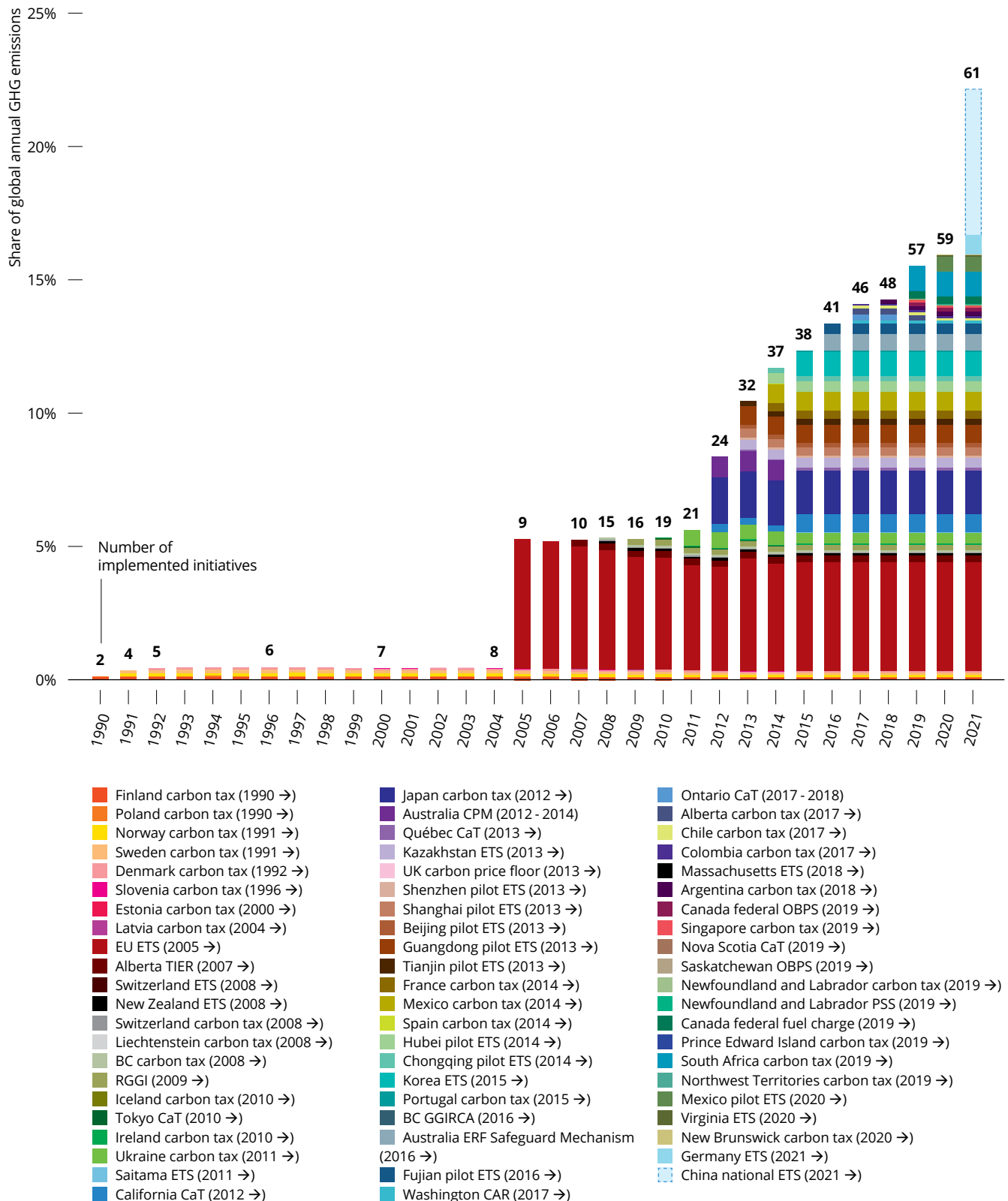


Figure 2.2 / Share of global emissions covered by carbon pricing initiatives (ETS and carbon tax)



Note: Only the introduction or removal of an ETS or carbon tax is shown. Emissions are presented as a share of global GHG emissions from (EDGAR) version 5.0 including biofuels emissions. Annual changes in GHG emissions are not shown in the graph from 2015 onwards. In 2020, the Technology Innovation and Emissions Reduction Regulation (TIER) replaced the Alberta Carbon Competitiveness Incentive Regulation, which in 2018 had replaced the Alberta Specified Gas Emitters Regulation. The information on the China national ETS represents early unofficial estimates based on the announcement of China's National Development and Reform Commission on the launch of the national ETS of December 2017.

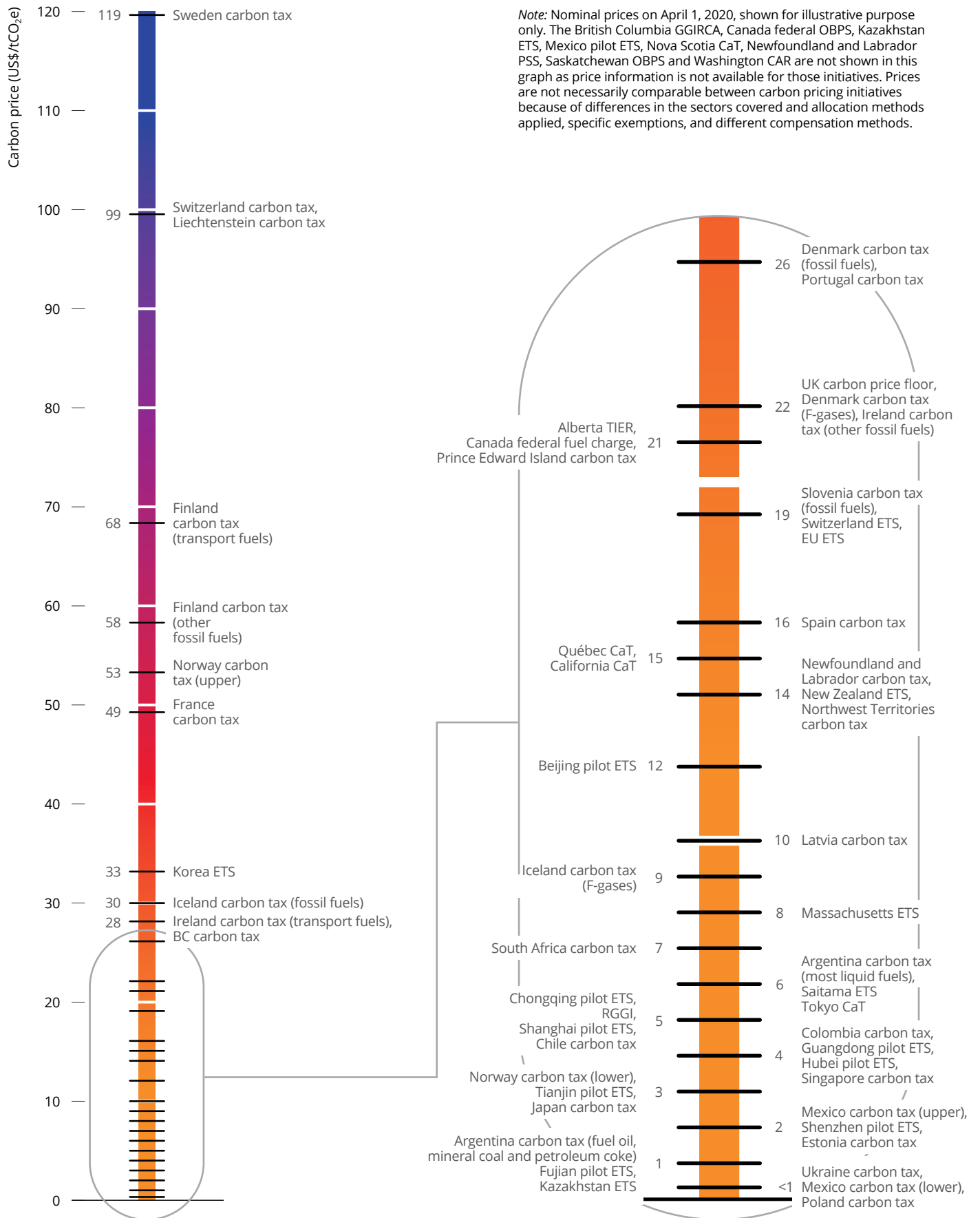
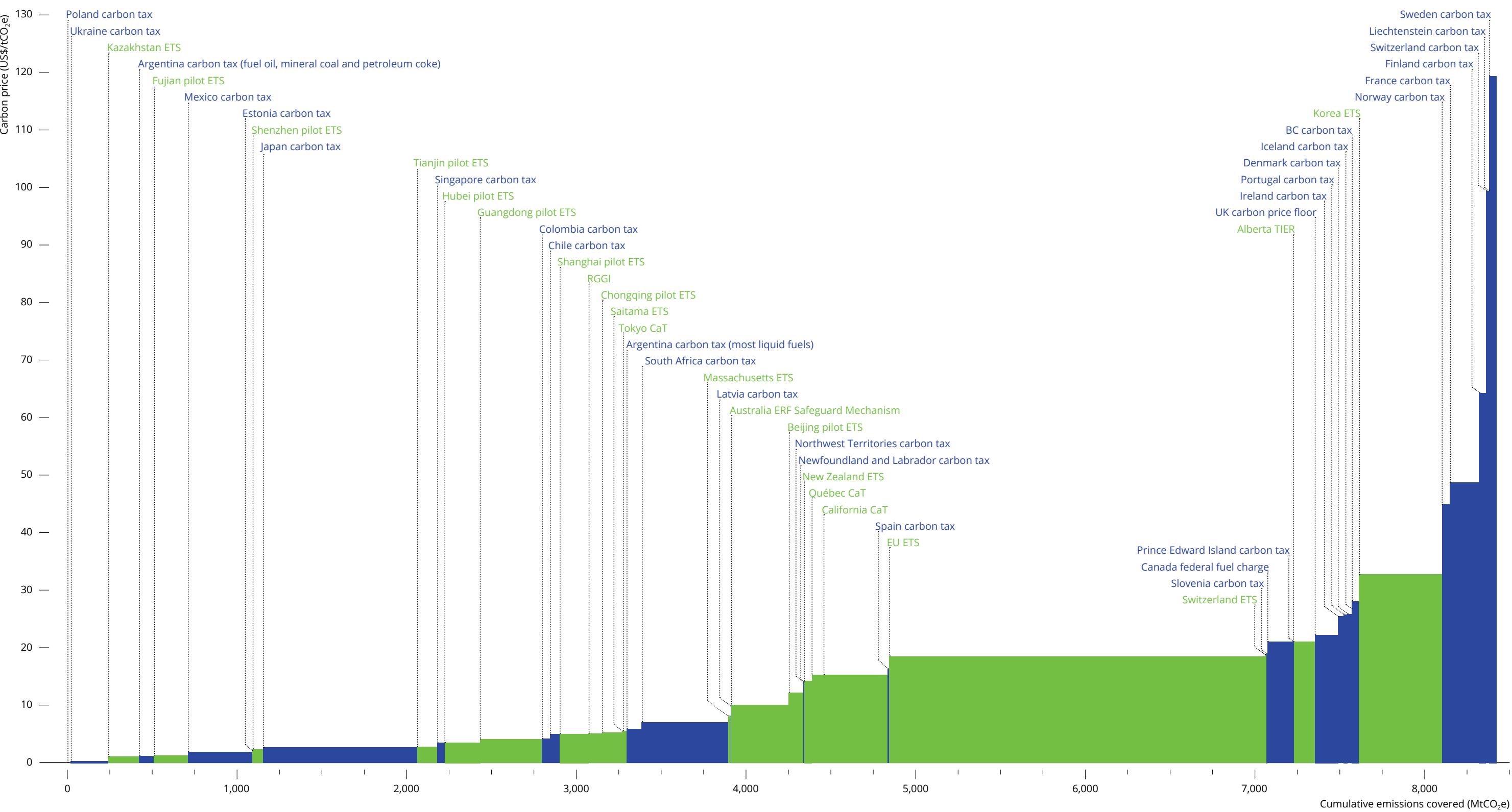
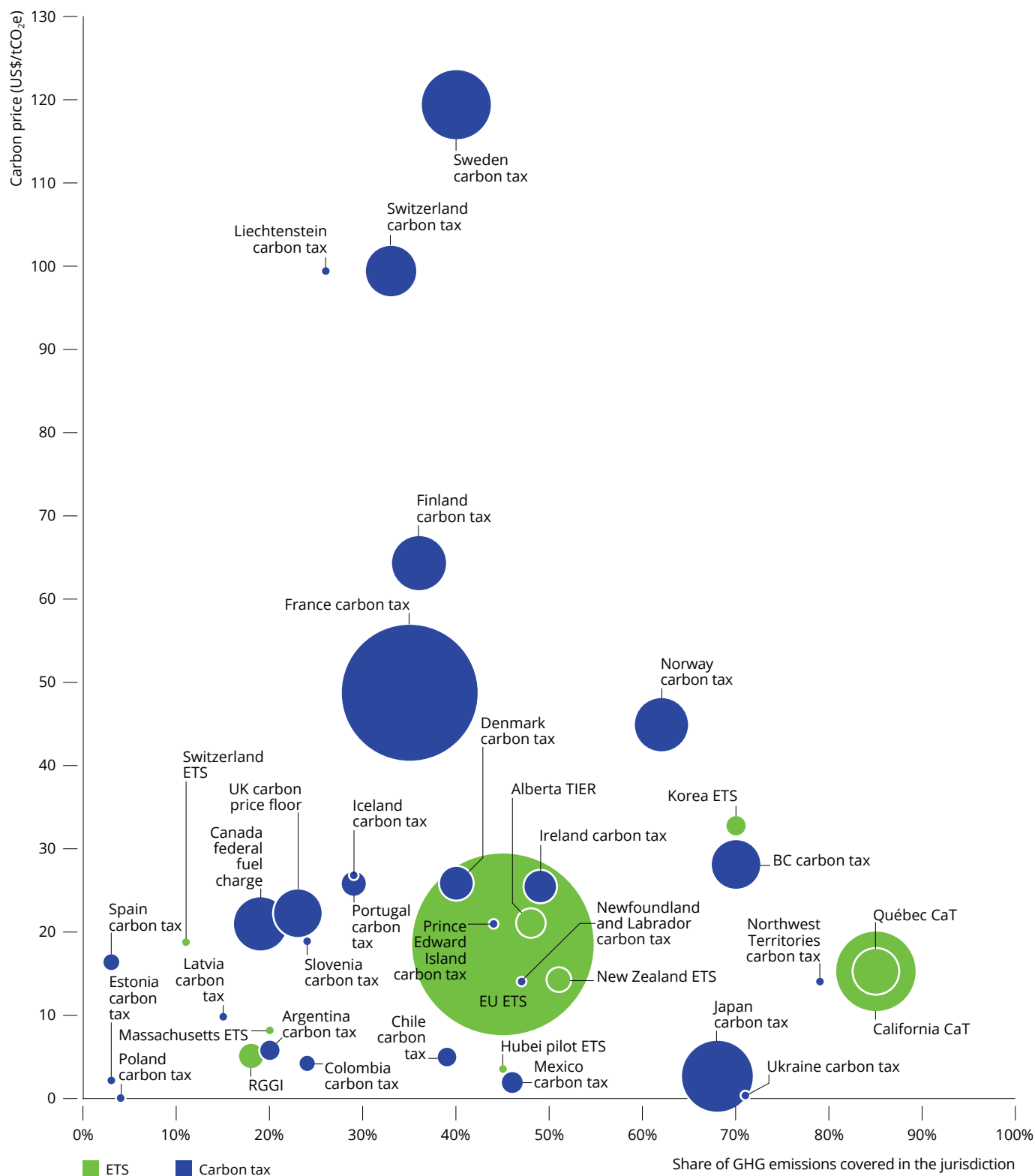
Figure 2.3 / Prices in implemented carbon pricing initiatives

Figure 2.4 / Carbon price and emissions coverage of implemented carbon pricing initiatives



Note: The British Columbia GGIRCA, Canada federal OBPS, Kazakhstan ETS, Nova Scotia CaT, Newfoundland and Labrador PSS, Saskatchewan OBPS, and Washington CAR are not shown in this graph as price information is not available for those initiatives. The carbon tax rate applied in Argentina, Finland, Ireland, Mexico and Norway varies with the fossil fuel type and use. The carbon tax rate applied in Denmark and Iceland varies with the GHG type. The graph shows the average carbon tax rate weighted by the amount of emissions covered at the different tax rates in those jurisdictions.

Figure 2.5 / Carbon price, share of emissions covered and carbon pricing revenues of implemented carbon pricing initiatives



Note: The size of the circles is proportional to the amount of government revenues except for initiatives with government revenues below US\$100 million in 2019; the circles of these initiatives have an equal size. For illustrative purposes only, the nominal prices on April 1, 2020 and the coverages in 2020 are shown. The carbon tax rate applied in Argentina, Finland, Ireland, Mexico and Norway varies with the fossil fuel type and use. The carbon tax rate applied in Denmark and Iceland varies with the GHG type. The graph shows the average carbon tax rate weighted by the amount of emissions covered at the different tax rates in those jurisdictions. The middle point of each circle corresponds to the price and coverage of that initiative.

2.2 Detailed overview of carbon pricing initiatives

This section only provides key developments over the past year²⁷ in regional, national and subnational carbon pricing initiatives (i.e. carbon taxes and ETSs) around the world that impose a compliance obligation on emitters. For more detailed information on all carbon taxes and ETSs, the reader is referred to the Carbon Pricing Dashboard.

Australia

In February 2020, the Australian Government published default emission intensity values for the Emissions Reduction Fund (ERF) Safeguard Mechanism. The default values provide covered facilities with an additional option of setting their baselines in a simplified way, because the baseline setting method that about three-quarters of the facilities currently use—based on their historically highest emissions in 2009–2014—will no longer be allowed for most facilities.²⁸

Austria

On January 2, 2020 the government of Austria presented its national climate plans²⁹ and its ambition to reach carbon neutrality by 2040. The plans include the introduction of carbon pricing for sectors not covered by the EU ETS—transportation and buildings—and a task force is in place to launch a formal proposal by 2022.

Brazil

On December 23, 2019, the Brazilian Ministry of Economy announced advances in discussions about carbon pricing in Brazil.³⁰ As part of a broader stakeholder consultation process, participants at the meeting, which included representatives from government, the private sector and international organizations, “pledged to accelerate studies on the creation of a carbon pricing system based on national greenhouse gas emissions trading”.

Canada

Since 2019, provinces and territories are required to either develop their own carbon pricing initiative in line with the criteria outlined in the Pan-Canadian Approach to Pricing Carbon Pollution³¹—the federal benchmark—or have the federal backstop system implemented in their jurisdictions. The federal backstop consists of two components: (i) a regulatory charge on fossil fuels set at CAN\$20/tCO₂e (US\$14/tCO₂e) in 2019 that rises by CAN\$10/tCO₂e (US\$7/tCO₂e) per year to CAN\$50/tCO₂e (US\$35/tCO₂e) in 2022; and (ii) an Output-Based Pricing System (OBPS)³² that sets emission intensity standards for power generation and a wide range of activities, and the applies to facilities in backstop jurisdictions emitting more than 50 kilotons of carbon dioxide equivalent (ktCO₂e) per year or any eligible facility that voluntarily chooses to participate. The two parts of the federal system can be implemented together or separately. OBPS entities can also surrender eligible offset credits (see 3.3.3).

27 For initiatives where there have been developments in 2019, but no further significant developments occurred after April 1, 2019, the State and Trends of Carbon Pricing 2019 offers more information. Developments on the following carbon pricing initiatives can be found there: Argentina carbon tax, Colombia carbon tax, Finland carbon tax, France carbon tax, and Singapore carbon tax.

28 Source: Australian government, *Safeguard Baselines Table*, March 26, 2020, <http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/Safeguard-baselines-table#Summary-of-updates>.

29 Source: Federal Chancellery Austria, *Out of a Sense of Responsibility for Austria - Government Program 2020-2024.*, 2020, https://www.bundeskanzleramt.gv.at/dam/jcr:d7057356-8c6d-4fb3-ab9f-7bc14ff3d871/GovProgramme-Short_EN_BF.pdf.

30 Source: Government of Brazil, *Ministry of Economy advances in discussions on carbon market in Brazil*, December 23, 2019, <http://editor.economia.gov.br:8080/Economia/noticias/2019/12/ministerio-da-economia-avanca-nas-discussoes-sobre-mercado-de-carbono-no-brasil>

31 Source: Government of Canada, *Government of Canada Announces Pan-Canadian Pricing on Carbon Pollution*, October 3, 2016, <https://www.canada.ca/en/environment-climate-change/news/2016/10/government-canada-announces-canadian-pricing-carbon-pollution.html>.

32 Source: Government of Canada, *Output-Based Pricing System Regulations*, February 11, 2020, <https://laws-lois.justice.gc.ca/PDF/SOR-2019-266.pdf>.

In addition to the start of the federal backstop measures in some of the provinces and territories (see Table 2.1), the Northwest Territories (NWT) carbon tax entered into force as of September 1, 2019.³³ Furthermore, New Brunswick launched its carbon tax on April 1, 2020 at a rate of CAN\$30/tCO₂e (US\$21/tCO₂e), replacing the fuel charge component of the federal backstop.³⁴ Meanwhile, Alberta abolished its carbon tax on May 30, 2019 and replaced its Carbon Competitiveness Incentive Regulation (CCIR) with the Technology Innovation and Emissions Reduction (TIER) Regulation system—a baseline-and-credit ETS—effective as of January 1, 2020.³⁵ Manitoba, New Brunswick, and Ontario are considering additional carbon pricing initiatives. A more detailed overview on the developments in the Canadian provinces and territories is provided in Appendix B.

Chile

On February 24, 2020, amendments to the carbon tax were adopted as part of a broader tax reform. The carbon tax now applies to installations emitting 25,000 tCO₂ or more, as well as to those that release more than 100 tons of particulate matter into the air each year.³⁶ Under the previous legislation, installations with a thermal capacity higher than 50 megawatts were subjected to the tax. The amendments also introduced the possibility to use offsets to meet compliance obligations, for which the rules still have to be established. The carbon tax rate remains at US\$5/tCO₂ in 2020.

In addition, the government is working on a Framework Law on Climate Change that sets a carbon neutrality goal for 2050.³⁷ The draft law includes provisions for a possible trading system. Regulated entities could reduce their emissions below limits fixed by the regulator or implement emission reduction projects that meet certain standards to earn credits. These credits could

Table 2.1 / Type and status of carbon pricing initiatives in the Canadian provinces and territories

Jurisdiction	Type and status
Alberta	ETS implemented Federal backstop partially imposed
British Columbia	ETS and carbon tax implemented Federal benchmark met
Manitoba	Federal backstop fully imposed ETS and carbon tax under consideration
New Brunswick	ETS under consideration Carbon tax implemented Federal backstop partially imposed
Newfoundland and Labrador	ETS and carbon tax implemented
Northwest Territories	Carbon tax implemented
Nova Scotia	ETS implemented
Nunavut	Federal backstop opt-in
Ontario	ETS under consideration Federal backstop fully imposed
Prince Edward Island	Carbon tax implemented Federal OBPS only opt-in
Québec	ETS implemented Federal benchmark met
Saskatchewan	ETS implemented Federal backstop partially imposed
Yukon	Federal backstop opt-in

33 Source: Government of Northwest Territories, *Bill 42 An Act to Amend the Petroleum Products Tax Act*, June 2019, https://www.ntassembly.ca/sites/assembly/files/bill_42_plain_language_summary.pdf.

34 Source: Government of Canada, *FCN13 New Brunswick No Longer a Listed Province Under Part 1 of the Greenhouse Gas Pollution Pricing Act Effective April 1, 2020*, March 26, 2020, 13, <https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/fcn13.html>.

35 Source: Government of Alberta, *Technology Innovation and Emissions Reduction Regulation*, January 1, 2020, <https://www.alberta.ca/technology-innovation-and-emissions-reduction-regulation.aspx>.

36 Source: Ministry of Finance (Chile), *Modernization Tax Legislation*, February 24, 2020, <https://www.leychile.cl/Navegar?idNorma=1142667&buscar=-impuesto#carbon0>.

37 Source: Ministry of Environment (Chile), *Draft law establishing the Framework Law on Climate Change*, January 13, 2020, https://www.senado.cl/appsenado/templates/tramitacion/index.php?boletin_ini=13191-12.

then be sold to other regulated entities to use for compliance. The government could also allow these entities to implement mitigation projects and use the certified reductions to either achieve the standard or transfer those reductions to third parties. A dedicated registry would track the projects and the transfers. The draft law is still in legislative process after it was submitted to Congress in January 2020.

China

In the past year, China has focused on preparing the power sector for the ETS, as well as finalizing the MRV and accounting requirements for its national carbon market. The Chinese government issued a notice on May 27, 2019 to regional governments requesting them to submit lists of power plants that meet the threshold for inclusion in the national ETS in preparation for the simulation phase for the power sector. Based on this information, the government released a draft plan on September 30, 2019 for allocating emissions allowances to the power sector to encourage generation from the most efficient fossil fuel power plants.³⁸ This draft serves as a basis for refining the allocation plan for the upcoming simulation phase of the Chinese national ETS. At the end of December 2019, the process for the reporting and verification of 2019 emissions data and the establishment of a list of key emission entities in the power generation industry was outlined.³⁹

More broadly, China is laying the foundation for its MRV requirements. In December 2019, the “Interim administration on accounting treatment of ETS”⁴⁰ defined the accounting principles and disclosure requirements of carbon allowances and China Certified Emission Reductions (CCERs). Additionally, it lays the foundation for further clarifying the tax treatment and audit requirements of enterprises

participating in the national ETS. A second notice⁴¹ outlines reporting and verification obligations for the manufacturing industry and domestic aviation for 2019 emissions. This could facilitate their gradual inclusion into the national ETS. Finally, the Chinese government rolled out a China-ETS Allowance Allocation and Management Training Series in 31 provinces to build stakeholder capacity and readiness.⁴²

While the rules for the national ETS are still under development, the eight Chinese ETS pilots continue to expand and refine their systems. Beijing adjusted benchmark values for power generation enterprises to increase stringency and released a notice on March 16, 2020 requiring 14 airlines to submit their emissions data,⁴³ which could indicate that it intends to bring them into the Beijing pilot ETS. Guangdong’s 2019 allocation plan, released in November 2019, expands auctioning from two MtCO₂e to five MtCO₂e. Equally, it expands benchmarking⁴⁴ to co-generation and refines the benchmarks for the iron and steel, power, cement, paper, and civil aviation sectors.⁴⁵ Hubei’s 2018 allocation plan came out in July 2019 and imposes a tighter allocation rule, expands coverage to the water supply sector, and changes the allocation method of heat and cogeneration from benchmarking to one based on historical intensity. In 2019, the Tianjin pilot ETS began auctioning and expanded to cover enterprises from the building materials, papermaking and aviation sectors. In the Chongqing pilot ETS, allowance prices grew tenfold from nearly CNY4/tCO₂e (US\$1/tCO₂e) to CNY38/tCO₂e (US\$5/tCO₂e) due to an increase in the cap reduction factor. In the Shenzhen pilot ETS, the price rose from CNY4/tCO₂e (US\$1/tCO₂e) to CNY17/tCO₂e (US\$2/tCO₂e) following increased production and a lower surplus of allowances.⁴⁶

38 Source: Government of China, *Notice on holding a series of training courses on carbon market quota allocation and management*, September 25, 2019, http://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/201909/t20190930_736483.html.

39 Source: Government of China, *Notice on Doing a Good Job in the 2019 Annual Carbon Emission Report and Verification and Submitting the List of Key Emission Units in the Power Generation Industry*, December 27, 2019, http://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202001/t20200107_757969.html?keywords=.

40 Source: Government of China, *Notice on Printing and Distributing the Interim Provisions on Accounting Treatment of Carbon Emission Trading*, December 25, 2019, http://www.gov.cn/xinwen/2019-12/25/content_5463857.htm.

41 Source: Government of China, *Notice on Doing a Good Job in the 2019 Annual Carbon Emission Report and Verification and Submitting the List of Key Emission Units in the Power Generation Industry*, December 27, 2019, http://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202001/t20200107_757969.html?keywords=.

42 http://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/201909/t20190930_736483.html

43 Source: Beijing Municipal Ecology and Environment Bureau, *Notice of the Beijing Municipal Bureau of Ecology and Environment on the announcement of the list of key carbon emission units and reporting units in Beijing in 2019*, March 16, 2020, <http://sthjj.beijing.gov.cn/bjhrb/index/xxgk69/zfxgk43/fdzdgknr2/hbjfw/1745093/index.html>.

44 In this report, benchmarking refers to the use of benchmarks to determine the level of free emission allowances to be allocated to entities covered under a carbon pricing initiative.

45 Source: Guangzhou Carbon Emissions Exchange, *Analysis of the Implementation Plan of the Carbon Emission Allowance Allocation of Guangdong Province in 2019*, November 14, 2019, <http://www.cnemission.com/article/jydt/scyj/201911/20191100001811.shtml>.

46 Prices on April 1, 2019 compared to prices on April 1, 2020.

European Union

In 2019, policymakers worked on implementing provisions in line with the revised ETS Directive ahead of the next trading phase (2021–2030). In the past year, new legislation was adopted on the carbon leakage list, free allocation rules, the Innovation Fund, auctioning, MRV and accreditation, and the Union Registry.

On January 1, 2019, the market stability reserve (MSR)—the instrument to address the supply–demand imbalance of allowances in the EU ETS and improve its resilience against future shocks—became operational. In 2019, 397 million allowances that were intended for auctions were placed in the MSR, thereby reducing the supply of allowances in the EU ETS market. From January to August 2020, another 265 million allowances are due to be placed in the reserve. Allowances held in the MSR are not permanently withdrawn from the market, although from 2023, the total number of allowances in the MSR is limited to the auction volume of the previous year. The introduction of the reserve has helped stabilize the EUA price around €25/tCO₂e (US\$27/tCO₂e) over 2019, after increasing from €5–10/tCO₂e (US\$5–11/tCO₂e) over the previous two years. However, the economic downturn caused by COVID-19 has seen a drop in EUA prices in the first quarter of 2020 to €17/tCO₂e (US\$19/tCO₂e).

Following its departure from the EU on January 31, 2020, the UK effectively also withdrew from the EU ETS. However, during the transition period until the end of 2020, the UK still participates in the EU ETS.⁴⁷ In early February 2020, the European Commission

published a negotiating mandate to begin talks with the UK on a deal governing post-Brexit relations. The mandate encourages the Parties to consider linking a UK national ETS with the EU ETS.⁴⁸ Linking would need to be based on conditions agreed within the EU to ensure a level playing field and the integrity of the EU ETS.

As part of the EU's Green Deal in line with the EU's commitment to reach carbon-neutrality by 2050, as enshrined in the proposed European climate law⁴⁹, the Commission will review and propose to revise where necessary all relevant climate-related policy instruments by June 2021. This includes the EU ETS and a possible extension of emissions trading to new sectors. Moreover, discussions have started on introducing a carbon border adjustment mechanism for selected sectors to reduce the risk of carbon leakage and a legislative proposal has been planned for mid-2021.⁵⁰ Sectors would include those traditionally vulnerable to carbon leakage, such as the steel industry. The carbon border adjustment would form an alternative to current measures—free allocation and compensation for indirect carbon costs in electricity prices—of addressing the risk of carbon leakage due to the EU ETS. Various options could include a carbon tax on selected products, a new carbon customs duty or tax on imports, or the extension of the EU ETS to imports.⁵¹ Methodological considerations for implementing a border adjustment mechanism could be similar to those already existing as part of the EU ETS, i.e. an adjustment based on benchmarking. The European Commission will also look at alternative approaches, which includes taking into account the interaction of the carbon content of products with existing and future climate policies.

47 Source: European Commission, *Lifting the Suspension of UK-Related Processes in the Union Registry of the EU ETS*, January 31, 2020, https://ec.europa.eu/clima/news/lifting-suspension-uk-related-processes-union-registry-eu-ets_en.

48 Source: European Commission, *Council Decision - Authorising the Opening of Negotiations for a New Partnership with the United Kingdom of Great Britain and Northern Ireland*, February 3, 2020, <https://ec.europa.eu/info/sites/info/files/communication-annex-negotiating-directives.pdf>.

49 Source: European Commission, *European climate law – achieving climate neutrality by 2050*, accessed May 13, 2020, <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12108-Climate-Law>.

50 Source: European Commission, *The European Green Deal*, December 11, 2019, https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf.

51 Source: European Commission, *EU Green Deal (Carbon Border Adjustment Mechanism)*, March 4, 2020, <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12228-Carbon-Border-Adjustment-Mechanism>.

Germany

On December 20, 2019, the Fuel Emissions Trading Act came into effect in Germany, establishing a national ETS for the heat and road transport sectors—which are currently not covered by the EU ETS—by putting a price on fuel suppliers starting in January 1, 2021.⁵² This is part of a wider national climate package adopted to help meet Germany's 2030 climate targets and its 2050 carbon neutrality target. Other planned measures include the phase-out of coal-fired power plants by 2038 in combination with cancelling EU ETS allowances corresponding to the emission reductions from shutting down these power plants.⁵³

The national ETS will be phased in gradually with a fixed price on emission allowances from 2021 to 2025. From 2021, the price will be set at €25/tCO₂e (US\$27/tCO₂e) and continuously rise to €55/tCO₂ (US\$60/tCO₂) in 2025.⁵⁴ In 2026, auctions will be introduced alongside a price corridor between €55/tCO₂e (US\$60/tCO₂e) and €65/tCO₂e (US\$71/tCO₂e). Whether a price corridor should be applied for 2027 onwards will be decided in 2025 based on a review of the system.⁵⁵ These prices are higher than the initial prices in the adopted Fuel Emissions Trading Act that started at €10/tCO₂e (US\$11/tCO₂e) in 2021. The increased prices are a result of negotiations between federal level and state governments in Germany. The federal government published a draft law to amend the Fuel Emissions Trading Act in February 2020, which is still in legislative process.⁵⁶

Revenues from the national ETS will be used to support various climate protection measures, including incentivizing climate-friendly transport, energy-efficient buildings and rebates to compensate citizens for higher carbon costs.

Iceland

The carbon tax rate grew by 10 percent on January 1, 2020,⁵⁷ to approximately ISK4235/tCO₂e (US\$30/tCO₂e). These increases will help phase out fossil fuels in the transport sector and are part of the Climate Action Plan 2018–2030 to help Iceland efforts reach its NDC and its 2040 goal of carbon neutrality.⁵⁸

Iceland introduced an additional tax rate of ISK2500/tCO₂e (US\$18/tCO₂e) on F-gases in January 1, 2020 to encourage companies to find more environmentally friendly alternatives that could replace the use of F-gases and thereby reduce GHG emissions.⁵⁹ The tax rate has a maximum of ISK10,000 per kilogram of F-gas. The tax rate is introduced over two years with companies only having to pay 50 percent of the tax rate in 2020 and the full tax rate from 2021.⁶⁰

Indonesia

To help meet its NDC targets and foster low-carbon sustainable development, Indonesia is considering a domestic ETS for power and industry. By means of Presidential Decree Number 77 of 2018,⁶¹ Indonesia will establish a public service agency to manage environmental funds and mechanisms, including its ETS. Indonesia aims to first implement a voluntary domestic ETS for the power sector, followed by a mandatory domestic ETS. Indonesia is in the process of developing the technical and regulatory framework for the pilot ETS, including operational and procedural guidelines. The results of the pilot will be used to inform the mandatory ETS.

52 Source: Government of Germany, *Law on a National Certificate Trading for Fuel Emissions (Fuel Emissions Trading Act - SESTA)*, December 12, 2019, <http://www.gesetze-im-internet.de/belg/BjNR272800019.html>.

53 Source: Government of Germany, *Ending coal-generated power*, accessed May 13, 2020, <https://www.bundesregierung.de/breg-en/news/kohleausstiegsgesetz-1717014>.

54 Source: Government of Germany, *Price Basis for CO₂ Price Stands*, December 19, 2019, <https://www.bundesregierung.de/breg-de/themen/klimaschutz/nationaler-emissionshandel-1684508>.

55 Source: Government of Germany, *Draft Law on National Certificate Trading for Fuel Emissions (Fuel Emissions Trading Act - BEHG)*, November 4, 2019, https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Glaeserne_Gesetze/19_Lp/behg_gesetz/Entwurf/behg_gesetz_bf.pdf.

56 Source: Government of Germany, *Draft Bill for a Law Amending the Fuel Emissions Trading Act*, February 28, 2020, <https://www.bmu.de/gesetz/referentenentwurf-eines-gesetzes-zur-aenderung-des-brennstoffemissionshandelsgesetzes/>.

57 Source: Icelandic Parliament, *Act on Amendments to Various Laws Relating to the Budget for 2019*, December 21, 2018, <https://www.althingi.is/altext/stjt/2018.138.html>.

58 Source: Government of Iceland, *Iceland Launches New Climate Strategy, Boosting Efforts to Reach Paris Goals*, September 10, 2018, <https://www.government.is/news/article/?newsid=c7ab2ec0-b515-11e8-942c-005056bc4d74>.

59 Source: Ministry of Finance and Economic Affairs (Iceland), *Tax Changes in 2020*, December 30, 2019, <https://www.stjornarradid.is/efst-a-baugi/frettir/stok-frett/2019/12/30/Skattabreytingar-i-byrjun-ars-2020/>.

60 Source: Government of Iceland, *A Bill to the Law on the Amendment of Various Laws Regarding the Budget for 2020*, 2019, <https://www.althingi.is/altext/150/s/0002.html>.

61 Source: Government of Indonesia, *Presidential Regulation (PERPRES) Concerning Management of Environmental Funds*, September 18, 2018, <https://peraturan.bpk.go.id/Home/Details/94707/perpres-no-77-tahun-2018>.

Ireland

Ireland's carbon tax increased by €6/tCO₂ (US\$7/tCO₂) to €26/tCO₂ (US\$29/tCO₂), keeping on track to reach €80/tCO₂ (US\$87/tCO₂) in 2030 as set out in the government's Climate Action Plan.⁶² This increase also follows the advice of the Climate Change Advisory Council that an increase in the carbon price is essential to meet Ireland's climate targets.⁶³ The price increase applied as of October 9, 2019 for transport fuels and will be effective for other fuels from May 1, 2020. The price increase is expected to raise €90 million (US\$98 million) in revenues in 2020 and will be redistributed to protect vulnerable energy consumers and to investments that facilitate the low-carbon transition.

Korea, Republic of

Following the start of the second phase of the Korea ETS on January 1, 2018, the first regular auctions in the Korea ETS were held early 2019. The 30 percent purchase limit for single entities was lowered to 15–30 percent of total auction volume depending on the number of bids received from the third auction onwards. This measure aims to dampen the carbon price and increase the number of successful bidders following a rapid price increase in the first two auctions; a small number of power generation companies with high bids obtained almost all allowances as there is a shortage in that sector.⁶⁴ An auction reserve price also applies, which is based on a combination of the average prices over the past three months, the last month and last three days prior to the auction. To further improve market liquidity, Korea

announced banking limits for allowances in May 2019 and restricted total borrowing activity levels. The government also enabled financial institutions to participate in the Korean ETS market as of June 2019 as designated market makers that trade from a government-held reserve of five million allowances. Two financial institutions have been designated as market makers, with their designation valid until the end of 2020, after which their market maker status has to be renewed annually.⁶⁵ Despite one of the first countries suffering from the COVID-19 pandemic, the ETS price has not been affected yet as of April 1, 2020, sitting around KRW40,000/tCO₂e (US\$33/tCO₂e) since the start of 2020, a 50 percent increase compared to a year ago. This suggests the economic downturn has not dented the demand for allowances so far as installations have yet to determine how many allowances they need to cover their 2019 emissions.

In October 2019, the Korean government announced its first regulatory changes for the third phase (2021–2025). Key reforms include a tighter ETS cap and the use of benchmarks will be increased from 40 percent to 70 percent. Auctioning will also increase from 3 percent to at least 10 percent. A limited use of international offsets (See Section 3 for more information) will also be allowed after 2020.⁶⁶ Leading up to the start of the third phase, several new amendments to improve the Korea ETS legislation were adopted in March 2020 that will enter into force on June 1, 2020. These include clarifying and simplifying the administration on free allocation, and reaffirming only covered entities and designated financial institutions can participate in the Korea ETS market.⁶⁷

62 Source: Government of Ireland, *The Budget in Brief - A Citizen's Guide to Budget 2020*, 2019, <https://assets.gov.ie/35763/9206518894af4256b111a078e01a84aa.Budget%20in%20Brief%20Guide>.

63 Source: Government of Ireland, *Budget 2020, Giving Ireland a Sustainable Future*, August 10, 2019, <https://www.dccae.gov.ie/en-ie/news-and-media/press-releases/Pages/-Budget-2020-Giving-Ireland-a-Sustainable-Future.aspx>.

64 Source: Government of the Republic of Korea, *Regulations on Additional Allocation of Allowances for Paid Allocation and Market Stabilization Measures*, March 3, 2019, <http://www.law.go.kr/LSW/admRulLsInfoP.do?admRulSeq=2100000176738>.

65 Source: Government of the Republic of Korea, *Announcement on the Date of Designation of Market Creator for the First Implementation Year*, March 3, 2019, <http://www.law.go.kr/LSW/admRulLsInfoP.do?admRulSeq=2100000176739#AJAX>.

66 Source: Government of the Republic of Korea, *Greenhouse Gas Emission Trading System*, 2020, <http://www.me.go.kr/home/web/board/read.do?pagerOffset=0&maxPageItems=10&maxIndexPages=10&searchKey=&searchValue=&menuId=10362&orgCd=&condition.hideCate=1&boardId=1160080&boardMasterId=649&boardCategoryId=1&decorator=>.

67 Source: Government of the Republic of Korea, *Greenhouse Gas Emissions Allocation and Transaction Act*, March 4, 2020, <http://www.law.go.kr/LSW//lInfoP.do?lSeq=215913&ancYd=20200324&ancNo=17104&efYd=20200601&nwjoYnInfo=N&efGubun=Y&chrClsCd=010202&ancYnChk=0#0000>.

Latvia

On November 14, 2019, Latvia raised its carbon tax rates as part of a broader reform of its Natural Resources Tax Law.⁶⁸ The rate increase is part of a set of additional measures the government introduced to meet its GHG reduction targets and bring the carbon price for non-ETS facilities better in line with installations in the EU ETS.⁶⁹ Beginning on January 1, 2020 rates increased from €4.5/tCO₂e (US\$5/tCO₂) to €9/tCO₂e (US\$10/tCO₂) and will climb to €12/tCO₂e (US\$13/tCO₂) in 2021 and €15/tCO₂e (US\$16/tCO₂) in 2022. An additional clause stipulates that the share of carbon tax revenue to be credited to the state basic budget will increase from 60 percent to 100 percent. Previously 40 percent of the revenue was allocated to the municipality where the revenue was generated.

Luxembourg

Luxembourg announced its plan to introduce a €20/tCO₂e (US\$22/tCO₂) carbon tax in 2021 as part of the National Integrated Energy and Climate Plan to meet Luxembourg's GHG emission reduction target of 55 percent below 2005 levels in the sectors not covered by the EU ETS.⁷⁰ The tax should rise to €25/tCO₂e (US\$27/tCO₂) in 2022 and €30/tCO₂e (US\$33/tCO₂) in 2023. Rates will be regularly reviewed to ensure alignment with the Paris Agreement. The expected revenues could be split between measures to combat climate change and social measures, such as a tax credit. The National Integrated Energy and Climate Plan is set to be finalized in the course of the year, after which the adoption of the necessary regulations will follow.⁷¹

Mexico

On January 1, 2020, the Mexico pilot ETS started operation as part of a two-phase process to gradually establish a fully-fledged ETS for promoting cost-effective emission reductions without harming the international competitiveness of covered sectors.⁷² The pilot ETS covers power, oil and gas, and industrial sectors, which account for approximately 40 percent of the country's GHG emissions. The ETS operates alongside Mexico's carbon tax, which covers CO₂ emissions from all sectors. Entities with annual emissions from direct sources equal or greater than 100 ktCO₂ during 2016-2019, or in any year from the launch of the pilot, will be covered under the pilot ETS. The first phase consists of a three-year period where the pilot ETS will test system design in 2020 and 2021, followed by one year of transition in 2022 to the fully operational ETS. The purpose of the first pilot phase is to enhance the quality of emissions data and build capacity in emissions trading for covered entities. The input from this phase will be used to improve the design of the ETS before it becomes fully operational in the second phase—planned for 2023.

The Mexico ETS is designed to not have an economic impact on regulated entities in its pilot phase. However, in the case of noncompliance, entities lose the opportunity to bank unused allowances into the next year of the pilot phase. Furthermore, noncompliant entities will see their free allowances reduced at the start of the operational phase. The reduction will be at the rate of two allowances for each insufficient allowance the entity failed to surrender during the pilot phase. In addition, the Mexican government has been working on

68 Source: Government of Latvia, *Natural Resources Tax Law*, January 1, 2020, <https://likumi.lv/ta/id/124707>.

69 Source: Government of Latvia, *Changes in the Application of Natural Resources Tax*, January 1, 2020, <https://lvportals.lv/skaidrojumi/311872-izmainas-dabas-resursu-nodokla-piemerosana-2020>.

70 Source: Government of Luxembourg, *Overview of the Integrated National Energy and Climate Plan*, December 6, 2019, <https://gouvernement.lu/dam-assets/documents/actualites/2019/12-d%C3%A9cembre/PNEC-synthese.pdf>.

71 Source: Government of Luxembourg, *The National Integrated Energy and Climate Plan (PNEC)*, September 12, 2019, <https://environnement.public.lu/fr/actualites/2019/12/pnec.html>.

72 Source: Government of Mexico, *Agreement Laying down the Preliminary Bases of the Test Program of the Emissions Trading System*, October 1, 2019, https://www.dof.gob.mx/nota_detalle.php?codigo=5573934&fecha=01%2F10%2F2019&fbclid=IwAR38nx6uLkhGVenrkXZzdhrk93vkVKOooloaBaedoDSh2ytDJH6K_1dWUo.

various infrastructure elements needed for the operationalization of its ETS: the system's registry, which is expected to be completed by the second half of 2020, offset protocols, and the design of an auction mechanism.

Montenegro

In December 2019, Montenegro adopted the Law on Protection from the Negative Impacts of Climate Change.⁷³ This law introduces a regulatory framework to limit GHG emissions from power and industry sectors and brings Montenegro closer to its accession to the EU. As part of fulfilling its mandate under this new regulatory framework, Montenegro adopted a regulation to operationalize its ETS on February 6, 2020,⁷⁴ which details several design elements similar to the EU ETS, including a cap declining annually from 2020 until 2030, which in the Montenegro ETS is set at 1.5 percent per year. Other similar design elements include free allocation for entities in specific sectors to limit the risk of carbon leakage, use of auctioning with a minimum price of €24/tCO₂e (US\$26/tCO₂e), and a stabilization reserve for allowances that are not sold by auction. Revenues will be allocated into the Environmental Protection fund and will be used to protect and improve environment, renewable energy projects, as well as stimulating innovation in line with the Smart Specialization Strategy of Montenegro. The start date of the ETS has yet to be announced.

Netherlands

In June 2019, the Netherlands government presented a National Climate Agreement,⁷⁵ which included the support for further strengthening of the EU ETS and contains two measures of national carbon pricing. In the climate agreement a carbon price

floor for electricity generators covered under the EU ETS is agreed upon, including facilities in the power sector and electricity generators, including those in the industry sector. The carbon price floor aims to provide long-term certainty on the carbon costs electricity producers face and to ensure these costs are considered in investment decisions.⁷⁶ If EUA prices are below the carbon floor price, covered facilities will be required to pay the difference between the two in the form of a tax, in addition to meeting their compliance obligations under the EU ETS. The floor price starts at €12/tCO₂ (US\$13/tCO₂) in 2020, rising annually to €32/tCO₂ (US\$35/tCO₂) in 2030. With EUA prices around €20–25/tCO₂e (US\$22–27/tCO₂e) in 2019 and projections used for establishing the floor price rates, the government expects electricity generators will not face any carbon costs from the floor price in the first few years of its implementation.⁷⁷ The bill for the carbon price floor is still in the legislative process, and if passed, it will enter into force a day after the final version has been officially published.⁷⁸

The Dutch government announced the details of a carbon tax for industry starting in 2021 in the National Climate Agreement.⁷⁹ The carbon tax would target all Dutch installations subject to the EU ETS, as well as waste incinerators currently not included in the EU ETS to provide them with a stronger incentive to reduce their emissions. The level of the carbon tax is to be determined, but according to initial estimates the tax would start at €30/tCO₂ (US\$33/tCO₂e) and would rise to €125–150/tCO₂ (US\$137–164/tCO₂e) in 2030. Installations would only have to pay the carbon tax if their emissions exceed their baseline based on benchmarks and a national reduction factor needed to reach the Dutch targets for the industry. The carbon tax comes on top of their compliance obligations in the EU ETS.

73 Source: Government of Montenegro, *Law on Protection from the Negative Impacts of Climate Change*, December 2019, <http://zakoni.skupstina.me/zakoni/web/dokumenta/zakoni-i-drugi-akti/868/2162-13139-27-2-19-1-5.pdf>.

74 Source: Government of Montenegro, *Regulation about the Activities Relating to the Activities Emitted by Gases with the Effect of the Greenhouse for Which the Emission Permit Is Issued Greenhouse Effects*, February 6, 2020, <http://dopuna.ingpro.rs/1GLASILA/CG8-2020.pdf>.

75 Source: Government of the Netherlands, *National Climate Agreement*, May 2020, <https://www.klimaataakkoord.nl/documenten/publicaties/2019/06/28/national-climate-agreement-the-netherlands>.

76 Source: Government of the Netherlands, *Amendment of the Tax on Environmental Basis and the Minimum CO₂ Price Act Electricity Generation - Explanatory Memorandum*, 2019, <https://www.tweedekamer.nl/downloads/document?id=f499c5cd-111b-457a-824f-bed3fe30e73b&title=Memorie%20van%20toelichting.pdf>.

77 Source: Government of the Netherlands, *Amendment of the Tax on Environmental Basis and the Minimum CO₂ Price Act Electricity Generation - Note on Reason of the Report*, September 13, 2019, <https://www.tweedekamer.nl/downloads/document?id=5a8f7d35-d058-4cac-a881-61037033b119&title=Nota%20naar%20aanleiding%20van%20het%20verslag.pdf>.

78 Source: Government of the Netherlands, *Wet Minimum CO₂-Prijen Elektriciteitsopwekking*, 2020, https://www.eerstekamer.nl/wetsvoorstel/35216_wet_minimum_co2_prijen.

79 Source: Government of the Netherlands, *Climate Agreement*, June 28, 2019, <https://www.government.nl/documents/reports/2019/06/28/climate-agreement>.

The benchmarks will be based on the EU ETS free allocation benchmarks. Covered installations can also cooperate to reduce their emissions below their designated baseline.

New Zealand

The New Zealand government continues to work on improvements of its ETS.⁸⁰ On July 31, 2019, the New Zealand government announced final decisions to strengthen its ETS and help New Zealand meet its climate change and NDC targets.⁸¹ One of the decisions undertaken by the government is to phase-out free allocations for the industrial sector. Between 2021 and 2030, the government plans to reduce free allocation by at least 1 percent per year. Between 2031 and 2040, this reduction is set to increase to 2 percent annually, and to 3 percent between 2041 and 2050. The government will also cancel New Zealand-issued Assigned Amount Units (AAUs), which are still eligible for compliance use in the New Zealand ETS, and replace them with an equivalent number of New Zealand Units (NZUs). All other units held from the first commitment period of the Kyoto Protocol will also be cancelled as these have not been eligible for surrender since May 31, 2015.⁸² The previous government had decided to make this change in 2013,⁸³ but it has not been implemented so far. Changes to penalties and compliance are also planned as part of the reform.

The New Zealand government announced in late 2019 that it will put a price on GHG emissions from the agricultural sector, beginning in 2025.⁸⁴ GHG emissions from fertilizers are likely to be covered under the New Zealand ETS at the processor level. For livestock emissions, a separate alternative pricing mechanism will be developed at the farm

level, together with the agriculture sector. However, if this has not made enough progress by 2022 for implementation in 2025, then emissions will be priced at the processor level and likely through the New Zealand ETS. These reform decisions are expected to be enacted in mid-2020.

Norway

Norway increased the full rate of its carbon tax from NOK508/tCO₂e (US\$49/tCO₂e) in 2019 to NOK544/tCO₂e (US\$53/tCO₂e) in 2020. Initially, the government removed certain exemptions for natural gas and liquefied petroleum gas for certain industrial processes as of January 1, 2020 to strengthen its climate policy and improve the cost-effectiveness of its carbon tax.⁸⁵ However, in relation to the COVID-19 disruption the Parliament has decided to reinstate the exemption for natural gas and liquefied petroleum as of April 1, 2020.⁸⁶ The intention is to remove the exemption in steps of 25 percent per year between 2021 and 2024.⁸⁷ In addition, as of January 1, 2020, the exemptions for fuels used on fishing vessels was also removed, but to facilitate a low-carbon transition of the fishing sector, temporary compensation measures were introduced. In 2020, the effective carbon tax rate for the fishing sector after compensation is equal to the original reduced rate of 2019 after taking inflation into account. The compensation levels are to be reduced in a stepwise manner over time.

Portugal

Portugal's government is phasing out certain fossil fuel exemptions under its tax on energy and petroleum products—which includes a carbon tax, aligning its fiscal policy with the energy transition

80 Source: Ministry of Environment (New Zealand), *Reforming the New Zealand Emissions Trading Scheme: Proposed Settings*, February 28, 2020, <https://www.mfe.govt.nz/consultations/nzets-proposed-settings>.

81 Source: Ministry of Environment (New Zealand), *Proposed Improvements to the New Zealand Emissions Trading Scheme*, December 19, 2019, <https://www.mfe.govt.nz/climate-change/proposed-improvements-nz-ets>.

82 Source: Government of New Zealand (EPA), *Kyoto Units from the First Commitment Period*, 2020, <https://www.epa.govt.nz/industry-areas/emissions-trading-scheme/market-information/kyoto-units-from-the-first-commitment-period/>.

83 Source: Government of New Zealand, *New Zealand Emissions Trading Scheme tranche two: cancellation and replacement of Kyoto units in private accounts*, June 19, 2019, <https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/kyoto-units-cabinet-paper.pdf>.

84 Source: Ministry of Environment (New Zealand), *Action on Agricultural Emissions*, August 13, 2019, <https://www.mfe.govt.nz/consultation/action-agricultural-emissions>.

85 Source: Government of Norway, *Changes in CO₂ Tax - the Government's Climate Policy Is Strengthened and Becomes More Cost-Effective*, 2019, <https://www.statsbudsjettet.no/Statsbudsjettet-2020/Satsinger/?pid=93114#hopp>.

86 Source: Government of Norway, *Recommendation from the Finance Committee on Amendments to the State Budget 2020 under KD, JBD, KMD, ASD, LMD, SD and FIN*, April 2020, <https://www.stortinget.no/no/Saker-og-publikasjoner/Vedtak/Vedtak/Sak/?p=79329>.

87 Source: Government of Norway, *Additional financial measures to mitigate the economic effects of the coronavirus crisis*, April 2020, <https://www.regjeringen.no/en/aktuelt/additional-financial-measures-to-mitigate-the-economic-effects-of-the-coronavirus-crisis/id2696548/>.

and its decarbonization objectives.⁸⁸ Revenues will be used for decarbonization and other climate action measures. These developments coincide with the almost doubling of the full carbon tax rate in 2020 from €12.74/tCO₂e (US\$13/tCO₂e) to €23.619/tCO₂e (US\$26/tCO₂e), as the carbon tax rate is tied to the average EU ETS price in the preceding year.⁸⁹ Specifically for coal-fired electricity generation and co-generation facilities that participate in the EU ETS, their carbon tax rate for 2020 is based on 50 percent of the difference between the full carbon tax rate and a target carbon price of €25/tCO₂e, resulting €0.69/tCO₂e (US\$1/tCO₂e) on top of the EU ETS price they face. In addition, non-ETS emitters are taxed for the fuel oil and natural gas used to generate electricity in 2020 at 25 percent and 10 percent of the carbon tax rate, respectively, whereas they were previously fully exempted.⁹⁰ The government will also reassess other carbon tax exemptions.

South Africa

South Africa's carbon tax went into effect on June 1 2019. The first phase is from 2019-2022 and the next phase is planned for after 2022. The 2020 carbon tax rate is R127/tCO₂e (US\$7/tCO₂e)⁹¹ and will increase until 2022 by the amount of consumer price inflation plus two percent annually. After 2022, only inflationary adjustments are envisioned. The tax will apply to industry, power, buildings and transport sectors irrespective of the fossil fuel used. Exemptions and offset allowances vary by sector.⁹²

To ensure a cost-effective transition, companies could receive tax-free allowances ranging from 60 to 95 percent of their emissions, reducing the effective carbon tax rate to between R6/tCO₂e (US\$0.3/tCO₂e) and R48/tCO₂e (US\$1.20/tCO₂e). The basic tax-free allowance of 60 percent applies to all taxpayers and companies can use carbon offsets as a flexibility mechanism to increase their tax-free allowances by either 5 or 10 percent of their emissions (see section 3.3.3 for more information on the offset regulations).⁹³ Companies also receive an additional tax-free allowance of 10 percent if they are trade exposed and another 10 percent if they outperform their respective industry's GHG emission intensity benchmarks. The government is currently in the process of legislating regulations for these two provisions. Companies can increase their tax-free allowances further by 5 percent if they comply with the carbon budget information requirements of the Department of Environmental Affairs.

Sweden

On August 1, 2019, Sweden eliminated or reduced exemptions to its carbon tax as part of a set of measures to reach its climate target of net zero emissions by 2045.⁹⁴ The partial exemption for diesel used in mining—which stood at 40 percent of the carbon tax rate—was abolished. In addition, the exemption for fuels used to generate heat in cogeneration facilities that fall under the EU ETS is reduced from 89 percent to 9 percent if this heat is not used in industrial manufacturing processes. This is in line with other heat generation plants in the EU ETS. Heat generated by facilities outside of the EU ETS remain taxed at the full carbon tax rate, which sits at SEK1190/tCO₂ (US\$119/tCO₂) in 2020.⁹⁵

88 Source: Government of Portugal, *State's Budget 2020 Report*, December 2019, <https://www.oe2020.gov.pt/wp-content/uploads/2019/12/Relatorio-Orcamento-do-Estado-2020.pdf>.

89 Source: Government of Portugal, *Republic Diary - 1st Series - Finance*, February 14, 2020, <https://dre.pt/application/conteudo/129208006>.

90 Source: Government of Portugal, *Budget Law n° 2/2020 - Republic Diary - 1st Series - art. 349*, March 31, 2020.

91 Source: Government of South Africa, *Chapter 4: Revenue Trends and Tax Proposals*, 2020, <http://www.treasury.gov.za/documents/national%20budget/2020/review/Chapter%204.pdf>.

92 Source: Ibid.

93 Source: Government of South Africa, *Gazetting of the Carbon Offsets Regulations in Terms of the Carbon Tax Act and Related Draft Regulations for Public Comment*, December 2, 2019, http://www.treasury.gov.za/comm_media/press/2019/20191202%20Media%20statement%20-%20Carbon%20Tax%20Act%20Regulations.pdf.

94 Source: Ministry of Finance (Sweden), *The Tax and Customs Department Increased Energy Tax and Carbon Dioxide Tax on Fuels for Certain Uses and Increased Tax on Chemicals in Certain Electronics*, 2019, <https://www.regeringen.se/490aef/contentassets/e9aac44d7310494da86ab1b49b5bc1ba/hojd-energiskatt-och-koldioxidskatt-pa-branslen-vid-viss-anvandning-samt-hojd-skatt-pa-kemikalier-i-viss-elektronik.pdf>.

95 Source: Government of Sweden, *Sweden's Carbon Tax*, February 25, 2020, <https://www.government.se/government-policy/taxes-and-tariffs/swedens-carbon-tax/>.

Switzerland

On January 1, 2020, the linking of the Swiss and EU ETS came into force.⁹⁶ Ratification of the agreement by the EU and Switzerland was announced on December 12, 2019 and followed legislative revisions required for the Switzerland ETS to be compatible with the EU ETS and comply with the agreement. The linkage follows a ten-year negotiation process. With the linking agreement now in effect, covered entities in the Switzerland ETS will be able to use allowances from the EU ETS for compliance, and vice versa. However, the two systems will run separate auctions. Leading up to and following the linkage, the price of allowance in the Switzerland ETS increased towards the price of EUAs, more than doubling from CHF7/tCO₂e (US\$8/tCO₂e) to CHF18/tCO₂e (US\$19/tCO₂e) in 2019. However, the Swiss allowance clearing prices remained below EUA prices leading to a cancellation of the first March auction.⁹⁷ The other auction in March was also cancelled as Switzerland closed its emission trading registry until the mid-May 2020 due to COVID-19. As installations could no longer surrender allowances in the registry, the compliance deadline was also extended until the end of August 2020.

Ukraine

On December 12, 2019, the government adopted the MRV framework law,⁹⁸ which enters into force in spring 2020. Large industrial installations are required to start monitoring their emissions as of January 1, 2021. Before establishing ETS legislation, Ukraine intends to first collect at least three years of data from its MRV system.

United Kingdom

Following its departure from the EU on January 31, 2020, the UK committed to participate in the EU ETS during the transition period until the end of 2020. UK installations will therefore continue to face compliance obligations for their 2019 and 2020 emissions.

In February 2020, the UK published its approach to negotiating the future relationship with the EU⁹⁹, in which the UK stated that its future carbon pricing initiative will support its net zero by 2050 target. It is also considering a link between any future UK ETS and the EU ETS, like the Swiss-EU ETS linking model, if it suits both sides' interests. This would allow allowances to be exchanged between both systems.¹⁰⁰ However, fallback options, such as a standalone UK ETS and a long-term carbon tax, are also being considered. The UK government has therefore legislated provisions for both a UK ETS and carbon tax as part of the Financial Bill 2020.¹⁰¹

United States

At the federal level, lawmakers presented a variety of bills over the past year for an ETS or a carbon tax without any success.¹⁰² Each of these bills contains an element that would return carbon pricing revenues to citizens. So far, none of the bills have made any progress in the legislative process. The Climate Leadership Council published a bipartisan climate roadmap including a carbon dividends plan that aims to prevent carbon leakage and protects industry competitiveness by implementing a border carbon adjustment system. However, chances for federal, bipartisan carbon pricing action remains limited.¹⁰³

96 Source: European Commission, *Agreement on Linking the Emissions Trading Systems of the EU and Switzerland*, December 9, 2019, https://ec.europa.eu/commission/presscorner/detail/en/ip_19_6708.

97 Source: Swiss Emissions Trading Registry, *Welcome to the Swiss Emissions Trading Registry*, 2020, https://www.emissionsregistry.admin.ch/crweb/public/welcome.action;jsessionid=yhzn6Bg8zngV5f4mnusaEZSgwNGhkF55MATt_acU.s021000106942a?token=.

98 Source: Government of Ukraine, *About the Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions*, December 12, 2019, <https://zakon.rada.gov.ua/laws/show/377-20>.

99 Source: Government of the United Kingdom, *The Future of UK Carbon Pricing*, May 2, 2019, <https://www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing>.

100 Source: Government of the United Kingdom, *The Future Relationship with the EU - The UK's Approach to Negotiations*, February 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/868874/The_Future_Relationship_with_the_EU.pdf.

101 Source: Government of the United Kingdom, *Budget 2020 - Delivering on Our Promises to the British People*, March 11, 2020, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/871799/Budget_2020_Web_Accessible_Complete.pdf.

102 These include: Stemming Warming and Augmenting Pay Act, Raise Wages, Cut Carbon Act, Climate Action Rebate Act, America Wins Act, Energy Innovation and Carbon Dividend Act, American Opportunity Carbon Fee Act, The Healthy Climate and Family Security Act, The Market Choice Act.

103 Source: Climate Leadership Council, *Bipartisan Climate Roadmap*, February 2020, <https://clcouncil.org/Bipartisan-Climate-Roadmap.pdf>.

This is in marked contrast to extensive carbon pricing action on the subnational level as states enhance cooperation on carbon pricing. On October 1, 2019, the participating TCI jurisdictions¹⁰⁴ released a draft framework outlining basic design features of a regional ETS for CO₂ emissions from the combustion of gasoline and on-road diesel fuel in the transport sector, which could start as early as 2022. This follows a series of expert and public stakeholder consultations, as well as a variety of analyses on the benefits and costs of a regional carbon pricing initiative for transportation.

The ETS targets transport fuel suppliers that produce the covered fuels within these states, as well as suppliers that import them to those states. The program intends to auction nearly 100 percent of its allowances with revenues being returned to participating TCI states. Each state can invest the revenue as determined appropriate to achieve TCI program goals, though the draft framework contains a commitment to address equity concerns. The program will implement a minimum reserve price and include a Cost Containment Reserve (CCR), as well as an Emissions Containment Reserve (ECR). Banking of allowances will be allowed without restrictions.

On December 17, 2019, the TCI jurisdictions released a draft memorandum of understanding (MOU) with further design elements such as three-year compliance periods, interim compliance obligations and timings for regular program evaluations. The MOU is to be finalized in the spring of 2020 and will include a decision surrounding the cap, the rate of the cap's reduction over time (cap trajectory) and whether the program will accept a limited use of offsets. Each jurisdiction will decide whether to sign the final MOU and participate in the regional program. Other states would also be able to join the initiative at any time. The participating jurisdictions must develop a model rule by December 31, 2020 and adopt the necessary regulations over the course of 2021.

Participating states¹⁰⁵ in the Regional Greenhouse Gas Initiative (RGGI) adopted the post-2020 cap-and-trade regulations in 2019.¹⁰⁶ This is based on the 2017 revised Model Rule, which tightened the cap and further adjusted the ETS design. As of January 2020, New Jersey rejoined RGGI, and its first auction as a rejoined member was in March 2020.¹⁰⁷ Virginia is planning to link to RGGI by the start of 2021, and Pennsylvania intends to link to the RGGI by 2022 at the earliest.

Various US states also continue to develop their own carbon pricing initiative or strengthen their existing ones (see Table 2.2).

104 Participating states in TCI include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.

105 Participating states in RGGI include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

106 Source: RGGI, *State Statutes & Regulations*, March 19, 2019, <https://www.rggi.org/program-overview-and-design/state-regulations>.

107 Source: Government of New Jersey, *The Regional Greenhouse Gas Initiative in New Jersey*, January 28, 2020, <https://www.state.nj.us/dep/aqes/rggi.html#/>.

Table 2.2 / Key carbon pricing developments in individual US States

Jurisdiction	Type and status	Key developments
New York City	Carbon pricing being explored	As part of a local law that sets emission intensity limits for most large buildings starting in 2024, the New York City government is required to study the feasibility of a citywide ETS for the buildings sector and release its findings by 2021. ¹⁰⁸
New Mexico	Carbon pricing being explored	In November 2019, the New Mexico Climate Change Task Force released initial recommendations stating the need for New Mexico to implement an ETS for the state to reach its emissions reductions goals. New Mexico is evaluating options for a future ETS and cooperation with other states that already have implemented an ETS. ¹⁰⁹
North Carolina	Carbon pricing being explored	In October 2019, the North Carolina Department of Environmental Quality released recommendations to start evaluating how a market-based program could help the state to achieve its GHG emission reduction goals. ¹¹⁰
Oregon	ETS under consideration	After two bills proposing a cap-and-trade system failed to pass the Oregon legislature in 2019 and 2020—House Bill 2020 (HB-2020) and Senate Bill 1530 (SB-1530)—an executive order was signed by the Governor on March 10, 2020 for a “Cap and Reduce Program” for large stationary sources of emissions, transportation fuels, natural gas and other fossil fuels. ¹¹¹ No details on program design were provided by the government. The Department of Environmental Quality is required to submit a report on rulemaking and program design by May 15, 2020. The cap is in line with previous legislation requiring a 45% reduction in GHG emissions based on 1990 levels by 2035 and at least an 80% reduction by 2050. The intended start date is in 2022.
Pennsylvania	ETS under consideration	On October 3, 2019, the government signed an executive order to develop a proposal for an ETS covering the power sector, with the intention to join or link with RGGI. ¹¹² The first draft of this proposal was released on January 30, 2020 by Pennsylvania’s Department of Environmental Protection. The draft proposal is largely consistent with the system design features of the RGGI Model Rule, including the implementation of an ECR and a CCR, as well as quarterly auctions to allocate allowances. This first proposal will be going through a review and stakeholder engagement process before the release of the final ETS proposal by July 31, 2020. ^{113, 114} The earliest start date for Pennsylvania’s ETS and its linkage to RGGI is envisaged to be 2022. ¹¹⁵ Pennsylvania, as the country’s second largest natural gas producer and third largest coal producer, would be the most carbon intensive state to join the system. In addition, their inclusion in the Pennsylvania-Jersey- Maryland regional transmission grid, which includes non-RGGI states, may create some competitiveness concerns.

108 Source: Government of New York, *Local Law No. 97 of the City of New York for the Year 2019*, 2019, https://www1.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf.

109 Source: New Mexico Interagency Climate Change Task Force, *New Mexico Climate Strategy - Initial Recommendations and Status Update*, 2019, https://www.climateaction.state.nm.us/documents/reports/NMClimateChange_2019.pdf.

110 Source: Government of North Carolina, *Clean Energy Plan*, October 2019, https://files.nc.gov/ncdeq/climate-change/clean-energy-plan/NC_Clean_Energy_Plan_OCT_2019_.pdf.

111 Source: Government of Oregon, *Directing State Agencies to Take Actions to Reduce and Regulate Greenhouse Gas Emissions*, 2019, https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf.

112 Source: Government of Pennsylvania, *Executive Order – 2019-07- Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, October 3, 2019, <https://www.governor.pa.gov/newsroom/executive-order-2019-07-commonwealth-leadership-in-addressing-climate-change-through-electric-sector-emissions-reductions/>.

113 Source: Government of Pennsylvania, *CO₂ Budget Trading Program*, January 30, 2020, <http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2020/2-13-20/Draft%20PRN%20CO2%20Budget%20Trading%20Annex%20A%201-30-20.pdf>.

114 Source: Government of Pennsylvania, *Governor Wolf Takes Executive Action to Combat Climate Change, Carbon Emissions*, October 3, 2019, <https://www.governor.pa.gov/newsroom/governor-wolf-takes-executive-action-to-combat-climate-change-carbon-emissions/>.

115 Source: Government of Pennsylvania, *CO₂ Budget Trading Program*, February 13, 2020, <http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/Air%20Quality%20Technical%20Advisory%20Committee/2020/2-13-20/Draft%20PRN%20CO2%20Budget%20Trading%20Annex%20A%201-30-20.pdf>.

Jurisdiction	Type and status	Key developments
Virginia	ETS scheduled	<p>On June 26, 2019, Virginia's ETS Regulation entered into force, which set the legal basis for the Virginia CO₂ Budget Trading Program to become operational as of January 1, 2020. This legislation establishes an ETS for its power sector and facilitates participation in RGGI. However, the state's 2019 Budget Act put the implementation of the Virginia ETS on hold by preventing any state expenditure for supporting Virginia's participation in RGGI without approval by the General Assembly. Provisions in the 2019 Budget Act also prohibit the use of proceeds from a regional climate change compact such as RGGI.</p> <p>In early 2020, the Virginia legislature therefore passed the Virginia Clean Economy Act and the Clean Energy and Community Flood Preparedness Act.^{116, 117} The former operationalizes the power sector ETS with a few changes compared to the 2019 regulation, while the latter determines how revenue from ETS will be used. Because the House and Senate passes slightly different versions of the bills, they were combined into a single draft on March 5, 2020.¹¹⁸ Once signed, the current trading regulation will have to be revised to conform to the legislation.</p>
Washington State	ETS implemented (compliance suspended)	<p>The compliance requirements under the Clean Air Rule (CAR) have been suspended since December 2017, following a county court ruling. On January 16, 2020, the Washington Supreme Court partially upheld the CAR. This new ruling stated that the compliance requirements could apply to stationary sources of direct emissions but not to fuel suppliers and natural gas distributors that indirectly emit GHGs from combustion occurring farther downstream.¹¹⁹ The CAR now has to go back to the county court to determine how to separate the rule.¹²⁰</p> <p>At the same time, bills have been submitted to the Washington State legislature at the request of the governor to extend the Department of Ecology's authority to regulate indirect sources of emissions such as fuel suppliers and natural gas distributors.¹²¹ However, 2020 legislative session ended before these bills passed in March 2020. Bills will normally only be considered again from January 2021 when the 2021 legislative session starts.</p>

116 Source: Virginia Legislative Information System, *HB 1526 Electric Utility Regulation; Environmental Goals.*, 2020, <https://lis.virginia.gov/cgi-bin/legp604.exe?201+sum+HB1526>.

117 Source: Virginia Legislative Information System, *HB 22 Virginia Community Flood Preparedness Fund; Loan and Grant Program.*, 2020, <https://lis.virginia.gov/cgi-bin/legp604.exe?201+sum+HB22>.

118 Source: Virginia Legislative Information System, *Senate Bill No. 851: Floor Amendment in the Nature of a Substitute*, 2020, <https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+SB851H2>.

119 Source: Washington Supreme Court, *Slip Opinion*, January 16, 2020, <http://www.courts.wa.gov/opinions/pdf/958858.pdf>.

120 Source: Department of Ecology State of Washington, *Clean Air Rule*, January 16, 2020, <https://ecology.wa.gov/Air-Climate/Climate-change/Greenhouse-gases/Reducing-greenhouse-gases/Clean-Air-Rule>.

121 Source: Government of Washington, *Senate Bill 6628*, January 28, 2020, <http://lawfilesexternal.leg.wa.gov/biennium/2019-20/Pdf/Bills/Senate%20Bills/6628.pdf?q=20200128070804>.

Box 2.4 / Summary of selected changes in regional, national and subnational carbon pricing initiatives

Initiatives implemented in 2019:

Canada (federal backstop—fuel charge and OBPS), Nova Scotia (ETS), Newfoundland and Labrador (ETS and carbon tax), Northwest Territories (carbon tax), Prince Edward Island (carbon tax), Saskatchewan (ETS), Singapore (carbon tax), and South Africa (carbon tax).

Initiatives implemented in 2020:

Mexico (pilot ETS), New Brunswick (carbon tax).

New initiatives now scheduled for implementation in 2020/21:

Germany (ETS), Virginia (ETS).

New initiatives under consideration announced in 2019/2020:

Austria, Indonesia (ETS), Luxembourg (carbon tax), Montenegro (ETS), Pennsylvania (ETS), United Kingdom.

Initiatives under consideration that experienced new developments in the past year:

- TCI released draft design elements of its ETS.
- Ukraine has adopted its MRV framework to collect data for establishing its ETS.
- The Netherlands presented design details of its carbon price floor for electricity generators and its carbon tax for industry.

Scope changes:

- Chile carbon tax now applies to installations emitting 25,000 tCO₂ or more, as well as to those that release more than 100 tons of particulate matter into the air each year instead of installations with a thermal capacity higher than 50 megawatts.
- Hubei pilot ETS was expanded to cover the water supply sector.
- Iceland introduced an additional tax rate on F-gases.
- Norway removed carbon tax exemptions for the fishing sector and is removing the carbon tax exemption for natural gas and liquefied petroleum stepwise between 2021 and 2024.
- Portugal is phasing out carbon tax exemptions of non-ETS emitters for electricity generation using fuel oil and natural gas.
- Sweden abolished the carbon tax exemption on diesel used for mining and reduced the exemption for fuels used to generate heat in cogeneration facilities not used in industrial manufacturing processes.
- Tianjin pilot ETS was expanded to cover enterprises from the building materials, papermaking and aviation sectors.

Significant price rate changes (carbon tax only):

- Canada federal fuel charge increased from CAN\$20/tCO₂e (US\$14/tCO₂e) to CAN\$30/tCO₂e (US\$21/tCO₂e) on April 1, 2020.
- Iceland carbon tax rate increased from ISK3850/tCO₂e (US\$27/tCO₂e) to ISK4235/tCO₂e (US\$30/tCO₂e) on January 1, 2020.
- Ireland carbon tax increased by €6/tCO₂e (US\$7/tCO₂e) to €26/tCO₂e (US\$28/tCO₂e) for liquid transport fuels on October 9, 2019 and other fuels from May 1, 2020.
- Latvia carbon tax increased from €4.50/tCO₂e (US\$5/tCO₂e) to €9/tCO₂e (US\$10/tCO₂e) on January 1, 2020.
- Norway carbon tax increased its full tax rate from NOK508/tCO₂e (US\$49/tCO₂e) in 2019 to NOK544/tCO₂e (US\$53/tCO₂e) on January 1, 2020
- Portugal carbon tax almost doubled from €13/tCO₂e (US\$14/tCO₂e) to €24/tCO₂e (US\$26/tCO₂e) on January 1, 2020.
- Prince Edward Island carbon tax increased from CAN\$20/tCO₂e (US\$14/tCO₂e) to CAN\$30/tCO₂e (US\$21/tCO₂e) on April 1, 2020.
- South African carbon tax increased from R120/tCO₂e (US\$7/tCO₂e) to R127/tCO₂e (US\$7/tCO₂e) on January 1, 2020.

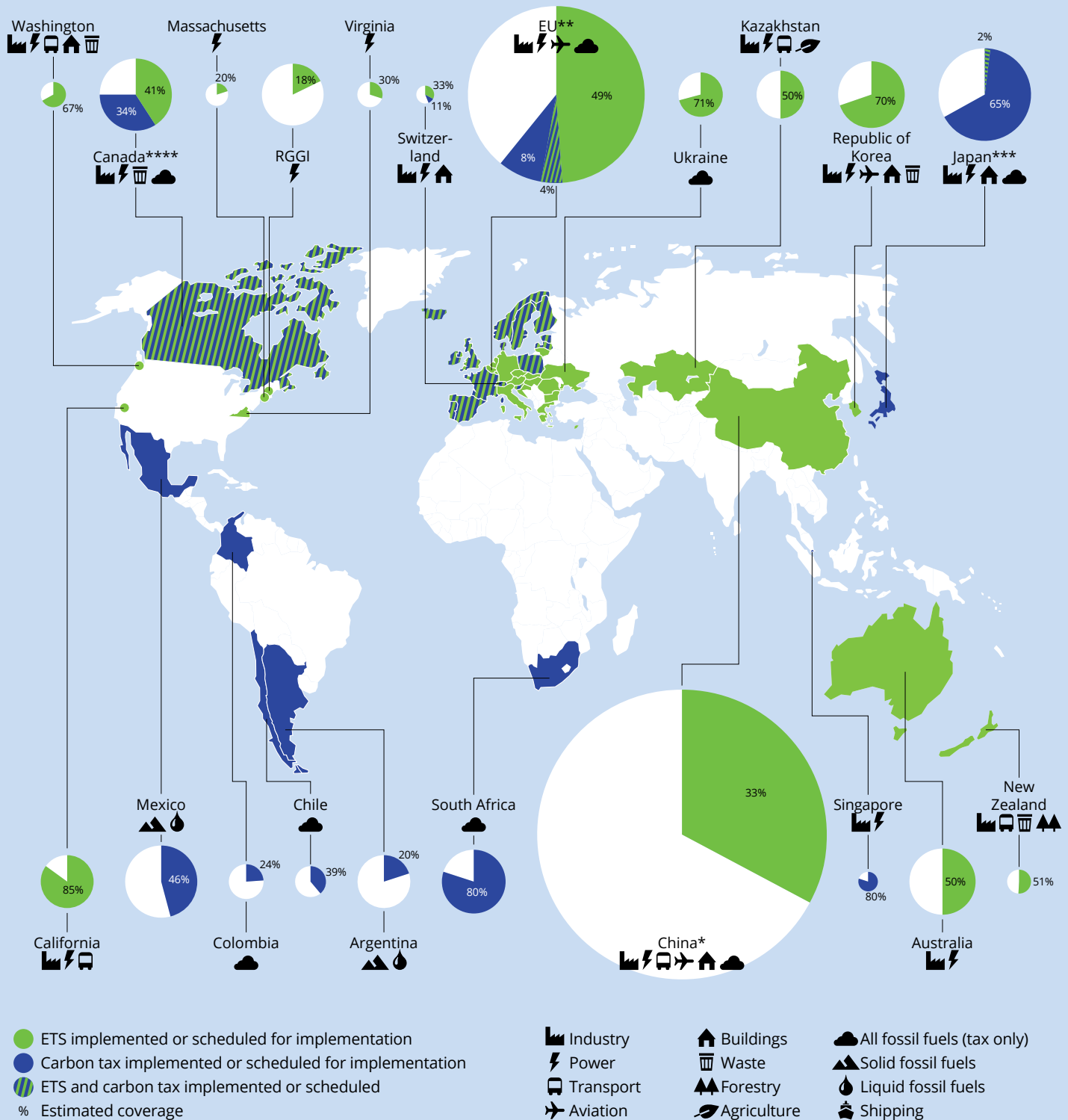
Price/market stabilization mechanisms (ETS only):

- In the EU ETS, the MSR entered into force on January 1, 2019.
- Nova Scotia is planning to launch its first auctions in 2020, with a minimal price of CAN\$20/tCO₂e (US\$14/tCO₂e) and annual price increase by 5 percent plus inflation.
- The Republic of Korea announced limits to banking in May 2019 to improve market liquidity in its ETS.
- TCI jurisdictions are planning a minimum reserve price, cost containment reserve and emissions containment reserve for the regional ETS.

Linking and/or cooperation:

- The link between the Switzerland ETS and EU ETS came into effect on January 1, 2020.
- New Jersey rejoined RGGI in 2020.
- New Mexico is looking into cooperation with other states that already have implemented an ETS.
- Pennsylvania is planning to link to RGGI by 2022 at the earliest.
- Virginia is scheduled to link in 2020.
- UK stated it is also considering a link between any future UK ETS and the EU ETS.

Figure 2.6 / Carbon pricing initiatives implemented or scheduled for implementation, with sectoral coverage and GHG emissions covered



Note: The size of the circles reflects the volume of GHG emissions in each jurisdiction. Symbols show the sectors and/or fuels covered under the respective carbon pricing initiatives. The largest circle (China) is equivalent to 13.2 GtCO₂e and the smallest circle (Switzerland) to 0.05 GtCO₂e. The carbon pricing initiatives have been classified in ETSs and carbon taxes according to how they operate technically. ETS does not only refer to cap-and-trade systems, but also baseline-and-credit systems such as British Columbia and baseline-and-offset systems such as in Australia. Carbon pricing has evolved over the years and they do not necessarily follow the two categories in a strict sense. The authors recognize that other classifications are possible.

* The coverage includes the China national ETS and eight ETS pilots. The coverage represents early unofficial estimates based on the announcement of China's National Development and Reform Commission on the launch of the national ETS of December 2017 and takes into account the GHG emissions that will be covered under the national ETS and are already covered under the ETS pilots. The sector symbol refers to the covered sectors in the national ETS or (one of the) ETS pilots. The national ETS will initially cover the power sector only. The covered sectors vary per ETS pilot.

** Also includes Norway, Iceland and Liechtenstein. Carbon tax emissions are the emissions covered under various national carbon taxes; the scope varies per tax.

*** ETS emissions are the emissions covered under the Tokyo CaT and Saitama ETS.

**** The coverage includes both components of the Canada federal backstop system and the subnational carbon pricing initiatives.

3

Carbon crediting mechanisms

More than **14,500** registered crediting projects, generating almost 4 billion tCO₂e of cumulative carbon credits so far

Crediting activities from the forestry sector has issued more credits than any other sector, accounting for

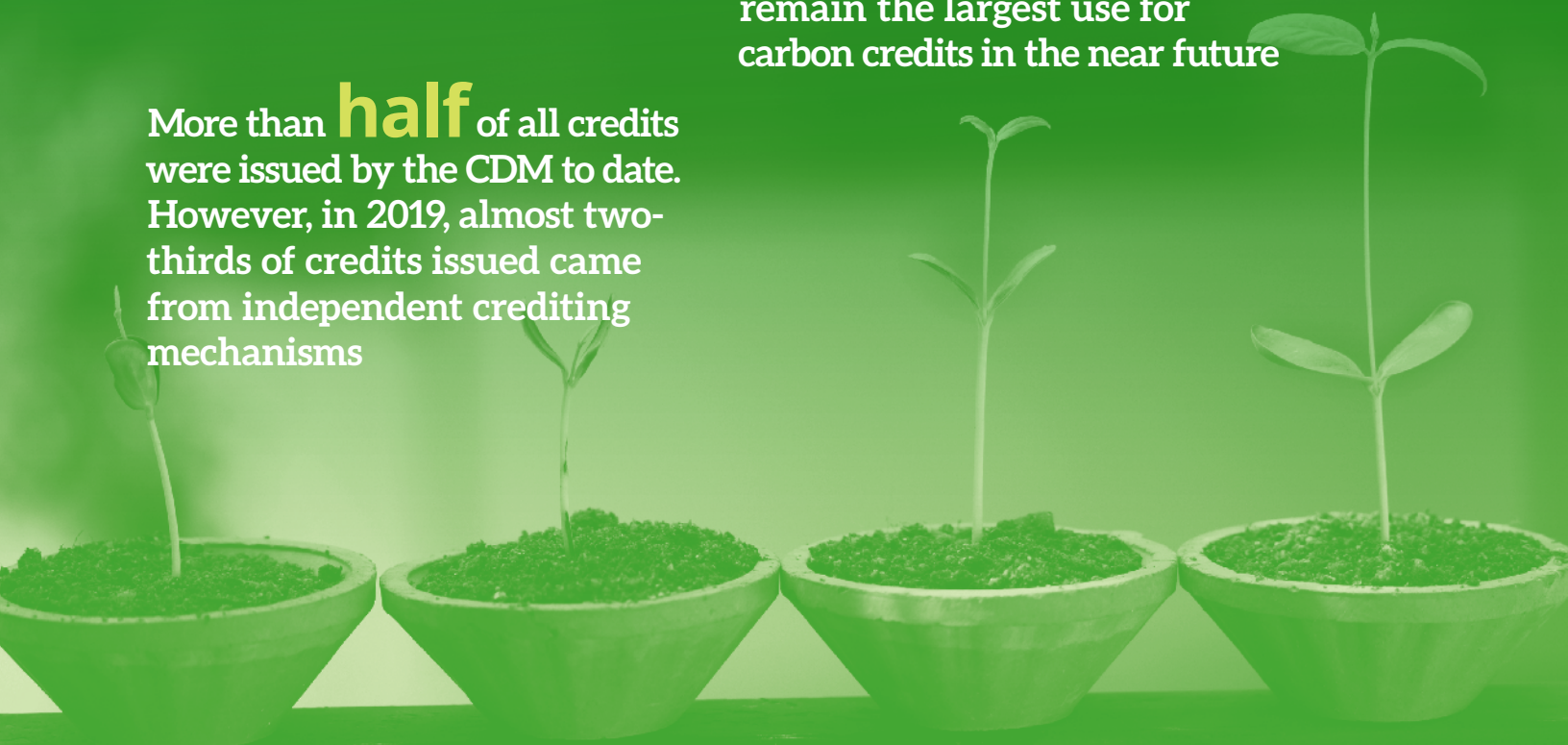
42% of the total in the last five years

More than **half** of all credits were issued by the CDM to date. However, in 2019, almost two-thirds of credits issued came from independent crediting mechanisms

Three-quarters

of issued credits from the past thirty years came from industrial gas, renewables and fugitive emissions projects

Credits are primarily being used by companies to **offset** part of their emissions for fulfilling compliance obligations or meeting voluntary commitments and this will likely remain the largest use for carbon credits in the near future



3

Carbon crediting mechanisms

This report section examines the state and trends of major carbon crediting mechanisms around the world, which are currently in operation and have issued credits that could be used for compliance purposes under one or more carbon pricing initiatives. The mechanisms are classified, based on how credits are generated and the way the crediting mechanism is administered. There are three categories:

– **International crediting mechanisms**

International crediting mechanisms are those governed by international climate treaties and are usually administered by international institutions. Examples are the Clean Development Mechanism and Joint Implementation.

– **Independent crediting mechanisms¹²²**

Independent crediting mechanisms are mechanisms not governed by any national regulation or international treaties. They are administered by private and independent third-party organizations, which are often non-governmental organizations. Examples are the Gold Standard and the Verified Carbon Standard.

– **Regional, national and subnational crediting mechanisms¹²³**

Independent crediting mechanisms are mechanisms not governed by any national regulation or international treaties. They are

administered by private and independent third-party organizations, which are often non-governmental organizations. Examples are the Gold Standard and the Verified Carbon Standard.

Since this is the first edition of the State and Trends of Carbon Pricing report that focuses on carbon crediting mechanisms, section 3.1 starts with the role and concept of crediting mechanisms. This is followed by key trends in section 3.2, with an overview of these mechanisms in section 3.3.

3.1 The concept and role of crediting mechanisms in climate action

Carbon crediting is the process of issuing tradable units to actors that are implementing approved emission reduction activities.¹²⁴ These emission reductions represent avoided or sequestered emissions that are additional to business-as-usual operations. This means that emissions are lower as a result of these activities than they would be in a counterfactual scenario without the incentives from the crediting program.¹²⁵ Credits are generated voluntarily and exist outside of the scope of other carbon pricing initiatives where covered entities have a compliance obligation, making them very different

¹²² Only the largest independent carbon crediting mechanisms which issue credits that can be used for compliance obligations have been considered in this report. These mechanisms comprise over 85% of the voluntary market by volume and value according to EcoSystem Marketplace's 2019 state of voluntary market report: *Financing Emissions Reductions for the Future*. The authors recognize that numerous other independent crediting mechanisms exist that generate credits sold on the voluntary carbon market.

¹²³ Mandatory baseline-and-credit ETSs are not considered in this section and are included in Section 2.

¹²⁴ "Emission reductions" refers to both avoidance of emissions (e.g. from methane capture from landfills and use for energy) and the sequestration of emissions (e.g. from afforestation projects).

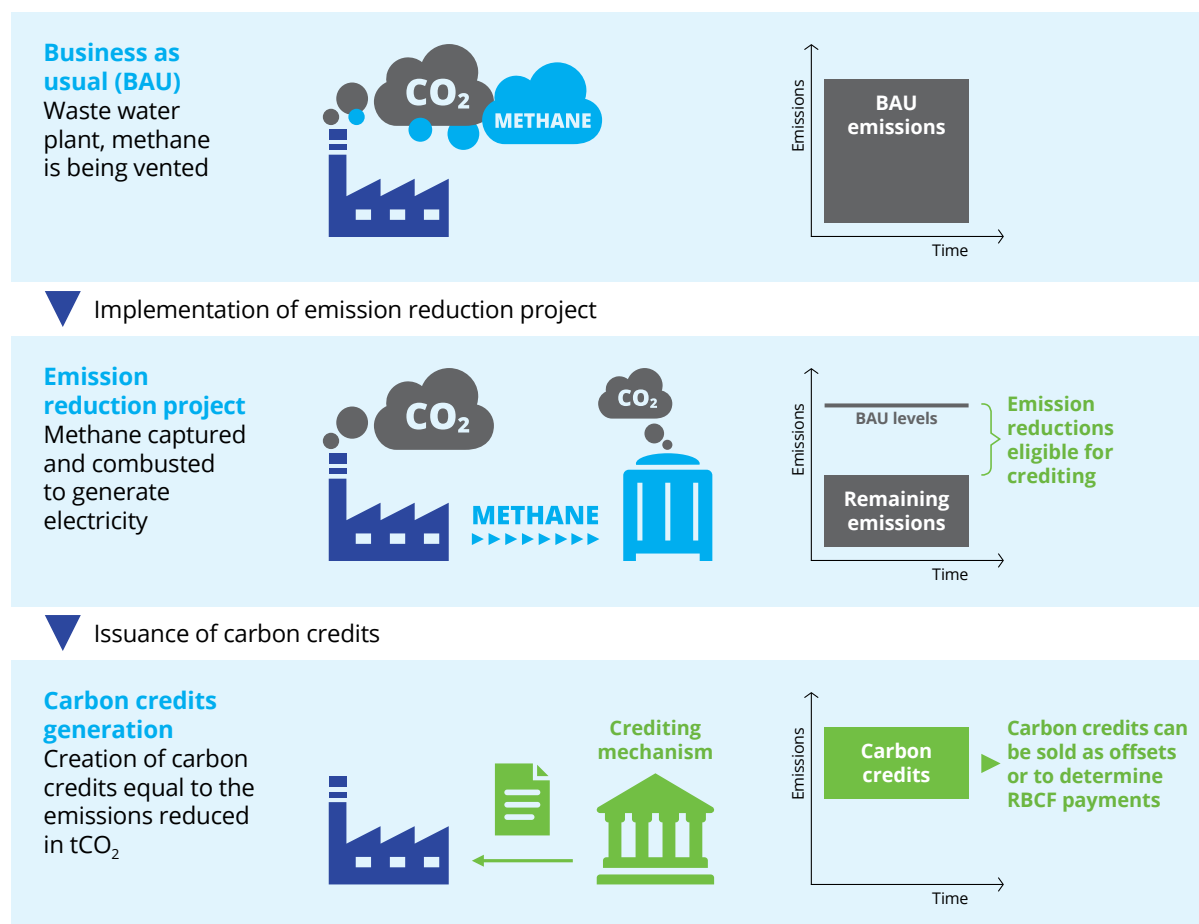
¹²⁵ For the Paris Climate Agreement, additionality would need to be defined in the context of NDC targets, whether that will mean the activity must be outside of the scope of the existing NDC coverage or result in emission reductions beyond the level stated in the NDC—or indeed both—is still a matter to be determined by the international negotiations.

from allowances under a cap-and-trade system or performance credits under a baseline-and-credit ETS (where compliance entities are given credits when they exceed their emission reduction targets).¹²⁶ Apart from project-based mechanisms, crediting can also be scaled up to include policy-wide crediting mechanisms.

Figure 3.1 provides a simplified overview of the concept of carbon crediting. For the sake of simplicity, additional steps in the typical carbon crediting project development cycle (including the selection and application of valid quantification methodologies, determining crediting periods, measuring of emission reductions data, auditing of the data, transactions using registries and associated quality control measures, etc.) are not included.

One way to use credits issued under carbon crediting mechanisms can be as “offsets”. This means that emission reductions achieved by one entity can be used to compensate for (i.e. offset) emissions from another entity. Outside of offsetting emissions for compliance obligations for a carbon tax or ETS, there is also a voluntary market where carbon credits are used to offset individual and organizational emissions on a voluntary basis. Credits can also be used as a means of quantifying and rewarding emission reductions from projects receiving carbon finance—for example in the World Bank’s Pilot Auction Facility. While most carbon credits are used for offsetting purposes, it is important to distinguish between the unit representing the verified reduction in GHG emissions (i.e. the credit) from its specific use, which may or may not be offsetting.

Figure 3.1 / High-level example of how carbon crediting works



¹²⁶ “Baseline-and-credit ETS” refers to mandatory systems where covered entities face compliance obligations for their emissions. Covered entities with emissions above their designated baselines need to surrender credits for these emissions above the baseline. Covered entities that have reduced their emissions below their baselines receive credits for these emission reductions.

Carbon credits can be used for a number of reasons. They can be established domestically as part of an entity's obligations under a carbon tax or ETS. In addition to offering regulated companies some flexibility for compliance, by offering financial incentives (i.e. monetizable carbon credits) sectors not covered under a mandatory carbon pricing initiative could be enticed to reduce their emissions and encourage low-carbon innovation. Credits can also be purchased voluntarily by companies to reach corporate social responsibility or voluntary climate goals. In addition, countries can trade credits as mitigation outcomes to achieve their NDC targets.

Although the majority of crediting mechanisms have been set up for domestic compliance purposes, this chapter covers all forms of crediting mechanisms. If countries were to trade credits internationally through Article 6 of the Paris Agreement (for more see chapter 4), additional considerations may arise (see Box 3.1).

A key benefit of carbon crediting is in giving buyers the flexibility to reduce some of their emissions by funding mitigation in sectors and/

or jurisdictions where the cost is lower. Lowering the cost of mitigation could facilitate an increase in climate action ambition.¹²⁷ As long as the reductions generated from crediting activities are real, crediting can also speed up climate action by enabling reductions to happen faster. While crediting provides flexibility in how entities can reduce their emissions, their abatement strategies would need to go beyond offsetting. Entities will need other measures to drive down emissions in their own operations.

The environmental integrity¹²⁸ of carbon credits must be maintained to provide confidence to purchasers that the credits accurately represent genuine and real emission reductions. While there is currently no globally accepted definition for environmental integrity, it is usually an umbrella term referring to the key considerations relating to the validity and the social-environmental impacts of generating, transacting and accounting for the use of the carbon credit. To mitigate risk of issuing credits that have poor environmental integrity, carbon crediting mechanisms follow best practice principles, which includes sets key requirements that

Box 3.1 / Crediting under the Paris Agreement

Article 6 of the Paris Agreement provides the mandate for countries to transfer mitigation outcomes, either through Article 6.2 or 6.4 in order to meet their NDCs. While a more detailed explanation of the issues surrounding international negotiations and Article 6 are outlined in chapter 4, two key issues arise when it comes to international crediting: double counting and the impact of selling mitigation outcomes on the seller country. Firstly, provisions would need to be in place to ensure that the emission reductions in the seller country should only be counted toward the buyer country's NDC target. They should not also be counted toward the achievement of the seller country's NDC target. Secondly, the seller country needs to be aware that it might need to tighten its mitigation pledge. Even if the reductions or removals took place outside of the scope of a country's NDC commitment or is not needed to meet its current NDC commitment, it may have a cost on the country's ability to meet future NDC commitments. Unlike crediting under the Kyoto Protocol, as all Parties to the Paris Agreement have NDC commitments, there is an opportunity cost of selling credits under Article 6 that Parties will need to assess. This will also be a relevant concern for a country if voluntary crediting is taking place within their jurisdiction. The impact this will have on its ability to achieve current or future NDC targets would also need to be considered, provided voluntary crediting mechanisms follow similar rules on exclusion for double counting.

¹²⁷ Source: IETA, The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges, September 2019, https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

¹²⁸ The environmental integrity, also sometimes termed as the "quality" of a carbon credit is an umbrella term that refers to the environmental and social impacts of the activity that generated the credit and its accounting robustness (e.g. reliability of data and accuracy of calculations used to derive emission reduction value). That being said, the definition itself of environmental integrity is not clear or agreed upon in the literature, it may also be defined differently across various crediting mechanisms.

projects must meet in order to receive carbon credits. Examples from the International Carbon Reduction and Offsetting Alliance (ICROA) are shown in Box 3.2.

Beyond the emissions mitigation benefit, projects that generate carbon credits could also generate additional co-benefits. Carbon crediting mechanisms could be designed explicitly to support or enhance specific co-benefits like health outcomes (e.g. from reduced indoor air pollution through the installation of improved cookstoves), biodiversity, resilience, water retention and habitat protection.

3.2 Carbon crediting trends

Crediting can help countries meet their NDC pledges under the Paris Agreement by reducing the cost of mitigation action and increasing climate action beyond domestic compliance programs. At the same time, national climate policies are expected to increase in coverage and ambition.

The ability of crediting projects – or scaled up crediting programs or policies – to demonstrate additionality therefore becomes more important and challenging to avoid double counting of emission reductions with these national policies. In addition, countries may also need to assess how the use of carbon crediting will affect their ability to achieve current and future NDC targets, particularly the opportunity cost if countries sell their lower-cost mitigation outcomes.

This section covers the most recent developments within the context of the historical developments that have shaped carbon crediting mechanisms. The trends are broken down by the three types of crediting mechanisms: international, independent, and regional, national and subnational. To be able to compare and consolidate data across the various crediting mechanisms analyzed in this section in a consistent manner, the sectoral scope categories and their emission mitigation activities have been remapped as per Table 3.1.

Box 3.2 / Example of best practice principles on carbon credits (based on ICROA)

Real: All emission reductions and removals—and the project activities that generate them—shall be proven to have genuinely taken place.

Measurable: All emission reductions and removals shall be quantifiable, using recognized measurement tools (including adjustments for uncertainty and leakage), against a credible emissions baseline.













Permanent: Carbon credits shall represent permanent emission reductions and removals. Where projects carry a risk of reversibility, at minimum, adequate safeguards shall be in place to ensure that the risk is minimized and that, should any reversal occur, a mechanism is in place that guarantees the reductions or removals shall be replaced or compensated. The internationally accepted norm for permanence is 100 years.

Additional: Additionality is a fundamental criterion for any offset project. Project-based emission reductions and removals shall be additional to what would have occurred if the project had not been carried out.

Independently verified: All emission reductions and removals shall be verified to a reasonable level of assurance by an independent and qualified third-party.

Unique: No more than one carbon credit can be associated with a single emission reduction or removal as one (1) metric ton of carbon dioxide equivalent (CO₂e). Carbon credits shall be stored and retired in an independent registry.

Table 3.1 / Sector map of crediting activities

#	Sector	Description
1	 Agriculture	Activities associated with agriculture and on-farm management, includes also livestock activity
2	 CCS/CCU	Any activities associated with carbon capture and storage/use
3	 Energy efficiency	Domestic or industrial activities that reduces emissions through reduced energy consumption. Includes waste heat/gas recovery and fossil fuel electricity generation through more efficient processes
4	 Forestry	Includes all forestry related activities such afforestation, reforestation, improved forestry management and reduced emissions from deforestation and degradation
5	 Fuel switch	Activities whose baseline is fossil fuel use for power or heat, includes switching to less carbon intensive fuels (e.g. coal to gas but excludes renewables)
6	 Fugitive emissions	Activities addressing industrial methane emissions such as avoided methane leaks/vents from oilfields and mining, excludes livestock and agricultural practices (e.g. rice paddies)
7	 Industrial gases	All fluorinated gases—hydrofluorocarbon (HFCs), perfluorocarbons (PFCs), ozone depleting substances
8	 Manufacturing	All activities associated with the less emission intensive creation of materials (cement, retail, construction, metal)
9	 Other land use	All land use management activities except forestry and agriculture, e.g. wetlands
10	 Renewable energy	All renewable energy activities including sustainable biomass
11	 Transport	Activities reducing emissions from activities associated with transport and mobility
12	 Waste	Landfill gas and wastewater treatment mitigation activities, includes waste management, and waste handling

As of the December 31, 2019,¹²⁹ there are 14,550 carbon crediting “projects”¹³⁰ registered across the world under the 23 carbon crediting mechanisms covered in this report. Of these

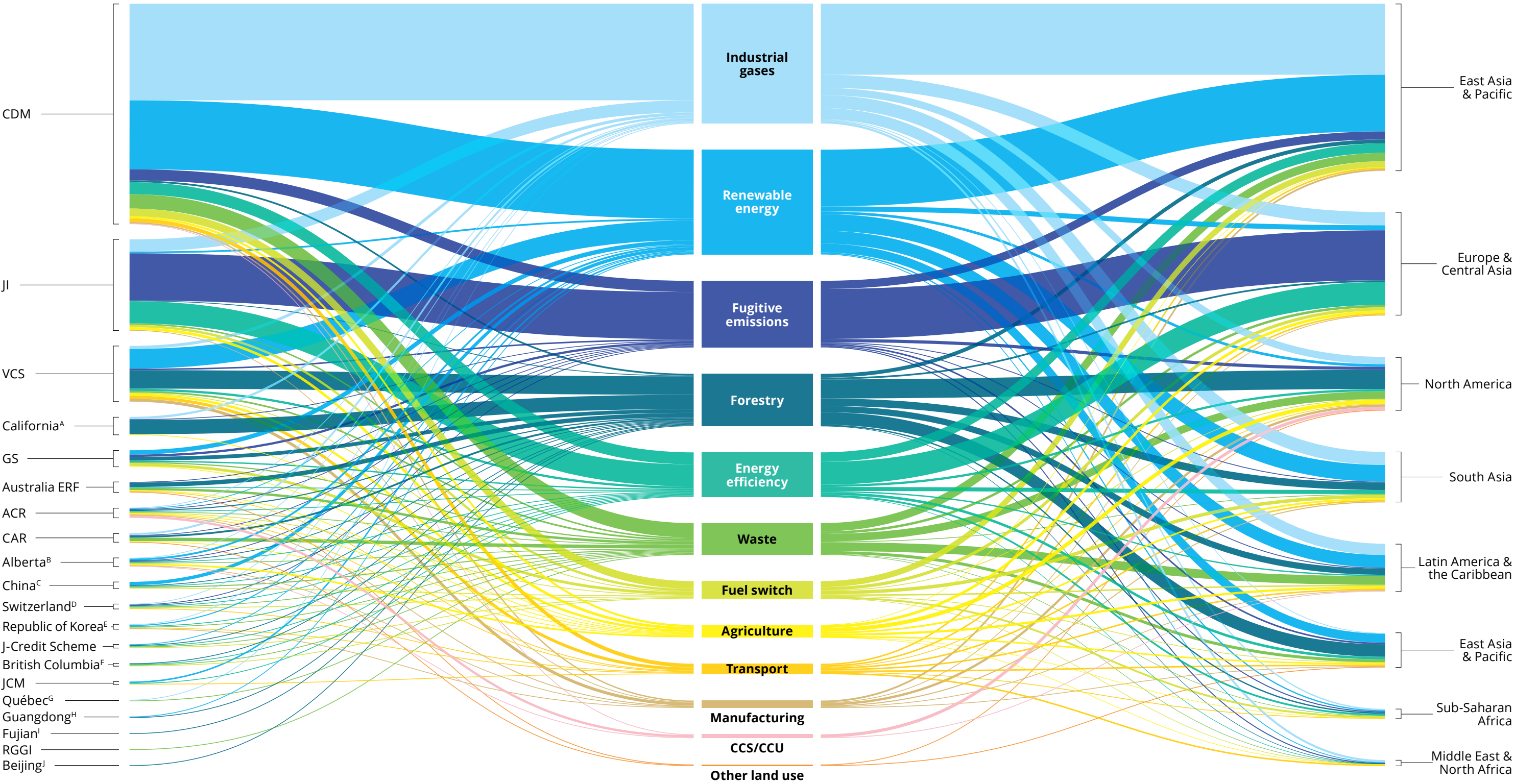
projects, 7,759 have issued some 3.9 billion tCO₂e of carbon credits, this is equivalent to taking over 842 million passenger cars off the road for a year.¹³¹

¹²⁹ While the State and Trends of Carbon Pricing 2020 report covers the period from January 1, 2019 until April 1, 2020, data for 2020 is not available for all crediting mechanisms in this report. To ensure consistency between the information presented from the different crediting mechanisms, the cut-off date for the data on the crediting mechanisms is December 31, 2019.

¹³⁰ This number also includes programs of activities. Where possible, CPAs under the same PoA are grouped and counted by their respective PoA. As some projects are registered under more than crediting mechanism (e.g. CDM project registered under voluntary programs such as VCS and Gold Standard for additional certification and CDM pre-registration credits), the actual number of registered projects is in reality slightly lower.

¹³¹ Based on the US EPA's Greenhouse Gas Equivalencies Calculator: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Figure 3.2 / Total credit issuance volumes by registry, sector, and region as of December 31, 2019



A California Compliance Offset Program
B Alberta Emission Offset
C China GHG Voluntary Emission Reduction Program
D Switzerland CO₂ Attestations Crediting Mechanism
E Republic of Korea Offset Credit Mechanism
F British Columbia Offset
G Québec Offset Crediting
H Guangdong Pu Hui Offset Crediting Mechanism
I Fujian Forestry Offset Crediting Mechanism
J Beijing Forestry Offset Mechanism

Note: To ensure consistency between the information presented from the different crediting mechanisms, the cut-off date for the data on the crediting mechanisms is December 31, 2019. Only the largest independent carbon crediting mechanisms which issue credits that can be used for compliance obligations have been considered in this report. The authors recognize that numerous other independent crediting mechanisms exist that generate credits sold on the voluntary carbon market. Credits generated under the Saitama crediting mechanism, the Saitama forest absorption certification system, the Switzerland CO₂ attestation crediting mechanism and Tokyo offset mechanism are not shown due to data limitations.

The Kyoto crediting mechanisms (the Clean Development Mechanism and Joint Implementation) have been responsible for almost three-quarters of all credits issued to date, with 70 percent of those coming from projects in industrial gases, renewable energy and fugitive emissions.¹³² The CDM is the biggest issuer, responsible for just over 50 percent of all credits ever issued. Despite not issuing anything for the last four years, due to the sheer volume of credit issuances before 2015, JI still remains the second largest issuer of carbon credits at around 22 percent of the cumulative global total. Certain types of mitigation activities tend to be more popular than others for a variety of reasons, including lower project development costs, higher emission reduction potential—hence more credits, lower MRV costs and risks, and higher desirability by carbon credit buyers. There is also a tendency for major crediting mechanisms to generate most of their carbon credits from one or two major sectors, with the Kyoto crediting mechanisms, for instance, focusing on industrial emissions and renewables. On the other end of the scale, the low credit issuance by sectors such as transport and other land-use projects—which combined makes up less than 2 percent of the total—highlights the challenges in developing these types of projects, which often have complex mitigation quantification approaches and high MRV costs. The sectoral foci of the CDM and JI has also led to a geographic trend, with most carbon credits are from East Asia and the Pacific (44 percent) and Europe and Central Asia (23 percent). However, the continuation of the CDM beyond the end of the second commitment of the Kyoto Protocol at the end of this year is unclear (see section 4.2 for more). The uncertain future of the Kyoto crediting mechanisms and rise in crediting activity in different sectors and from different mechanisms show a different crediting landscape than that established thirty years ago.

An inspection of historical global crediting activity levels reveal that crediting activities increased rapidly until 2012 before crashing in 2013, but have stabilized since 2015, coinciding with the adoption of the Paris Agreement (Figure 3.3). The spike in activities in 2012 reflects the rush to register CDM projects and issue Kyoto credits before the close of the first compliance period of the Kyoto Protocol to avoid the various limitations that were being introduced for allowing post-2012 CDM units (Certified Emission Reductions—CERs) to enter the EU ETS—the biggest buyer of Kyoto credits at the time. The general lack of demand for Kyoto credits after 2012 was largely triggered by the lack of demand by EU ETS facilities as a result of the financial crisis and oversupply of EU allowances. This in turn led to a drop in the price of CERs. In turn, other carbon markets also moved to reduce the number of Kyoto credits allowed in their system. Demand for CERs has not kept pace with their issuance, resulting in a surplus of CERs on the market. The steadily declining number of CDM credit issuances over the past years as new crediting mechanisms start to come online suggest an end of the CDM/JI dominance of the global crediting market, especially since the future of these credits under the Paris Agreement remain uncertain (as discussed in section 4.2). That being said, any positive decision on the transition of the Kyoto crediting mechanisms to Article 6.4 could see a spike in issuances.

However, interest and activity in the voluntary market is growing as companies purchase voluntary credits through independent crediting mechanisms. Independent mechanisms have grown significantly over the past years and in 2019 were responsible for 65 percent of the annual credits issued. This is close to a four-fold increase compared to 17 percent in 2015. Most notably, Verified Carbon Standard (VCS) issued more credits than the CDM in 2019 (Figure 3.4). This is the first time that another crediting mechanism has issued more credits in a year than the CDM since 2006.

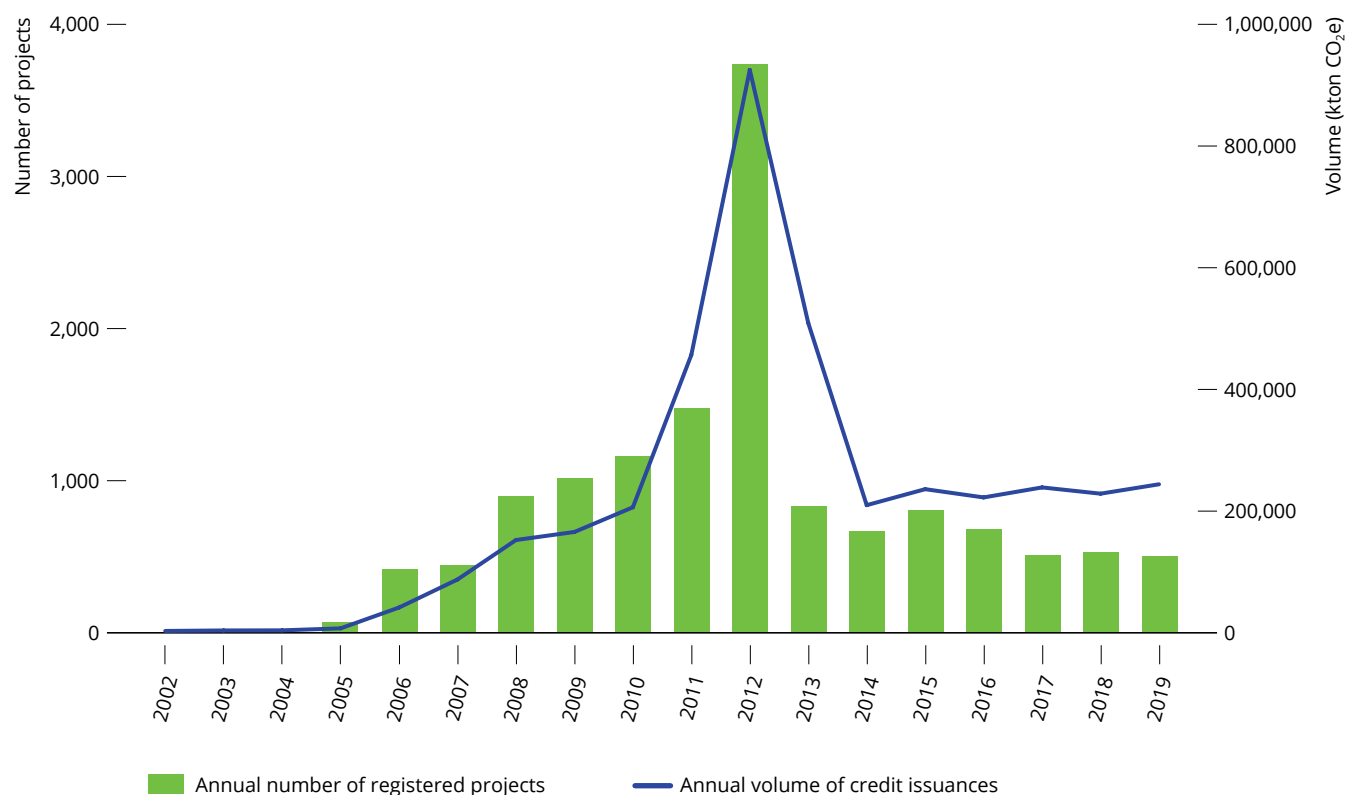
¹³² Breakdown of the largest three sectors are: industrial gas emissions (28 percent), increased renewable energy capacity (24 percent) and fugitive emissions from industrial and mining processes (15 percent).

To stimulate local climate action and give companies flexibility in complying with carbon pricing regulations, governments are putting domestic crediting mechanisms in place.

Regional, national and subnational crediting mechanisms are mainly used to generate offsets for the jurisdiction's mandatory carbon pricing initiative. Over the past five years, four jurisdictions implemented new crediting mechanisms in this category,¹³³ with several more under development,

including in Canada, Mexico and South Africa. In 2019, these mechanisms were responsible for around 17 percent of the global carbon credit issuance that year. However, the volume of credit issuances from regional, national and subnational crediting mechanisms has in fact decreased slightly since 2015 (35 percent) due to the ongoing suspension of issuances from the China GHG Voluntary Emission Reduction Program (as detailed in section 3.3.3).

Figure 3.3 / Annual number of projects and issuances of covered crediting mechanisms for 2002–2019¹³⁴



¹³³ British Columbia (2016), Guangdong (2017), Fujian (2017), South Korea (2015)

¹³⁴ Historical trends do not include mechanisms where chronological data on crediting activities are not available. These mechanisms are those under the Chinese pilot ETS's (Beijing, Fujian and Guangdong), Tokyo ETS and Saitama ETS. The volume of credits involved are small and their exclusion does not impact the overall trends shown.

The stability of the number of credits issued suggests demand for carbon credits as a whole is also likely to have been relatively stable over the last five years. However, the large changes in where these credits are coming from (as shown in Figure 14) suggests that focus of crediting activities—and likely with it demand for the credits—has drastically shifted from international compliance systems to regional compliance and voluntary ones. This is not an entirely new trend as demand for CERs has been limited for some time with only some RBCF mechanisms and national carbon pricing initiatives such as the Colombia carbon tax and South Korea's ETS accepting limited volumes of CERs—albeit with additional eligibility criteria. Some 2.8 million CERs were canceled from Korean CDM projects and 1.3 million from Colombian CDM projects in 2019, likely in order to be used in the respective carbon pricing initiatives. Potentially driven by greater public attention to and concern over climate change, the voluntary offset market has seen record issuances from independent crediting mechanisms over the same period. Whether this trend will continue given the economic impacts of COVID-19 remains to be seen. One area of particular interest is the impact of COVID-19 on the Carbon Offset and Reduction Scheme for International Aviation (CORSIA). The CORSIA is considered to be one of the most likely and largest sources of future carbon credit demand,¹³⁵ but given the impacts of COVID-19 on airlines and questions over the baseline year for CORSIA (see section 4.4), crediting demand remains uncertain.

The growing number of crediting mechanisms and activities also brings the challenge of ensuring consistency across the various mechanisms, especially in the context of the Paris Agreement.

Credits from regional, national and subnational mechanisms are currently developed with only their regional carbon pricing initiatives in mind, but at some point the use of their credits could be linked with their national government's NDC achievements. Therefore, consistency on the rules governing the quantification of credits is important to ensure all NDCs' achievements are measured in the same way. Furthermore, more jurisdictions are allowing certain credits from independent mechanisms to be used for compliance in their carbon pricing initiatives, including Colombia, South Africa and more recently, in the CORSIA. This means that transparency and consistency—with best practices applied to carbon credit accounting and quality assurance, including MRV—are vital to maintaining confidence in carbon crediting.

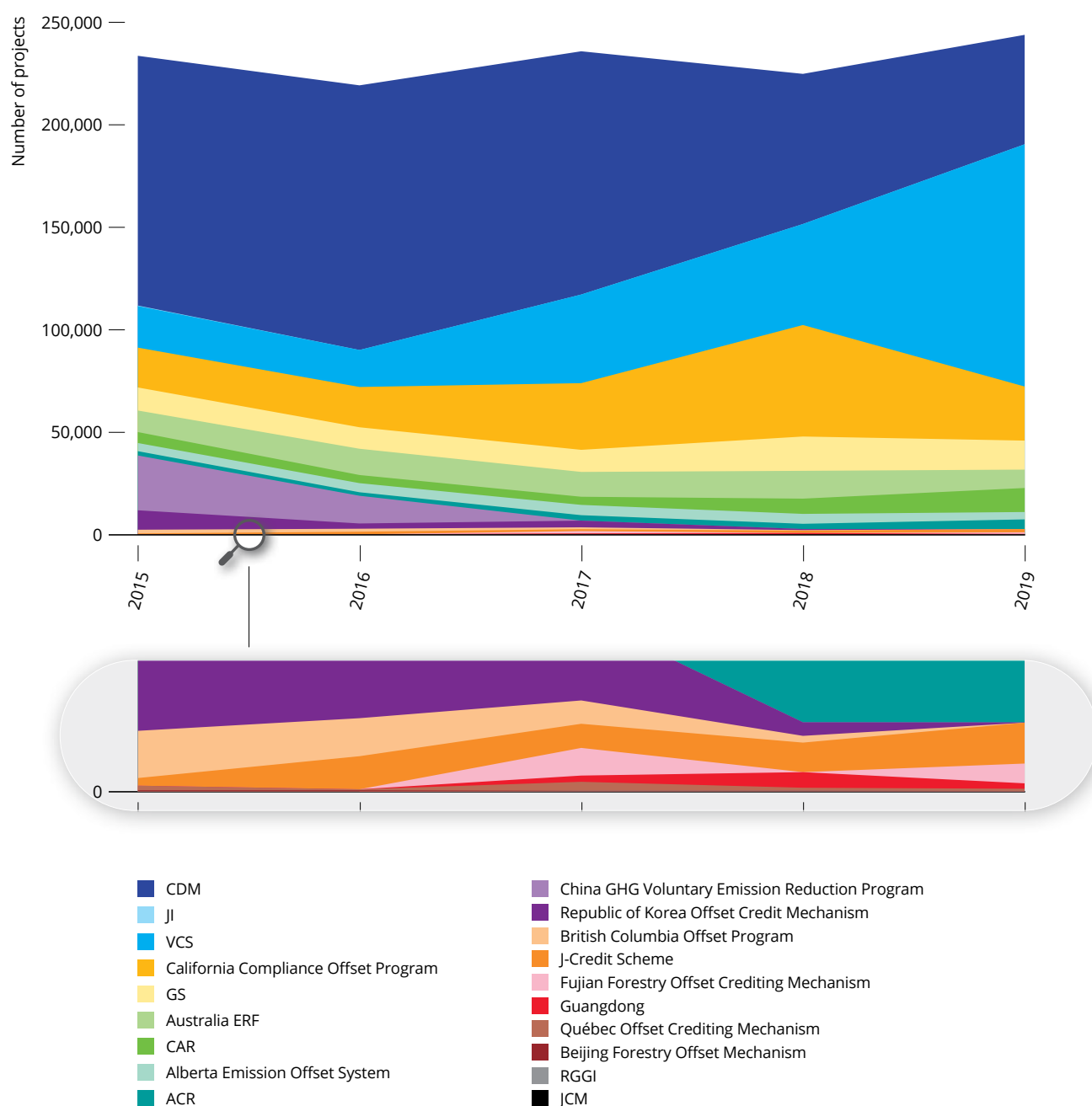
The past five years have seen a significant increase in both the absolute amount and share of forestry credits (Figure 3.5).

This trend is part of a broader interest in nature-based solutions, which is a rapidly emerging concept covering a range of approaches that use natural processes and species to address societal challenges. This includes leveraging forestry and land-based activities, such as wetlands restoration for carbon storage, to assist the mitigation of climate change. The forestry sector assumes the largest chunk of credits issued over

the last five years and makes up 42 percent of the global total. Almost all (99 percent) of these credits came from independent mechanisms—VCS, as well as regional, national and subnational mechanisms—predominantly the California Compliance Offset Program. It is difficult to identify a single reason for the increase in forestry-related carbon crediting activities over recent years, and why these activities

have become the main source of carbon credits issued since 2015. However, two key characteristics of NBS projects which can also be found in forestry projects are likely to be at play: the significant potential for NBS projects to reduce emissions cost effectively, and the ability for NBS project to generate additional co-benefits in addition to emission reductions.

Figure 3.4 / Annual volume of issuances by crediting mechanism for 2015–2019

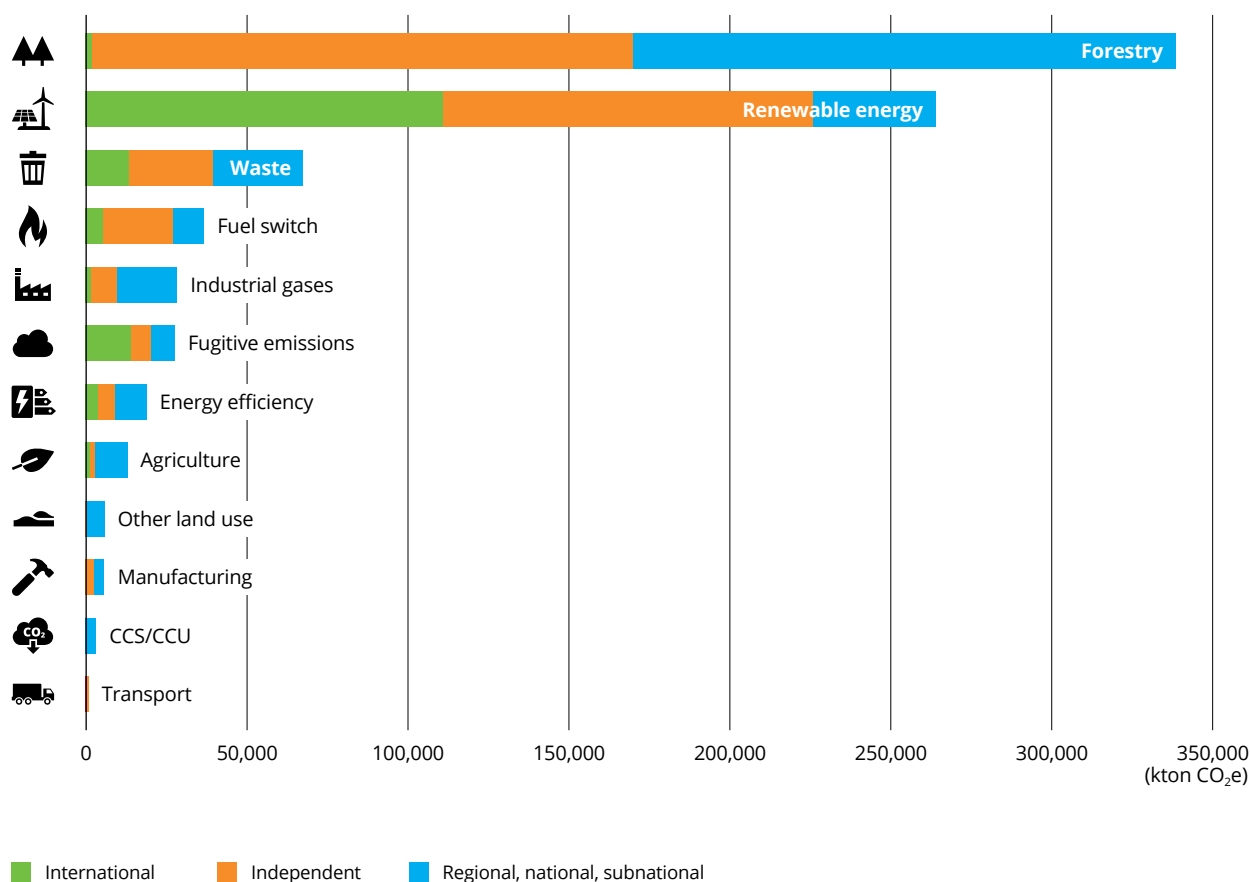


Past experience with the CDM has shown that projects with the potential to generate large volumes of emission reductions relative to their MRV costs are the most popular with project developers. While MRV costs can be high for NBS projects, they also have significant potential to generate credits and can deliver a third of the emission reductions needed by 2030 to keep global warming below 2 degrees at comparatively low cost.¹³⁶ Co-benefits refer to additional social-environmental benefits in addition to climate change mitigation, for example improved biodiversity from an avoided deforestation project. Carbon credits from projects which generate co-benefits are in general more desirable to buyers, as they offer more value for money and the co-benefits can often be more visible than climate change mitigation outcomes. NBS projects including forestry projects have the ability to deliver a host

of co-benefits such as biodiversity conservation, sustained water supplies, enhanced agricultural productivity and livelihood opportunities. These reasons—combined with the relatively more mature quantification approaches for the forestry sector and the potential for some forestry projects to be very large and cost effective—are the likely reasons for NBS projects and forestry projects in particular to be popular with both project developers and credit buyers.

Prior to the recent surge in forestry and NBS projects, most crediting activities stemmed from the industrial gas sector (Figure 3.5). Renewable energy is currently the second largest sector, making up some 33 percent of the global credit issuance since 2015 and is also the sector where the majority of international credits are generated.

Figure 3.5 / Issuance volumes in ktonCO₂e by sector and type of mechanism for 2015–2019



136 <https://www.pnas.org/content/114/44/11645>

3.3 Overview of crediting mechanisms

This section provides an up-to-date picture of the crediting mechanisms that could be used for

compliance obligations with at least one carbon pricing initiative.¹³⁷ All mechanisms are arranged in alphabetical order. Table 3.2 provides an explanation of how to read the information from the overview tables for each carbon crediting mechanism in this section.

Table 3.2 / Description of the overview table for carbon crediting mechanisms¹³⁸

<p>Clean Development Mechanism (CDM)</p> <p>Name of mechanism</p> <p>Logo of the crediting mechanism or administrative organisation, or flag of the mechanism's governing jurisdiction</p>	<p>Geographic coverage</p> <p>Where crediting activities can take place</p> <p>Countries with projects</p> <p>Number of countries hosting at least 1 registered crediting activity</p> <p>Price in (year)</p> <p>The lowest and highest price found for 2019 or latest year available, unless otherwise stated ¹³⁹</p> <p>Carbon pricing initiatives accepting issued credits for compliance</p> <p>Carbon pricing initiatives where covered emitters can use credits from the mechanism for compliance. Additional limitations on credit use by individual carbon pricing initiatives such as geography, vintage and sectoral scope may apply. Since all mentioned credits could technically be used for voluntary offsetting purposes, we only list the relevant mandatory carbon pricing initiatives.</p>
<p>Administered by</p> <p>The organisation in charge of operating the mechanism</p> <p>Established in</p> <p>Year in which the mechanism was founded</p> <p>Type</p> <p>International, Independent, Regional, National, or Subnational</p> <p>Registered activities</p> <p>The number of projects or programs recognized by the mechanism as meeting all associated regulatory requirements (for CDM, individual CPAs within a Programme of Activities –PoA – are not counted separately)</p> <p>Credit name</p> <p>Name of the credits issued; 1 credit = 1 tCO₂e unless otherwise stated</p> <p>Credits issued (MtCO₂e)</p> <p>Cumulative amount of carbon credits issued to date by the mechanism as of December 31, 2019</p> <p>Credits retired or cancelled (MtCO₂e)</p> <p>Cumulative amount of credits that have being used already either for compliance or voluntary offsetting and are effectively no longer in circulation and are not available for use</p>	<p>Sectoral coverage</p> <p>Number of sectors as classified in Table 3.1 for which credits have been issued under the mechanism as of December 31, 2019</p> <p>Graphical representation of the sectoral coverage based on the sector classification in Table 3.1 ¹⁴⁰ (total credits issued by mechanism for the sector, in MtCO₂e unless stated otherwise; percentage of total credits issued by this mechanism in %) ¹⁴¹</p>


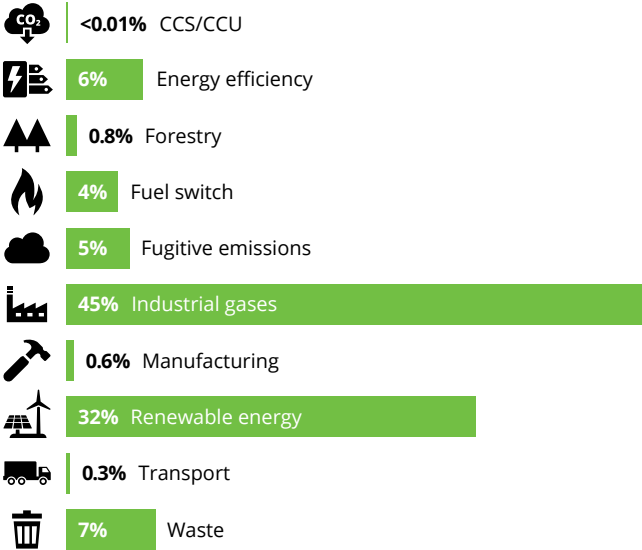
¹³⁷ Various smaller, independent and regional voluntary crediting mechanisms have formed as carbon crediting increases in popularity. This edition of the State and Trends of Carbon Pricing aims to provide a brief summary of what the mechanism is, its key characteristics in terms of crediting activity and any notable developments since 2019. Additional details can be found on the websites of each mechanism. For consistency, all data is up to December 31, 2019, unless stated otherwise.

¹³⁸ Information collected from publicly available sources and direct outreach to the administrators of the crediting mechanism. Where information is not publicly available or could not be provided, the 'Not available' status is used

3.3.1 International mechanisms

Currently there are two—the CDM and the JI. Both are mechanisms under the Kyoto Protocol and their futures under the Paris Agreement is currently uncertain. However, the work of the CDM has contributed to a better understanding about how to create methodologies and ensure credibility, with other crediting mechanisms importing or drawing on the methodologies under the CDM.

The CDM is a crediting mechanism under the Kyoto Protocol and allowed emissions reductions from registered activities in “non-Annex I” countries to be transferred to “Annex I” countries, who could use these credits for compliance with their emissions commitments under the Kyoto Protocol. However, the use of carbon pricing initiatives has diversified over the years and can also be used for voluntary offsetting by individuals via the Carbon Neutral now online offset platform¹⁴⁵ credits under other carbon

Clean Development Mechanism (CDM) 		Geographic coverage Any Non Annex I country of the Kyoto Protocol ¹⁴²
		Countries with projects 111
		Price data for 2019 US\$0.15–0.24/tCO ₂ e ¹⁴³
		Carbon pricing initiatives accepting issued credits for compliance Colombia carbon tax, CORSIA ¹⁴⁴ , EU ETS, Mexico carbon tax, Republic of Korea ETS, South Africa carbon tax
Administered by	UNFCCC	Sectoral coverage 10 sectors
Established in	1997	 <ul style="list-style-type: none"> <0.01% CCS/CCU 6% Energy efficiency 0.8% Forestry 4% Fuel switch 5% Fugitive emissions 45% Industrial gases 0.6% Manufacturing 32% Renewable energy 0.3% Transport 7% Waste
Type	International	
Registered activities	8142	
Credit name	Certified Emission Reductions (CERs)	
Credits issued (MtCO₂e)	2002	
Credits retired or cancelled (MtCO₂e)	1192	

¹³⁹ Price data is primarily obtained from third party research or exchanges. However, not all credits are traded openly on exchanges, so for some crediting mechanisms no price data is available, while for others more accurate data may be available.

¹⁴⁰ Note that the numbers presented on sector coverage may differ from those stated by the mechanisms themselves due to remapping of sectors to allow for comparison across crediting mechanisms as explained in Table 3.1.

¹⁴¹ The share of issuance volumes per sector in the tables may not add up to 100 percent due to rounding.

¹⁴² Effectively developing countries who have ratified the Kyoto Protocol and are not on the list of countries with emission obligations in Annex I to the Protocol











¹⁴³ Source: ICE, *CER Futures*, 2020, <https://www.theice.com/products/814666/CER-Futures/data?marketId=1240048&span=3>. Note that this does not include price ranges for voluntary purchases of CERs of which 2019 data is unavailable. In 2018, prices for CERs in the voluntary market reached as high as US\$2.4/tCO₂e according to Ecosystem Marketplace, *Financing Emissions Reductions for the Future—State of Voluntary Carbon Markets Report 2019*, December 2019.

¹⁴⁴ Carbon Offsetting and Reduction Scheme for International Aviation

¹⁴⁵ Source: UN Carbon Offset Platform, *UN Certification of Emission Reductions*, 2020, <https://offset.climateutralnow.org/uncertification>.

pricing initiatives and use by RBCF initiatives as proof of mitigation results achieved.¹⁴⁶ In 2019, the CDM issued its 2 billionth CER, making it the largest carbon crediting mechanism by both cumulative issued credits and registered activities. While it has over 250 methodologies on how to credit activities across a wide range of project types, over 75 percent of the credits issued by the CDM have come from just two sectors: industrial gases and renewable energy. The influence of the CDM has been in decline in the recent years as global attention has shifted away from the Kyoto Protocol. The potential future role for CDM under Article 6 of the Paris Agreement is one of the most challenging negotiation issues still to be resolved.

The JI is another crediting mechanism under the Kyoto Protocol. The JI works similarly to the CDM with the exception that it involved cooperation between two countries with emission target obligations. This meant that for each credit issued under the JI, corresponding adjustments needed to be made to the emission target obligations. In this case the cancelation of the equivalent amount of Kyoto Protocol allowances—Allocated Allowance Units (AAUs)— is required from the seller country to avoid the double counting of the mitigation outcomes with those of the buyer

Joint Implementation Mechanism (JI) 		Geographic coverage Any Annex I country of the Kyoto Protocol ¹⁴⁷
		Countries with projects 17
		Price range in 2019 Not available ¹⁴⁸
		Carbon pricing initiatives accepting issued credits for compliance EU ETS
Administered by	UNFCCC	Sectoral coverage 9 sectors
Established in	1997	 3% Agriculture  25% Energy efficiency  0.6% Forestry  3% Fuel switch  53% Fugitive emissions  14% Industrial gases  0.5% Manufacturing  2% Renewable energy  0.2% Waste
Type	International	
Registered activities	64	
Credit name	Emissions Reductions Units (ERUs)	
Credits issued (MtCO₂e)	872	
Credits retired or cancelled (MtCO₂e)	632	

¹⁴⁶ Such as by the Pilot Auction Facility and the Carbon Initiative for Development.


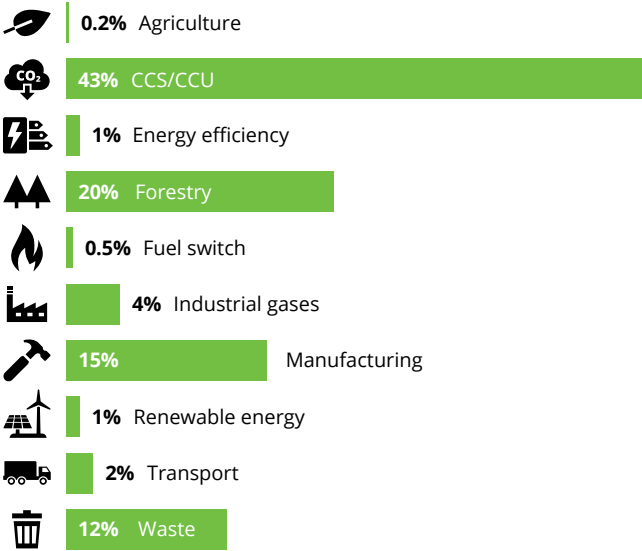
¹⁴⁷ Effectively developed countries who have ratified the Kyoto Protocol with emissions obligations and are listed in Annex I to the Protocol

¹⁴⁸ Accurate data is not available as JI credits once in the market are effectively treated the same as CERs as both could be used for compliance with obligations under the Kyoto Protocol, and the issuance of JI credits has ended after the first commitment period of the Kyoto Protocol ended.

country. As AAUs in turn are currently only valid under the Kyoto Protocol's first compliance period which ended in 2012, this sets JI apart from its sister Kyoto mechanism the CDM which does not have this limitation and in turn means that the JI is unlikely to transition into the Paris Agreement. Due to this nuance, there have been no activities within the JI mechanism since 2016, with no new projects registered or new ERUs issued. However JI's structure and process may serve as a template for the future Article 6.4 mechanism given it was designed to account for crediting by countries which all have emission reduction targets.

3.3.2 Major independent crediting mechanisms¹⁴⁹

Independent carbon crediting mechanisms generate credits that are mainly used for voluntary offsetting purposes—by both organizations and individuals—and form the bulk of the voluntary carbon offset credit market. However, some independent carbon credits are also used for compliance purposes in various carbon pricing initiatives, blurring the lines between the voluntary and compliance carbon markets. The number of independent crediting mechanisms has also been on the rise, but the voluntary market is dominated by the four largest mechanisms: the American Carbon Registry (ACR), the Climate Action Reserve, the Gold Standard and VCS.

American Carbon Registry (ACR)¹⁵⁰ 		Geographic coverage Global
		Countries with projects 5
		Price data for 2019 US\$3/tCO ₂ e ¹⁵¹ (unweighted average)
		Carbon pricing initiatives accepting issued credits for compliance CORSIA, Washington State CAR
Administered by Winrock International	Sectoral coverage 10 sectors	
Established in 1996		
Type Independent		
Registered activities 338		
Credit name Verified emissions reductions (VERs)		
Credits issued (MtCO₂e) 50		
Credits retired or cancelled (MtCO₂e) 8.5		

¹⁴⁹ There are numerous voluntary carbon offset programs in addition to the ones mentioned in this section. However, for practical purposes only the four largest voluntary standards are included. Combined, they account for over 80% of both the active market value and volume, according to the EcoSystem Marketplace reports on the State of the Voluntary Market.


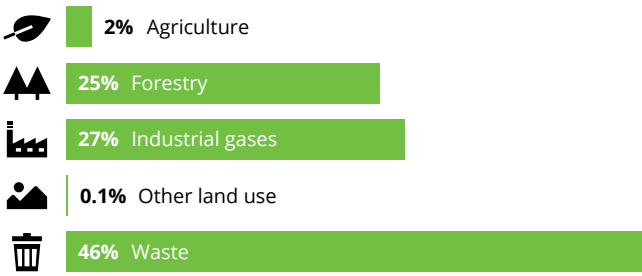
¹⁵⁰ Data excludes OPR activities under the California Compliance Offset Program

¹⁵¹ Source: Ecosystem Marketplace, *Financing Emissions Reductions for the Future—State of Voluntary Carbon Markets Report 2019*, December 2019.

The ACR is the first independent voluntary offset program in the world and have since branched out to credit emission reductions for both voluntary and compliance (e.g. CORSIA) markets, from projects based primarily in the US. ACR was initially founded as the Environmental Resources Trust with the help of The Environmental Defense Fund prior to merging with Winrock. Updates to its main rulebook, the ACR Standard, were made in 2019 to no longer credit international forestry projects or renewable energy or energy efficiency projects where the baselines include indirect emissions, regardless of location.¹⁵² ACR is the fourth-largest independent crediting mechanisms by total issued credit volume to date with most of its credits from forestry and carbon capture and storage

activities. In addition to its own crediting activities, ACR also currently serves as an Offset Project Registry (OPR) for the California Compliance Offset Program, as explained in Box 3.3.

The Climate Action Reserve originally began as the California Climate Action Registry and was created by the State of California in 2001 to promote and protect local businesses as they took actions to manage and reduce their GHG emissions. CRTs are mainly used for voluntary offsetting purposes and most (around 97 percent) are from activities that reduce emissions from landfills, reduce ozone-depleting substances, and forestry. 2019 saw Climate Action Reserve expand into Canada from its








Climate Action Reserve ¹⁵³ 		Geographic coverage	USA, Canada and Mexico
		Countries with projects	2
		Price data for 2019	US\$3/tCO ₂ e (unweighted average) ¹⁵⁴
		Carbon pricing initiatives accepting issued credits for compliance	CORSIA, Washington State CAR
Administered by	Climate Action Reserve	Sectoral coverage	5 sectors
Established in	2001		
Type	Independent		
Registered activities	274		
Credit name	Climate Reserve Tonnes (CRTs)		
Credits issued (MtCO₂e)	69 ¹⁵⁵		
Credits retired or cancelled (MtCO₂e)	40		

152 Source: American Carbon Registry, *American Carbon Registry Standard*, 2020, <https://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard>.

153 Data excludes OPR activities under the California Compliance Offset Program

154 Source: Ecosystem Marketplace, *Financing Emissions Reductions for the Future-State of Voluntary Carbon Markets Report 2019*, December 2019.

155 Does not count early action credits which transitioned to the California Compliance Offset Program

<div>Gold Standard</div>	Geographic coverage	Global
	Countries with projects	72
	Price in 2018	US\$4/tCO ₂ e (unweighted average) ¹⁵⁹
	Carbon pricing initiatives accepting issued credits for compliance	Colombia carbon tax, CORSIA, South Africa carbon tax
Administered by	Gold Standard Secretariat	
Established in	2003	
Type	Independent	
Registered activities	1249	
Credit name	Verified Emission Reductions (VERs)	
Credits issued (MtCO ₂ e)	97	
Credits retired or cancelled (MtCO ₂ e)	59	
<div>Sectoral coverage7 sectors</div> <div><div><div></div><div>0.2%</div><div>Agriculture</div></div><div><div></div><div>13%</div><div>Energy efficiency</div></div><div><div></div><div>2%</div><div>Forestry</div></div><div><div></div><div>26%</div><div>Fuel switch</div></div><div><div></div><div>6%</div><div>Fugitive emissions</div></div><div><div></div><div>42%</div><div>Renewable energy</div></div><div><div></div><div>11%</div><div>Waste</div></div></div>		

original US and Mexico boundaries, with the release of its *Canada Grassland Protocol*.¹⁵⁶ Its main rulebook on crediting, the *Reserve Offset Program Manual*, was also updated¹⁵⁷ to clarify several programmatic rules, including allowing for the option of “Ton-Year Accounting” in certain instances.¹⁵⁸ Outside of its crediting activities for voluntary offsetting, Climate Action Reserve is also an OPR for the state of California as explained in Box 3.3.

The Gold Standard was established by the World Wildlife Fund and several international NGOs as a crediting mechanism for both voluntary offsetting

and additional certification on the social impacts of CERs.¹⁶⁰ As such, it has a particular focus on generating co-benefits, such as employment and health improvements for local communities, alongside emission reductions from its projects. There are strict requirements relating to the demonstration of appropriate safeguards to ensure these co-benefits are realized. Like most of the other independent mechanism’s credits, VERs are used predominantly for voluntary offset purposes, although more than 200,000 Colombian VERs have been used for compliance purposes under the Colombia carbon tax. The Gold Standard


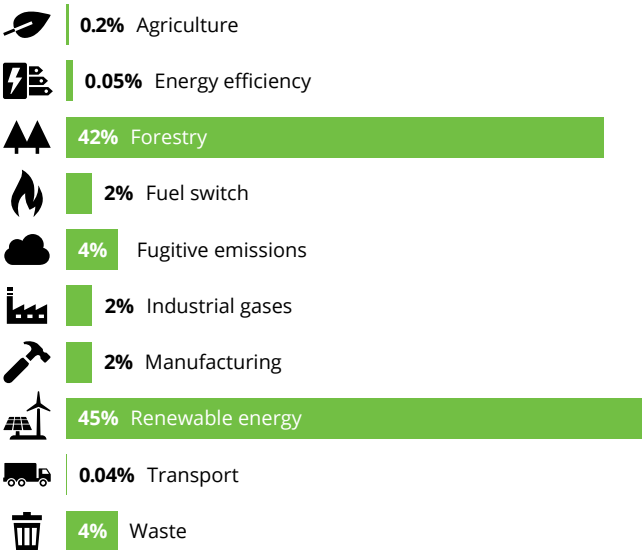
¹⁵⁶ Source: Climate Action Reserve, *First Canadian Offset Protocol Adopted by Reserve Board of Directors*, October 16, 2019, <https://www.climateactionreserve.org/blog/2019/10/16/first-canadian-offset-protocol-adopted-by-reserve-board-of-directors/>.

¹⁵⁷ Source: Climate Action Reserve, *Program Manuals and Policies*, 2019, <https://www.climateactionreserve.org/how/program/program-manual/>.

¹⁵⁸ Tonne-Year Accounting is an approach to address non-permanence risk in sequestration projects. Tonne-Year Accounting is an approach which discounts the issuance of credits to reflect the effective radiative forcing benefits to the atmosphere from the length of time that the stored carbon is protected. It differs from more traditional tonne-tonne accounting and the temporary credits approach used by the CDM. Tonne-year accounting differs from the use of buffer pools to ensure permanence, and the two approaches are not mutually exclusive.

¹⁵⁹ Source: Ecosystem Marketplace, *Financing Emissions Reductions for the Future-State of Voluntary Carbon Markets Report 2019*, December 2019.

¹⁶⁰ Certification relates to additional requirements that projects must meet to provide higher assurance on meeting key environmental quality principles such as additionality and taking appropriate steps to protect the interests of impacted local communities.

Verified Carbon Standard (VCS) ¹⁶¹ 		Geographic coverage Global
		Countries with projects 72
		Price in 2018 US\$3/tCO ₂ e ¹⁶²
		Carbon pricing initiatives accepting issued credits for compliance Colombia carbon tax, CORSIA, South Africa carbon tax
Administered by Verra	Sectoral coverage 10 sectors	
Established in 2005		
Type Independent		
Registered activities 1628		
Credit name Verified Carbon Units (VCUs)		
Credits issued (MtCO₂e) 410		
Credits retired or cancelled (MtCO₂e) 251		

is also active in aligning its crediting activities with the Paris Agreement and the UN Sustainable Development Goals (SDGs) through a best practice standard called the “Gold Standard for the Global Goals”, which has been active since 2017. The Gold Standard is the second-largest independent crediting mechanism by crediting project activity and credit volume with a significant portion of its crediting activities from renewable energy and cookstove fuel switch projects. It is based out of Switzerland, making it the only one of the four largest independent mechanisms to be based outside of the US.

The VCS Program was founded by several key carbon market actors including The Climate Group, the International Emissions Trading Association, the World Business Council for Sustainable Development, and the World Economic Forum. Its initial purpose was to certify and credit voluntary emission reduction projects. While the main use of VCUs is still predominantly for voluntary offsetting, over 17 million VCUs from VCS projects have been used for compliance under the Colombia carbon tax. Other compliance systems, including South Africa's carbon tax and CORSIA, have also sanctioned the use of VCUs.¹⁶³

¹⁶¹ <https://verra.org/> , Excludes OPR activities under the California Compliance Offset Program

¹⁶² Source: Ecosystem Marketplace, *Financing Emissions Reductions for the Future-State of Voluntary Carbon Markets Report 2019*, December 2019.

¹⁶³ Source: Carbon Pulse, *Colombia Carbon Tax-Linked Offset Cancellations Slow on Supply, Administrative Bottlenecks*, September 9, 2019, <https://carbon-pulse.com/81714/>.

Verra, which manages the VCS Program, released a substantive update to the VCS rules (VCS Version 4) in 2019 that restricted the type of future emission reduction activities that can still be credited under the mechanism. Notable amongst the sectors excluded from future crediting activities are most new grid-connected renewable energy projects.¹⁶⁴ The rationale for revising the scope of the VCS Program was that certain project types supported through carbon finance have since gained a foothold in the market and increased their competitiveness with emissions-intensive alternatives, and have therefore moved beyond their need to rely on carbon instruments as a source of critical, early-stage finance.

The VCS Program has also been active in aligning its crediting activities with the Paris Agreement and the UN SDGs. In January 2019, Verra launched the Sustainable Development Verified Impact Standard (SD VISta), which is a flexible framework for assessing and reporting on the sustainable development benefits of project-based activities. Projects can participate in both the VCS and SD VISta programs simultaneously. VCS projects will also soon be able to indicate their contributions to sustainable development by completing an SDG Contributions Report template. The VCS Program is currently the largest independent GHG crediting mechanism and is also the largest issuer of REDD+ and forestry credits overall. In addition, Verra is also an OPR for the State of California as explained in Box 3.3.

3.3.3 Regional, national and subnational crediting mechanisms

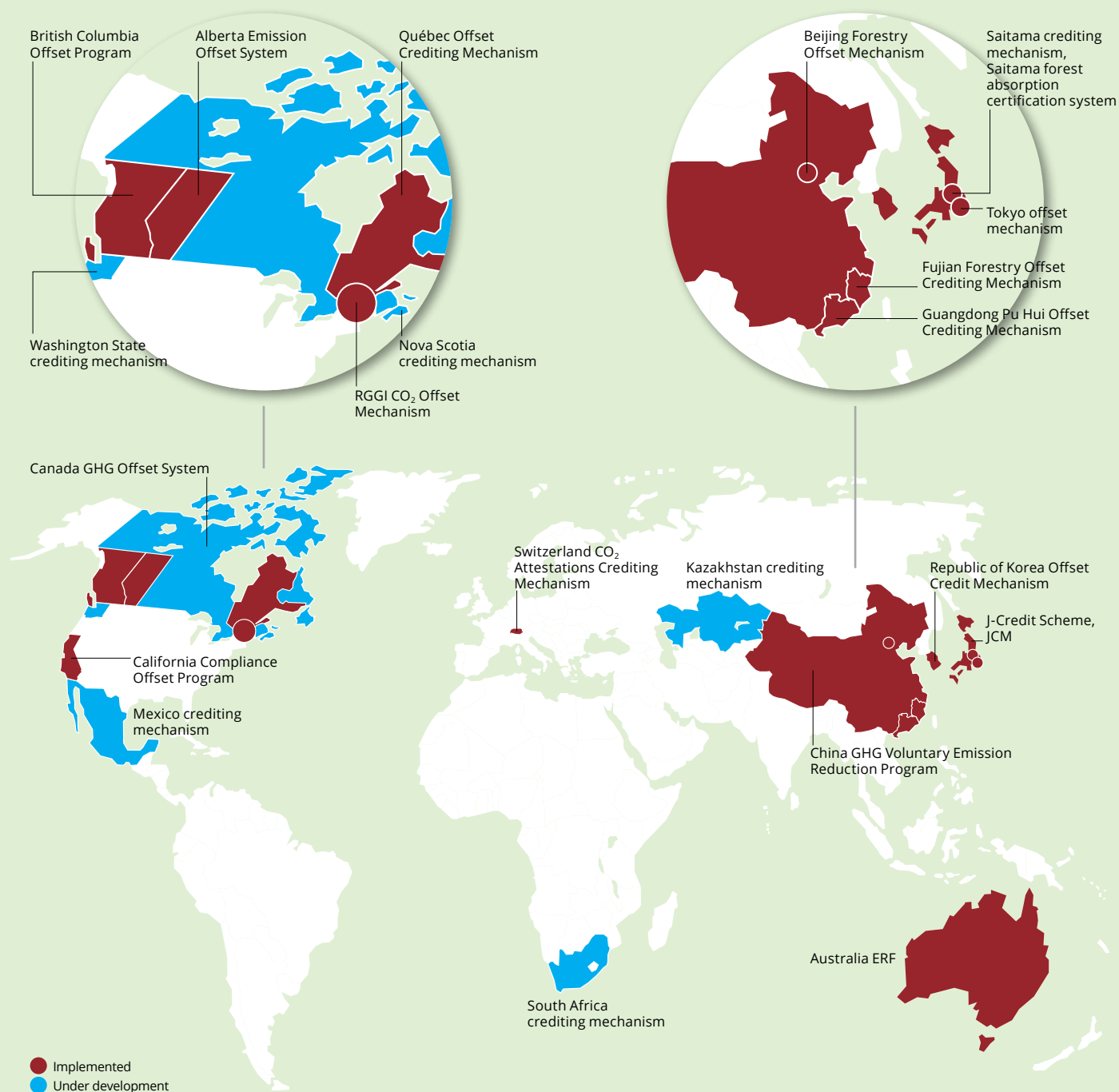
The growth in regional, national and subnational carbon pricing initiatives over the past years has also led to the increase in domestic crediting mechanisms, which provide the credits for the initiatives' offset components. In this section we provide an overview of regional, national and subnational mechanisms that have issued carbon credits that can be used under mandatory carbon pricing initiatives so far:

- Regional mechanisms are defined as those with crediting activities that span more than one country, they are governed by bilateral or plurilateral treaties and are administered by one or more of the participating nations.
- National mechanisms are those with crediting activities predominantly within a country, these mechanisms are governed by national legislation and are administered by the country's national government. Subnational mechanisms are those with crediting activities within either a country or jurisdictions within the country, they are governed by the legislation of the jurisdiction or inter jurisdictional treaties and they are administered by one or more subnational government such as a state or province.

As shown in the map, there are 17 regional, national and subnational implemented crediting mechanisms that have issued credits. Five are in development. The majority of implemented mechanisms are operated by jurisdictions in North America and East Asia.

¹⁶⁴ Certain exceptions apply, existing already registered projects are not affected. Source: Verra, *VCS Version 4 Update*, March 9, 2020, <https://verra.org/vcs-version-4-update/>.

Figure 3.6 / Status of regional, national and subnational crediting mechanisms


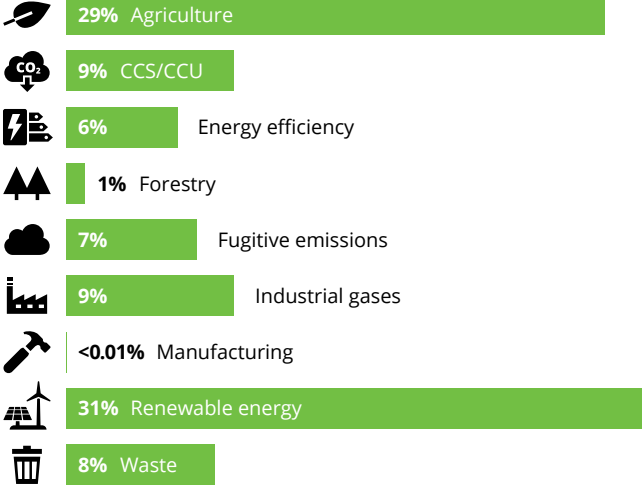


Note: The large circles represent cooperation initiatives on crediting between subnational jurisdictions. The small circles represent crediting mechanisms in cities.

JCM = Joint Crediting Mechanism. RGGI = Regional Greenhouse Gas Initiative.

Implemented crediting mechanisms have the required legislative mandate as well as the supporting procedures, emission reduction protocols and registry systems in place to allow for crediting to take place. Crediting mechanisms are considered to be under development if they have legislature in place allowing for the future implementation of carbon crediting system but has currently not issued any credits either due to missing components such as registries and protocols. The authors recognize that numerous other independent crediting mechanisms exist that generate credits sold on the voluntary carbon market.

Crediting mechanisms implemented: *National:* China GHG Voluntary Emission Reduction Program, J-Credit Scheme, Republic of Korea Offset Credit Mechanism, Switzerland CO₂ Attestations Crediting Mechanism. *Subnational:* Fujian Forestry Offset Crediting Mechanism, Guangdong Pu Hui Offset Crediting Mechanism, Québec Offset Crediting Mechanism, Saitama crediting mechanism, Saitama forest absorption certification system, Tokyo offset mechanism. **Crediting mechanisms under development:** *National:* Canada GHG Offset System, Kazakhstan crediting mechanism, Mexico crediting mechanism, South Africa crediting mechanism. *Subnational:* Nova Scotia crediting mechanism, Washington State crediting mechanism.

Alberta Emission Offset System 		Geographic coverage Province of Alberta
		Countries with projects 1
		Price data for 2019 CAN\$20–27/tCO ₂ e (US\$14–19/tCO ₂ e) ¹⁶⁵
		Carbon pricing initiatives accepting issued credits for compliance Alberta TIER ¹⁶⁶
Administered by Ministry of Environment and Parks		Sectoral coverage 9 sectors
Established in 2007		
Type Subnational		
Registered activities 271		
Credit name Alberta emissions offset		
Credits issued (MtCO₂e) 56		
Credits retired or cancelled (MtCO₂e) 2		

Alberta's crediting mechanism was originally enacted by Alberta's Climate Change Emissions Management Amendment Act of 2007¹⁶⁷ to mainly supply the credits for use by entities with obligations under Alberta's Specified Gas Emitters Regulation (SGER)—a baseline-and-credit ETS. To be eligible for crediting, all activities must take place within the province of Alberta.¹⁶⁸ The SGER was replaced by the CCIR in 2017, and subsequently by the TIER—another baseline-and-credit ETS—in January 2020.


Alberta's emission offset credits remain eligible for compliance use under TIER. Agricultural projects, renewable energy, and waste projects were the first to be used for crediting, but the coverage of the mechanism has expanded to other sectors. By the close of 2019, there were 16 approved protocols (with 5 flagged for review) spanning a variety of emission reduction activities, with most credits coming from projects in the renewable energy and agriculture sectors.

¹⁶⁵ Source: Carbon Pulse, *Alberta Offset Prices Rise Ahead of Compliance Deadline, Though Future Increases Uncertain*, January 21, 2020, <https://carbon-pulse.com/90525/>.

¹⁶⁶ Source: Government of Alberta, *Emission Offsets and TIER*, November 21, 2019, <https://www.alberta.ca/assets/documents/aep-tier-emission-offsets-webinar-presentation.pdf>.

¹⁶⁷ Source: Government of Alberta, *Overview of Alberta's Agricultural Carbon Offset Trading System 2007 to 2010*, April 13, 2012, <http://www.assembly.ab.ca/lao/library/egovdocs/2011/alard/161141.pdf>.

¹⁶⁸ Source: Government of Alberta, *Alberta Emission Offset System*, 2020, <https://www.alberta.ca/alberta-emission-offset-system.aspx>.

Australia ERF 		Geographic coverage Australia
		Countries with projects 1
		Price data for 2019 A\$16–18/tCO ₂ e (US\$10–11/tCO ₂ e) ¹⁶⁹
		Carbon pricing initiatives accepting issued credits for compliance Australia ERF safeguard mechanism
Administered by Clean Energy Regulatory	Established in 2012	Sectoral coverage 7 sectors
Type National	Registered activities 794	
Credit name Australia Carbon Credit Unit (ACCU)	Credits issued (MtCO₂e) 72 ¹⁷⁰	
Credits retired or cancelled (MtCO₂e) 43 ^{171, 172}		

Australia's crediting mechanism started in 2012 with the establishment of the Carbon Farming Initiative Act 2011. The Carbon Farming Initiative (CFI) was used to supply offsets to Australia's Carbon Pricing Mechanism – a national ETS. When the ETS was repealed in 2014, the CFI transitioned to the ERF. ACCUs issued by the ERF can be used for compliance purposes by entities covered under the Australia ERF Safeguard Mechanism or sold back to the ERF to meet Australia's national emission reduction targets. The government's function in the fund as the credit purchaser makes the ERF unique. Developers of projects seeking to generate ACCUs can enter

into contracts with the Australian government to deliver future ACCUs, and contracts are won through a reverse auction held by the Clean Energy Regulatory on the price of ACCUs to be delivered. As of April 2020, ten auctions had taken place with 475 projects contracted this way to deliver over 193 million ACCUs, with about two-thirds coming from forestry and land use activities.¹⁷³ This makes the ERF government the main purchaser of ACCUs. In addition, the government is actively seeking to introduce more flexibility to the ERF. For example, on February 20, 2020 the government announced the inclusion of new "option" contracts.¹⁷⁴

¹⁶⁹ Based on average auction prices. Source: Government of Australia, *Quarterly Carbon Market Report*, December 2019, <http://www.cleanenergyregulator.gov.au/DocumentAssets/Documents/Quarterly%20Carbon%20Market%20Report%20-%20December%20Quarter%202019.pdf>.


¹⁷⁰ taken from ERF register as of January 2020.

¹⁷¹ Source: Government of Australia, *Carbon Abatement Contract Register*, April 3, 2020, <http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/carbon-abatement-contract-register>.

¹⁷² Based on deliveries to government only.

¹⁷³ Source: Government of Australia, *Auction March 2020*, April 3, 2020, <http://www.cleanenergyregulator.gov.au/ERF/Auctions-results/march-2020>

¹⁷⁴ Option contracts provide project proponents with the security of a contracted price for credits to invest in a new carbon abatement project. They can then choose whether to deliver abatement at the contracted price to the government or to sell the credits elsewhere. In addition, on January 20, 2020, the government proposed amendments to allow projects and their credits under the ERF to be transferred to new project proponents.






Beijing Forestry Offset Mechanism		Geographic coverage	Municipality of Beijing
		Countries with projects	1
		Price data for 2019	CNY11/tCO ₂ e (US\$2/tCO ₂ e—unweighted average) ¹⁷⁵
		Carbon pricing initiatives accepting issued credits for compliance	Beijing pilot ETS
Administered by	Beijing Ecology and Environment Bureau	Sectoral coverage	1 sector
Established in	2014		
Type	Subnational		
Registered activities	4		
Credit name	Beijing Forestry Certified Emission Reductions (BFCERs)		
Credits issued (MtCO₂e)	0.2		
Credits retired or cancelled (MtCO₂e)	Not available		

The Beijing forestry offset mechanism is a subnational crediting mechanism running in parallel with the China GHG Voluntary Emission Reduction Program (the national crediting mechanism). BFCERs are only eligible for compliance use under the Beijing pilot ETS. The Beijing forestry offset mechanism was established in the same year as China's national crediting mechanism and focuses on crediting

forestry carbon sequestration activities within the Beijing municipality. Only 0.2 million BFCERs have been issued and the total transaction value since 2014 is just over 2 million CNY.¹⁷⁶ Due partially to the size of its geographical coverage whereby only activities within the Beijing municipality are eligible to receive credits, it is also the smallest of China's subnational crediting mechanisms.

¹⁷⁵ Source: Beijing Carbon Emissions Trading Platform, *Average Transaction Price Table*, 2020, <https://www.bjets.com.cn/article/jyxx/>

¹⁷⁶ Source: China Carbon Emissions Trading Portal, *Development of China's Carbon Sink Trading and Policy Suggestions*, October 8, 2019, http://www.tanpaifang.com/tanhui/2019/1008/65813_3.html.

British Columbia Offset Program 		Geographic coverage Province of British Columbia
		Countries with projects 1
		Price data for 2019 CAN\$11.41/tCO ₂ e (weighted average) ^{177, 178}
		Carbon pricing initiatives accepting issued credits for compliance Greenhouse Gas Industrial Reporting and Control Act (GGIRCA)
Administered by British Columbia Ministry of Environment and Climate Change Strategy		Sectoral coverage 4 sectors
Established in 2016		 3% Energy efficiency  80% Forestry  17% Fuel switch  1% Waste
Type Subnational		
Registered activities 20		
Credit name British Columbia Offset Units		
Credits issued (MtCO₂e) 6		
Credits retired or cancelled (MtCO₂e) 3		

British Columbia's crediting mechanism was legislated through the GHG Emission Control Regulation under the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA) in 2014. Emissions reductions from projects within British Columbia can earn British Columbia Offset Units, which can then be sold to facilities covered under the GGIRCA—a baseline-and-credit ETS, such as LNG operators, to satisfy their legislative requirements. The credits can also be sold to public sector organizations in the province of British Columbia to offset their emission


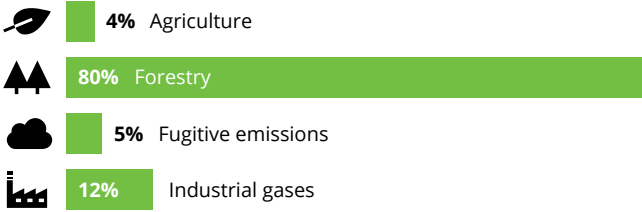
reductions mandated by the British Columbia carbon neutral government program under the Climate Change Accountability Act¹⁷⁹ and the Carbon Neutral Government Regulation. While most of the credits previously issued under the British Columbia mechanism are from forestry and fuel switching activities, currently only fuel switching projects within the province have an established protocol and are eligible for crediting. Many of the projects from other sectors were grandfathered under section 54 of GGIRCA on or before June 30, 2016.¹⁸⁰

¹⁷⁷ Price reflects purchases from government

¹⁷⁸ Source: Government of British Columbia, *2018 Carbon Neutral Government Year in Review 2018: Summary*, May 2020, https://www2.gov.bc.ca/assets/gov/environment/climate-change/cnar/2018/347953_attachment_cng_annual_report_summary_2018.pdf.

¹⁷⁹ Source: Government of British Columbia, *Greenhouse Gas Emission Offset Projects*, 2020, <https://www2.gov.bc.ca/gov/content/environment/climate-change/industry/offset-projects>.

¹⁸⁰ Source: Government of British Columbia, *Protocol for the Creation of Forest Carbon Offsets in British Columbia*, 2016, <https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/consulting-with-first-nations/agreements/other-docs/forest-carbon-offset-protocol.pdf>.

California Compliance Offset Program 		Geographic coverage US
		Countries with projects 1
		Price data for 2019 US\$14.13/tCO ₂ e ¹⁸¹ (weighted average)
		Carbon pricing initiatives accepting issued credits for compliance California ETS, Québec ETS
Administered by California Air Resources Board (CARB)		Sectoral coverage 4 sectors
Established in 2013		
Type Subnational		
Registered activities 443		
Credit name California Air Resource Board Offset Credits (ARBOCs)		
Credits issued (MtCO₂e) 168.6 ¹⁸²		
Credits retired or cancelled (MtCO₂e) 89		

The California Compliance Offset Program is the mechanism that supplies carbon offset credits within California's cap-and-trade program. The Compliance Offset Program is implemented and overseen by CARB, and leverages administrative services of approved OPRs to assist in administering the offset project registration and credit issuance application process as explained in Box 3.3.

Based on new legislation (AB 398), the California cap-and-trade regulation was modified. The amount of offset credits compliance entities can use to meet their obligations under California's cap-and-trade program (also called the quantitative usage limit) will be reduced from the current 8 percent to 4 percent in 2021-2025, and then 6 percent thereafter.¹⁸³ In addition, AB 398 required regulatory changes so that no more than one half of this quantitative offset

usage limit can be met from offset credits that do not provide direct environmental benefits within the state. The regulatory amendments that took effect on April 1, 2019 specify that both projects located within and outside of California must demonstrate they provide direct environmental benefits to California.¹⁸⁴

In addition, AB 398 required CARB to establish a Compliance Offsets Protocol Task Force, which will provide guidance to CARB in approving new offset protocols for the cap-and-trade program that provide direct environmental benefit to the state. Additional legislation, AB 293, requires this task force to consider crediting in agricultural and natural lands, as well as the restoration of wetlands.¹⁸⁵ Currently California's Compliance Offset Program is the largest subnational crediting mechanism by volume of credits issued, with the majority of its credits from forest projects.

¹⁸¹ Source: California Air Resources Board, *Summary of Transfers Registered in CITSS*, 2020, <https://ww3.arb.ca.gov/cc/capandtrade/2019transferssummaryfinal.xlsx>.

¹⁸² Source: California Air Resources Board, *ARB Offset Credit Issuance*, 2020, https://ww3.arb.ca.gov/cc/capandtrade/offsets/issuance/arbof_issuance.xlsx.







¹⁸³ Source: Government of California, *Assembly Bill No. 398*, July 25, 2017, https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398.

¹⁸⁴ Source: Government of California, *Cap-and-Trade Regulation*, April 1, 2019, https://ww3.arb.ca.gov/cc/capandtrade/ct_reg_unofficial.pdf.

¹⁸⁵ Source: State of California, *AB 293 Greenhouse gases: offset protocols*, July 15, 2019.

Box 3.3 / California Offset Project Registry

Under California's Cap-and-Trade Regulation, the California Air Resources Board (CARB) may approve qualified Offset Project Registries (OPRs) to help administer parts of the Compliance Offset Program within California's Cap-and-Trade Program. Once approved by CARB, OPRs facilitate the registration, listing, and verification of offset projects prior to issuance of registry offset credits. OPRs conduct a first step review of project applications under the California program and issue Registry Offset Credits (ROCs) to eligible projects which then go to CARB to apply for the formal conversion to ARBOCs. CARB may carry out a second review of the project application and if in agreement with the OPR conclusions, issues ARBOCs when the OPR cancels the ROCs. ARBOCs can then be used for compliance purposes under the cap-and-trade program. Currently there are three approved OPRs – ACR, CAR, and Verra – all of which are US based, independent offset crediting entities.

China GHG Voluntary Emission Reduction Program 		Geographic coverage China
		Countries with projects 1
		Price data for 2019 CNY7–15/tCO ₂ e (US\$1–2tCO ₂ e) ¹⁸⁶
		Carbon pricing initiatives accepting issued credits for compliance Beijing pilot ETS, Chongqing pilot ETS, CORSIA, Fujian pilot ETS, Guangdong pilot ETS, Hubei pilot ETS, Shanghai pilot ETS, Shenzhen pilot ETS, Tianjin pilot ETS
Administered by Ministry of Ecology and Environment	Established in 2014	Sectoral coverage 5 sectors
Type National	Registered activities 287	 8% Energy efficiency  0.01% Forestry  14% Fuel switch  59% Renewable energy  18% Waste
Credit name Chinese Certified Emission Reductions (CCERs)	Credits issued (MtCO₂e) 53	
Credits retired or cancelled (MtCO₂e) Not available		


The China GHG Voluntary Emission Reduction Program was established by the National Development and Reform Commission (NDRC) as

an offset crediting mechanism to support greater control and management of domestic GHG emissions and the promotion of the domestic carbon market.

CCERs can be used by the compliance entities under Chinese ETS pilots to help meet emission obligations. The system builds upon China's experience in the CDM¹⁸⁷ and, consequently, the system shows many similarities in its crediting approach to the CDM, including the adapted use of most of the 200+ CDM methodologies. New CCER activities including new credit issuances and projects have been suspended by the Chinese government since March 2017 in order to revise the regulations and further improve and standardize transactions to promote low-carbon development.¹⁸⁸ Already issued CCERs can still be traded and used, but the supply of additional CCERs to the market is effectively frozen. The approval in March 2020 of the China GHG Voluntary Emission Reduction Program to supply credits to CORSIA may create an impetus to change this situation. There was also high expectation that the China GHG Voluntary Emission Reduction Program might provide

credits for the future China national ETS. However, announcements by the Chinese government in recent years indicate that CCERs' entry into the ETS from its initial phase is not certain.

The Fujian forestry offset crediting mechanism was launched as a subnational crediting mechanism to credit emission reductions from forestry sequestration activities within the province of Fujian. The launch of a forestry-focused crediting mechanism in Fujian is perhaps not surprising considering that as much as two-thirds of the province is covered by forests, making Fujian the most forest covered province in China.¹⁹⁰ Currently, three different types of forestry activities are approved under the mechanism which has issued about two million FFCERs. The credits are only eligible for compliance use in the Fujian pilot ETS, and FFCER projects cannot apply for CCERs. The cumulative trading volume of

Fujian Forestry Offset Crediting Mechanism		Geographic coverage	Province of Fujian
		Countries with projects	1
		Price data for 2019	CNY10–20/tCO ₂ e (US\$1–30/tCO ₂ e) ¹⁸⁹
		Carbon pricing initiatives accepting issued credits for compliance	Fujian pilot ETS
Administered by	Fujian Ecology and Environment Bureau	Sectoral coverage	1 sector
Established in	2017	 <div>100% Forestry</div>	
Type	Subnational		
Registered activities	12		
Credit name	Fujian Forestry Certified Emission Reduction (FFCERs)		
Credits issued (MtCO₂e)	2		
Credits retired or cancelled (MtCO₂e)	Not available		

187 Source: CDM China, *Clean Development Mechanism in China*, 2020, <http://cdm-en.ccchina.org.cn/>.

188 Source: Government of China, *National Development and Reform Commission's Portal*, November 30, 2019, https://www.ndrc.gov.cn/zcfb/zcfbgg/201703/t20170317_841211.html%20March%2019%202020.

189 Estimated based on 2018 and 2019 cumulative exchange volumes and cumulative exchange values.


190 People's Daily, *Take a Look at China's "Greenest" Province*, March 21, 2019, <http://en.people.cn/n3/2019/0321/c90000-9559174.html>

FFCERs is about 2 million credits, making it the largest of the three subnational crediting mechanisms in China by issuance and transaction volume.¹⁹¹ Along with the environmental benefits, the profits from trading FFCERs are intended to directly benefit the local forest farmers and help poverty alleviation in the province.

The Pu Hui offset crediting mechanism is a subnational mechanism that credits emission reduction activities within the province of Guangdong. PHCERs are primarily intended to be used by compliance entities under the Guangdong pilot ETS. Similar to other Chinese subnational mechanisms, projects applying for PHCERs are not eligible to apply for CCERs and vice versa.¹⁹⁴ The Pu Hui mechanism is designed to facilitate the reduction of emissions by the general public through promoting low-carbon social actions. As such, the project types

it credits focus on community based activities, including distributed photovoltaics, energy-saving air-conditioning, domestic air-source heat pumps, cycling and forestry carbon sinks.

2019 saw the reinstatement of new PHCER crediting activities, which had been suspended by the provincial government since August 2018, pending an evaluation of the mechanism.¹⁹⁵ Registration of new PHCER projects and issuance of new credits resumed in of June 2019. In the 2018 compliance year, compliance entities of the Guangdong pilot ETS were allowed to use 1.5 million offset credits, including both CCERs and PHCERs, toward their compliance obligations.¹⁹⁶ The market share of PHCERs during the compliance year was 2.2 percent of the Guangdong pilot ETS.¹⁹⁷ The limit on offset credit use including PHCERs for 2019 under the Guangdong pilot ETS has not yet been announced.







Guangdong Pu Hui Offset Crediting Mechanism		Geographic coverage	Province of Guangdong
		Countries with projects	1
		Price data for 2018	CNY17/tCO ₂ e (US\$2/tCO ₂ e—unweighted average) ¹⁹²
		Carbon pricing initiatives accepting issued credits for compliance	Guangdong pilot ETS
Administered by	Guangdong Ecology and Environment Bureau	Sectoral coverage	2 sectors ¹⁹³
Established in	2017		
Type	Subnational		
Registered activities	48		
Credit name	Pu Hui Certified Emissions Reductions (PHCERs)		
Credits issued (MtCO₂e)	1		
Credits retired or cancelled (MtCO₂e)	Not available		

¹⁹¹ Source: Government of China, *Five New Forestry Carbon Sink Projects in Fujian*, November 20, 2019, <http://www.forestry.gov.cn/chinagreen/3/20191120/110252168138547.html>.

¹⁹² Sinocarbon data

¹⁹³ Source: Guangzhou Carbon Institute, *Notice of Guangdong Provincial Department of Ecology and Environment on Resumption of Accepting Proposals for Provincial Carbon Incentives for Emission Reductions*, June 4, 2019,

¹⁹⁴ Source: Government of China, *Guangdong Development and Reform Commission's Carbon Emission Reduction Certification Management*, March 30, 2017, <http://files.gemas.com.cn/carbon/201703/20170330171928990.pdf>.

J-Credit Scheme 	
Geographic coverage	Japan
Countries with projects	1
Price data for 2019	1,851 yen/t-CO ₂ (Renewable energy) 1,473 yen/t-CO ₂ (Energy saving and others)
Carbon pricing initiatives accepting issued credits for compliance	Saitama ETS
Administered by	Government of Japan
Established in	2013 ¹⁹⁸
Type	National
Registered activities	812
Credit name	J-credits
Credits issued (MtCO₂e)	5.9
Sectoral coverage	5 sectors
	 33% Energy efficiency  1.4% Forestry  0.1% Fuel switch  66% Renewable energy  0.6% Waste

The J-Credit Scheme was established in 2013 to support regional efforts to reduce GHG emissions in Japan. This scheme integrates two voluntary crediting mechanisms in the country: Japan's Domestic Credit Scheme and the Japan Verified Emission Reductions (J-VER). J-credits are predominantly used for voluntary offsetting, in Japan including domestic initiatives such as

the Keidanren's Commitment to a Low-Carbon Society¹⁹⁹, reporting emissions in accordance with the Act on the Promotion of Global Warming Countermeasures (1998),²⁰⁰ and reporting energy efficiency projects under the Act on Rational Use of Energy (1979).^{201, 202} Credits from forestry projects under the J-credit mechanism can also be used for compliance under the Saitama ETS.²⁰³

195 Source: ETS in China, *Guangdong Province Pauses Its Local Offset Mechanism*, August 30, 2018, <https://ets-china.org/news/guangdong-province-pauses-its-local-offset-mechanism/>.

196 Source: ICAP, *China - Guangdong Pilot ETS*, April 3, 2020, https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list-&systems%5B%5D=57.

197 Source: Guangzhou Carbon Institute, *Guangdong Carbon Market 2018 Annual Performance Transaction Data Report*, July 23, 2019, <http://www.cnemission.com/article/jydt/scyj/201907/20190700001702.shtml>.

198 Source: EDF, *Japan: An Emissions Trading Case Study*, May 2015, <https://www.edf.org/sites/default/files/japan-case-study-may2015.pdf>.





199 Source: Keidanren, *Keidanren Policy and Action*, accessed April 9, 2020, <http://www.keidanren.or.jp/>.

200 Source: Government of Japan, *Act on Promotion of Global Warming Countermeasures*, accessed April 9, 2020, <http://www.cas.go.jp/jp/seisaku/hourei/data/APGWC.pdf>.

201 Source: Ibid.

202 Source: Japan Credit, *The J-Credit Scheme Is Designed to Certify the Amount of Greenhouse Gas Emissions Reduced and Removed by Sinks within Japan*, accessed April 9, 2020, <https://japancredit.go.jp/english/>.



203 Source: Government of Saitama, *Credits Available under This System*, 2020, <https://www.pref.saitama.lg.jp/a0502/saitamacredit.html>.

Joint Crediting Mechanism (JCM) 		Geographic coverage Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand, Philippines ²⁰⁴
		Countries with projects 17
		Price data for 2019 Not available
		Carbon pricing initiatives accepting issued credits for compliance None
Administered by	Government of Japan	Sectoral coverage 3 sectors  24% Energy efficiency  75% Renewable energy  1% Transport
Established in	2012	
Type	Regional	
Registered activities	56	
Credit name	JCM credits	
Credits issued (MtCO₂e)	0.03	
Credits retired or cancelled (MtCO₂e)	0	

The JCM was initiated by Japan as a bilateral crediting mechanism between Japan and partner countries. The partner countries who have signed the bilateral document with the government of Japan host and implement the emission reduction projects and the JCM issues JCM credits to approved mitigation outcomes. The Japanese government provides advanced low and decarbonization technology and technical support and also purchases the JCM credits to meet its emission reduction obligations.

The JCM is one of two national mechanisms that credits internationally transferred mitigation outcomes under the Article 6 Paris Agreement. While only very low volumes have been issued to date, it may serve as a potential model for bilateral cooperation and provides structure for government-to-government collaboration. The Japanese government is now implementing the JCM and sharing experience of mitigation outcomes under Article 6 by using the JCM, (see section 4.2 for more).

204 As of 2019 these countries have signed bilateral agreements with the government of Japan on JCM.



Québec Offset Crediting Mechanism 		Geographic coverage Canada
		Countries with projects 1
		Price data for 2019 US\$12.79/tCO ₂ e ²⁰⁵ (weighted average)
		Carbon pricing initiatives accepting issued credits for compliance Québec ETS, California ETS
Administered by	Ministère de l'Environnement et de la Lutte contre les changements climatiques	Sectoral coverage 2 sectors
Established in	2013	
Type	Subnational	
Registered activities	15	
Credit name	Québec Offset Credits	
Credits issued (MtCO₂e)	0.8	
Credits retired or cancelled (MtCO₂e)	None	

The government of Québec established an ETS in 2013 and linked it with California's as part of the Western Climate Initiative. It also established a crediting program that issues Québec offset credits intended for organizations wanting to meet compliance obligations under the ETS. Those credits can also be bought by individuals and organizations that want to voluntarily purchase carbon credits to offset their emissions.

Throughout 2019, just over 85,000 Québec Offset Credits were issued, all from landfill gas mitigation projects. The Québec government is working to expand the mechanism crediting protocols, and by 2020, Québec aims to release a draft forestry protocol that utilizes a quantification approach.²⁰⁶

²⁰⁵ Source: California Air Resources Board, *Summary of Transfers Registered in CITSS*, 2020, <https://ww3.arb.ca.gov/cc/capandtrade/2019transferssummaryfinal.xlsx>.

²⁰⁶ Source: Government of Québec, *The Carbon Market: Offset Credits*, 2020, <http://www.environnement.gouv.qc.ca/changements/carbone/credits-compensatoires/index-en.htm>.

Regional Greenhouse Gas Initiatives' (RGGI) CO₂ Offset Mechanism 		Geographic coverage States of Connecticut, Delaware, Maine, Maryland, New Jersey, New York, Vermont ²⁰⁷
		Countries with projects 1
		Price data for 2019 US\$5/tCO ₂ e ²⁰⁸
		Carbon pricing initiatives accepting issued credits for compliance RGGI, Virginia ETS
Administered by	Cooperative of New England and Mid-Atlantic States of the US	Sectoral coverage 1 sector
Established in	2005	 <div>100% Waste</div>
Type	Subnational	
Registered activities	1	
Credit name	RGGI CO ₂ offset allowances	
Credits issued (MtCO₂e)	0.048	
Credits retired or cancelled (MtCO₂e)	Not available	

The RGGI CO₂ Offset Mechanism is designed to credit project-based GHG emission reductions that follows one of the approved crediting protocols and is located within one of the states of the RGGI program. The RGGI CO₂ offset allowances can be used by compliance entities under the RGGI program to meet emission obligations. Credits can be issued to five types of activities spanning from forestry to methane avoidance (both industrial and agricultural). However, only one landfill gas capture project has been registered so far. The project issued just over 15,000 credits in 2019. The low credit volume suggest a low level of demand, likely caused by the relatively low prices in RGGI.²⁰⁹



As the mechanism is cooperatively administered by the RGGI states—each with their own regulatory bodies in charge of crediting within their state, crediting rules differ across states. The states of Delaware, Maryland, New Jersey and Vermont will only credit projects that avoid methane emissions from landfills and agriculture, while Massachusetts, New Hampshire and Rhode Island do not allow crediting of any offset activities under RGGI.²¹⁰ However, the RGGI CO₂ offset allowances, once issued, are fungible across all RGGI States and can be used by compliance entities within any state.



²⁰⁷ The RGGI states of Massachusetts, New Hampshire, and Rhode Island are not include as they do not allow crediting of any offset activities under RGGI.

²⁰⁸ Source: RGGI, *Transaction Price Report*, 2020, https://rggi-coats.org/eats/rggi/index.cfm?fuseaction=reportsv2.price_rpt&clearfuseattrs=true.

²⁰⁹ Source: RGGI, *Annual report on the market for RGGI CO₂ allowances: 2018*, April 2019.

²¹⁰ Source: RGGI, *Offsets*, 2020, <https://www.rggi.org/allowance-tracking/offsets>.

Saitama Target Setting Emissions Trading System 		Geographic coverage Saitama Prefecture
		Countries with projects 1
		Price data for 2019 N/A ²¹¹
		Carbon pricing initiatives accepting issued credits for compliance Saitama Target Setting Emissions Trading System, Tokyo ETS
Administered by Saitama Prefecture Government	Sectoral coverage 1 sector	
Established in 2011	 100% Renewable energy	
Type Subnational		
Registered activities 680		
Credit name Offset credits		
Credits issued (MtCO₂e) 6.2		
Credits retired or cancelled (MtCO₂e) 0.17		

Saitama forest absorption certification system 		Geographic coverage Saitama Prefecture
		Countries with projects 1
		Price data for 2019 N/A ²¹²
		Carbon pricing initiatives accepting issued credits for compliance Saitama Target Setting Emissions Trading System
Administered by Saitama Prefecture Government	Sectoral coverage 1 sector	
Established in 2010	 100% Forestry	
Type Subnational		
Registered activities 153		
Credit name Forest Absorption Credits		
Credits issued (MtCO₂e) 0.01		
Credits retired or cancelled (MtCO₂e) 0 ²¹³		

²¹¹ In 2019 credits were untraded

²¹² From 2020 credits are tradeable.


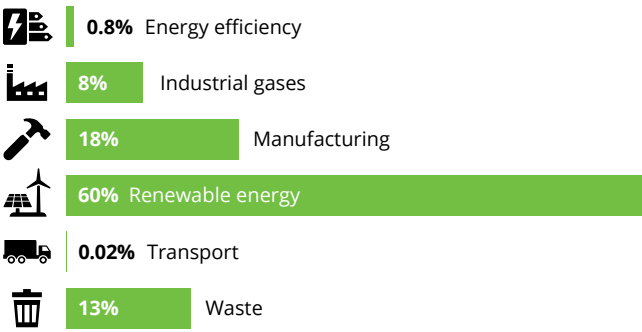
²¹³ Volume of credits transferred from the Saitama Forest Absorption Certification System to Saitama Target Setting Emissions Trading System.

The Saitama prefecture in Japan launched its offset mechanism alongside its ETS in 2011. GHG reductions from small or medium sized businesses can generate credits, as well as renewable energy production. Solar power (heat), wind, geothermal, and hydropower were certified previously at 1.5 times the amount of credits, but during 2020 will decrease to 1, which is when the third compliance period starts.²¹⁴ Large-scale facilities within the prefecture's ETS can utilize credits for compliance purposes.²¹⁵

The Saitama forest absorption certification system generates credits for companies engaged in forest maintenance activities and its protocol was established in 2010.²¹⁶ Credits can be converted and used under the Saitama ETS (along with J-Credit forestry sector credits).²¹⁷ Planting diverse tree

species and other forest improvement activities are among projects implemented by companies and organizations under the Saitama Prefecture Forest Creation Agreement for the purpose of social contribution.²¹⁸

The Republic of Korea offset credit mechanism was implemented to provide the offset credits for use within the Korea ETS. It initially focused on crediting facilities in the Republic of Korea that are not covered by the ETS. The crediting mechanism allows for CERs from Korean CDM projects to be reissued as KOCs, provided they are cancelled from the CDM. A large number of CERs from Korea projects have been converted to KOCs. KOCs must be further converted into Korean Credit Units by the Korean government before it can be used for compliance obligations.²²²

Republic of Korea Offset Credit Mechanism 		Geographic coverage Global ²¹⁹
		Countries with projects 1 ²²⁰
		Price data for 2019 KRW30,000–40,000/tCO ₂ e (US\$25–33/tCO ₂ e) ²²¹
		Carbon pricing initiatives accepting issued credits for compliance Republic of Korea ETS
Administered by	Ministry of Environment	Sectoral coverage 6 sectors
Established in	2015	
Type	National	
Registered activities	164	
Credit name	Korean Offset Credits (KOCs)	
Credits issued (MtCO₂e)	16	
Credits retired or cancelled (MtCO₂e)	Not available	

²¹⁴ Source: Government of Saitama, *About Holding of Briefing Session Such as Application Matter of the Third Plan Period*, 2020, https://www.pref.saitama.lg.jp/a0502/dai3keikaku_gaiyou.html.

²¹⁵ Source: Government of Saitama, *Credits Available under This System*, 2020, <https://www.pref.saitama.lg.jp/a0502/saitamacredit.html>.

²¹⁶ Source: Government of Saitama, *Saitama Forest CO₂ Absorption Certification System*, 2020, <https://www.pref.saitama.lg.jp/a0905/co2ninsyou.html>.

²¹⁷ Source: Government of Saitama, *Credits Available under This System*, 2020, <https://www.pref.saitama.lg.jp/a0502/saitamacredit.html>.


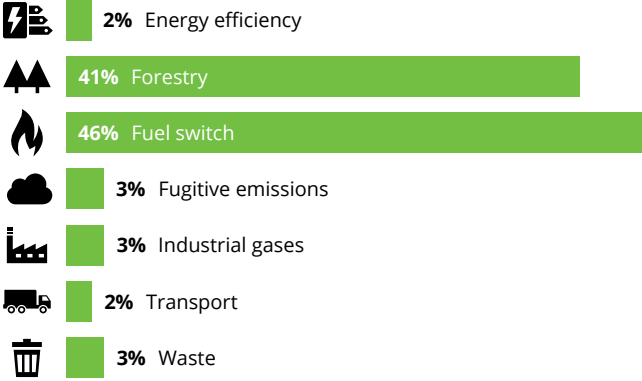
²¹⁸ Source: Ibid.

²¹⁹ Projects must be owned by Korean enterprises and registered under the CDM.

²²⁰ While CDM projects owned by South Korean enterprises are eligible for crediting through credit conversion process where CERs are converted to KOCs, the projects remain CDM projects

²²¹ Source: Government of South Korea, *Offset Registry System*, 2020, <https://ors.gir.go.kr/ors/>.

²²² Source: Korean Research Institute on Climate Change, *Introduction to Korea Emission Trading Scheme; Korean Offsetting program*, February 7, 2018, https://www.icao.int/Meetings/carbonmarkets/Documents/04_Session2_Yoo_KETS.pdf.

Switzerland CO₂ Attestations Crediting Mechanism 		Geographic coverage Switzerland
		Countries with projects 1
		Price data for 2019 CHF80–82/tCO ₂ e (US\$83–85/tCO ₂ e) ²²³
		Carbon pricing initiatives accepting issued credits for compliance producers and importers of fossil motor fuels only
Administered by	Swiss Federal Office for the Environment & Swiss Federal Office of Energy	Sectoral coverage 7 sectors
Established in	2012	
Type	National	
Registered activities	134	
Credit name	Swiss CO ₂ attestations	
Credits issued (MtCO₂e)	2.4 ²²⁴	
Credits retired or cancelled (MtCO₂e)	3.6 ²²⁵	

Emission reduction projects and programs can receive “attestations” under the Swiss CO₂ Act and the CO₂ Ordinance. The credits are issued to activities in Switzerland and cannot be traded outside of the country. Companies that produce or import fossil motor fuels can use these credits to compensate for their CO₂ emissions and fulfil their compliance obligations under the Switzerland




CO₂ Act. Additionality requirements apply in such cases. Credits generated in this manner can be traded, but only be used by companies obliged to compensate.²²⁶ Note there are currently more retired credits than issued as attestations can be issued to companies exempt from the carbon tax and that chose to over-fulfill reduction commitments.

²²³ Source: KLIK, *Company Platform*, 2020, <https://www.jahresbericht.klik.ch/de/Aktivitaeten/Plattform-Unternehmen.239.html>.

²²⁴ Swiss companies are not obliged to report an annual issuance, therefore confirmation of 2019 volumes are still pending.

²²⁵ Some retired volumes include those transitioned from Swiss CO₂ levy projects, hence retirement exceeds the amount of issued attestations.

²²⁶ Source: Federal Office for the Environment (Switzerland), *Compensation Projects in Switzerland*, 2020, <https://www.bafu.admin.ch/bafu/en/home.html>.

Tokyo Cap-and-Trade Program (Tokyo CaT) 		Geographic coverage 1 country in 1 region
		Countries with projects 1
		Price data for 2019 Renewable energy offset credits: JPY 4,800-6,400/tCO ₂ e (US\$46-59) ²²⁷
		Carbon pricing initiatives accepting issued credits for compliance Tokyo cap and trade program
Administered by Tokyo Metropolitan Government (TMG)		Sectoral coverage²²⁸ 2 sectors
Established in 2010		 Energy efficiency  Renewable energy Sector split information not available
Type Subnational		
Registered activities 1,481		
Credit name No formal umbrella name for offset credits ²²⁹		
Credits issued (MtCO₂e) 0.5 ²³⁰		
Credits retired or cancelled (MtCO₂e) 0.1		

The Tokyo prefecture in Japan launched its offset mechanism with the establishment of its ETS in 2010. Credits include small and medium enterprise credits and renewable energy credits (solar—heat and electricity, wind, geothermal, or hydro).²³¹ Emissions reductions generated by large facilities outside the Tokyo prefecture can also generate credits. These can be used under the Tokyo ETS. Before the Tokyo 2020 Olympics were postponed, the government had planned to offset emissions via the “Towards Zero Carbon” initiative, which would likely have included the use of credits from the Tokyo and Saitama mechanisms.

Regional, national, subnational crediting mechanisms under development

Other regional, national and subnational jurisdictions with crediting mechanisms under development have shown progress towards issuing their first credits. Crediting mechanisms for compliance use are under development in Canada, Kazakhstan, Mexico, Nova Scotia, South Africa, and Washington State. The remainder of this section highlights the jurisdictions where key developments on their upcoming carbon crediting mechanism have taken place over 2019–2020.

²²⁷ Source: Mizuho Information & Research Institute, *Tokyo Emission Trading Seminar: Obligation to Reduce Total Emissions and Emissions Trading System*, October 31, 2019, https://www.kankyo.metro.tokyo.lg.jp/climate/large_scale/trade/index.files/sateikakaku.pdf.

²²⁸ Data unavailable for the respective share of issuance by each sector

²²⁹ Names exist for the subtypes of the offset credits issued by TMG, these subtypes are: Small and medium offset credits, renewable energy offset credits, outside Tokyo credits

²³⁰ Excludes ‘excess credits’ which are considered to be excess allowances under the definition set out in this report

²³¹ Source: Bureau of Environment (Tokyo), *Creation of Credits, Etc.*, 2020, https://www.kankyo.metro.tokyo.lg.jp/climate/large_scale/measure/index.html.

Canada

The Government of Canada is developing a federal GHG offset system, building on the *Pan-Canadian Greenhouse Gas Offsets Framework* (Offsets Framework)²³² agreed by the Canadian Council of Ministers of the Environment (CCME) in 2018. A discussion paper was released in June 2019 for public comment on the proposed design of the federal GHG offset system.²³³ The paper proposed offset project eligibility criteria and protocol requirements, along with guidelines for project registration, monitoring, reporting and verification.

The main purpose of the system is to generate offset credits for use in the federal OBPS, thereby increasing the supply of compliance units for the system and reducing compliance cost while creating incentives for voluntary GHG mitigation projects (see chapter 2 for more information). The credits will be tradeable in the same manner as OBPS surplus credits. The proposed federal system will not replace provincial offset systems and the OBPS regulations allow recognized units from existing provincial/territorial offset systems to be used for compliance by covered facilities. Draft regulations for the federal GHG offset system are targeted for fall 2020.²³⁴

Mexico

The Mexico Ministry of Environment and Natural Resources (SEMARNAT) is looking to establish a domestic mechanism for the generation of carbon

credits that can be used for compliance obligations by entities covered under its new ETS. Details around eligible mitigation projects or activities are still to be determined but are expected to include domestic projects that have been validated and verified under approved protocols. The crediting mechanism is also expected to credit early action activities by projects in Mexico—projects that are already receiving credits from other crediting mechanisms—before the pilot phase of the national ETS comes into force. To receive early action credits, these projects would be expected to cancel any credits they have received from other mechanisms to avoid double counting. SEMARNAT expects to establish a registry for early action credits later in 2020.

South Africa

As part of the implementation of its carbon tax, the Government of South Africa is preparing to accept credits from CDM, VCS and the Gold Standard projects within South Africa. In addition, it is also considering implementing its own crediting mechanism.²³⁵ The South Africa Treasury is working through the World Bank's Partnership for Market Readiness on a framework to guide the development of local offset standards and methodologies. These standards will be piloted with the aim of reducing reliance on the international standards and crediting mechanisms beyond 2022, i.e. the first tax phase.²³⁶

232 Source: Canadian Council of Ministers of the Environment, *Pan Canadian Greenhouse Gas Offset System*, October 2019, https://www.ccme.ca/files/Resources/climate_change/Pan-Canadian%20GHG%20Offsets%20Framework%20EN%201.0%20secured.pdf

233 Source: Government of Canada, *Carbon Pollution Pricing: Options for a Federal Greenhouse Gas Offset System*, July 2, 2019, <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/federal-offset-system.html>.

234 Source: Government of Mexico, *Agreement Laying down the Preliminary Bases of the Test Program of the Emissions Trading System*, January 10, 2019, https://www.dof.gob.mx/nota_detalle.php?codigo=5573934&fecha=01%2F10%2F2019&fbclid=IwAR38nx6uLkhGVenrkXZdhrk93vkVKOooloaBaedoDS-h2ytdJH6K_1dWVUo.

235 Source: Government of South Africa, *Government Gazette*, November 29, 2019, <http://www.treasury.gov.za/public%20comments/CarbonTaxAct2019/Gazetted%20Carbon%20Offset%20Regulations%2029%20Nov%202019.pdf>.

236 Source: Government of South Africa, Publication of the 2019 carbon tax act, May 26, 2019, <https://www.gov.za/speeches/publication-2019-carbon-tax-act-26-may-2019-0000>.

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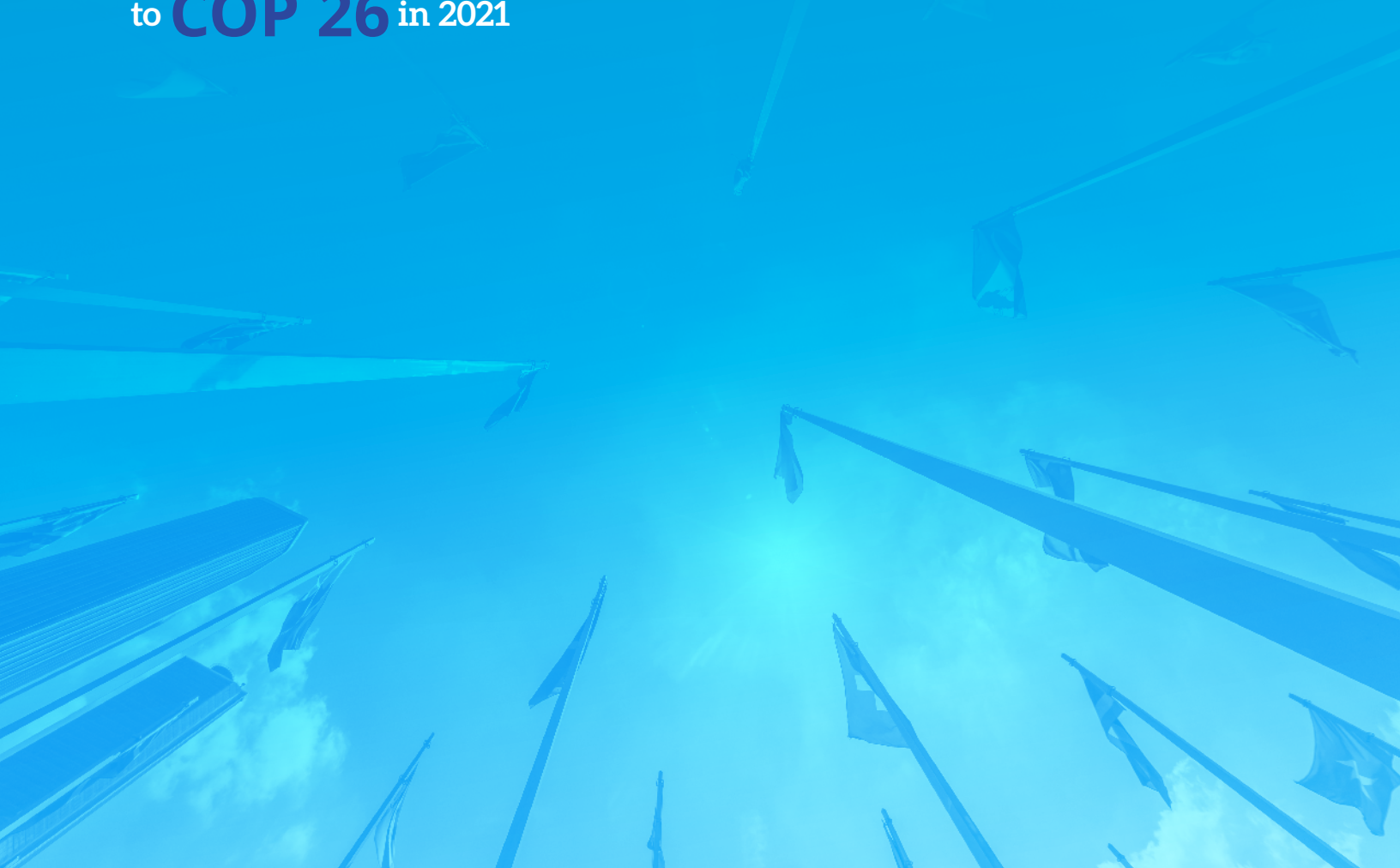
International carbon pricing initiatives

ICAO accepted **6** eligible crediting mechanisms for CORSIA's pilot phase

114 countries have expressed commitments to update their NDCs by the end of 2020

The overarching framework of the international carbon market remains unclear with Article 6 guidelines deferred to **COP 26** in 2021

At least **11** pilot programs have been implemented to support the operationalization of Article 6



4

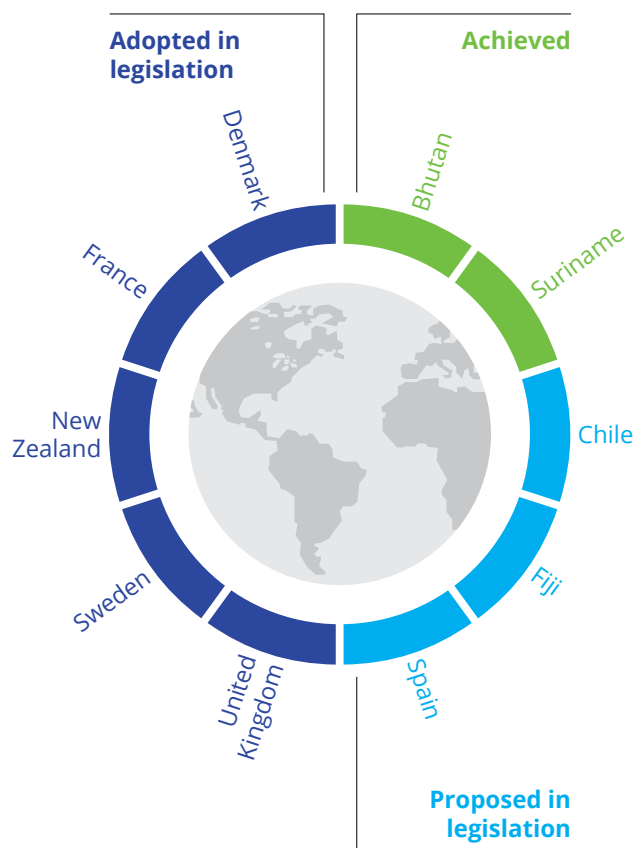
International carbon pricing initiatives

4.1 NDCs under the Paris Agreement

The Paris Agreement continues to serve as a catalyst for increased climate action. At COP 25 held in Madrid, Spain in December 2019, the Chilean COP presidency announced that 120 Parties to the UNFCCC—representing 20 percent of global GHG emissions—are working towards achieving net zero CO₂ emissions²³⁷ by 2050 as part of the Climate Ambition Alliance as shown in Figure 4.1.²³⁸ Of these Parties, as of April 1, 2020, Denmark, France, New Zealand, Sweden and the UK have enshrined a net zero CO₂ emissions target into legislation, and Suriname and Bhutan are already carbon negative.²³⁹ Chile, the EU, Fiji and Spain have proposed legislation for a net zero emissions target. In addition, 15 subnational regions, 398 cities, 786 businesses and 16 investors have also indicated that they are working towards achieving net zero emission targets.²⁴⁰ These commitments reflect the wide-spread recognition that current climate action plans are insufficient in reducing the risk climate change poses to society, our well-being and natural systems.

While no clear conclusion was reached on guidelines for Article 6, COP 25 highlighted the urgency and need to ramp up ambition as parties work on updating their NDCs. This is particularly pressing given the significant gap between Parties'

Figure 4.1 / Status of net zero CO₂ emissions targets by country²⁴¹



²³⁷ Becoming carbon negative requires a country to remove more GHG emissions from the atmosphere than it emits.

²³⁸ Source: Climate Ambition Alliance, Annex II: *Net zero CO₂ emissions by 2050*, December 11, 2019, <https://cop25.mma.gob.cl/wp-content/uploads/2020/02/Annex-Alliance-ENGLISH.pdf>.

²³⁹ Source: Energy and Climate Intelligence Unit, *Net Zero Tracker*, April 1, 2020, <https://eciu.net/netzerotracker>.

²⁴⁰ Source: UNFCCC, *Climate Ambition Alliance: Net Zero 2050*, accessed April 10, 2020 at <https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94>.

²⁴¹ 110 countries which, as of April 1, 2020, are developing plans to achieve net zero CO₂ emissions are not shown in this figure.

current commitments and what is needed to keep the global temperature increase well below 2°C and pursue efforts to limit the increase to 1.5°C compared to pre-industrial levels. Indeed, the UN Environment Programme's Emissions Gap Report states that even if all current NDC pledges were implemented, temperatures are expected to rise by 3.2°C – more than double the aspirational 1.5°C temperature target.²⁴² The COP 25 decisions—titled “Chile Madrid Time for Action”—called on Parties to ratify the Doha Amendment to the Kyoto Protocol^{243, 244} and the Paris Agreement as soon as possible. Additionally, the decisions urged Parties to submit their first NDCs or to ramp up the ambition of their current ones.²⁴⁵ Agreement on the need to strengthen climate mitigation and adaptation action for ocean and coastal ecosystems; enhance the “loss and damage” mechanism to support vulnerable countries and the importance of science in decision-making was reached. Countries also agreed on the need for a plan to incorporate the gender perspective as part of the implementation of the Paris Agreement.

As of April 1, 2020, 195 Parties have signed the Paris Agreement and 189 have deposited their instruments of ratification.²⁴⁶ The Parties that have ratified the Paris Agreement represent 95 percent of global GHG emissions compared to 89 percent a year ago.²⁴⁷ This increase is partly due to ratification by the Russian Federation in October 2019.

114 countries expressed commitments to update their NDCs by the end of 2020, including three NDC submissions that reference the use of market mechanisms.²⁴⁸ Suriname states an openness to cooperative approaches under Article 6, while Lebanon and Moldova do not exclude the possibility of carbon markets. Moldova and Suriname have already submitted a second NDC to enhance their level of ambition, joining the Marshall Islands.²⁴⁹ This is supported by the COP 25 decision to urge Parties to raise the ambition of their NDCs and update them by 2020, as requested under the decisions that gave effect to the Paris Agreement, especially Parties whose NDCs contains targets up to 2025.²⁵⁰ In addition, some countries (Ecuador, Lebanon, Kyrgyzstan, Oman and Suriname) submitted their first NDCs.

97 Parties now mention carbon pricing in their NDCs, indicating that they are planning or considering the use of climate markets and/or domestic carbon pricing to meet their NDC commitments. These 97 Parties represent 58 percent of global GHG emissions. The way in which carbon pricing is included across the submitted NDCs differs.²⁵¹

For a detailed overview of the NDCs please refer to the UNFCCC interim NDC Registry.²⁵²

242 Source: UNEP, *Emissions Gap Report*, November 26, 2019, <https://www.unenvironment.org/resources/emissions-gap-report-2019>

243 The Doha Amendments to the Kyoto Protocol cover emissions reduction targets for Annex B countries (Australia, Canada, the EU countries, Iceland, Japan, Liechtenstein, New Zealand, Norway, the Russian Federation, Switzerland and the United Kingdom) over the period 2013–2020. As of February 18, 2020, 137 of the 144 Parties required for it to enter into force have ratified the Doha Amendments. The emission reduction targets for the Annex B countries become legally binding upon entry into force of the Doha Agreement.

244 Source: UNFCCC, *7. c Doha Amendment to the Kyoto Protocol*, December 8, 2012, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtldsg_no=XXVII-7-c&chapter=27&clang=_en.

245 Source: UNFCCC, *Chile Madrid Time for Action - Decision 1/CP.25*, 2019, https://unfccc.int/resource/cop25/1cop25_auv.pdf; UNFCCC, *Chile Madrid Time for Action - Decision 1/CMA.2*, 2019, https://unfccc.int/resource/cop25/1cma2_auv.pdf; UNFCCC, *Chile Madrid Time for Action - Decision 1/CMP.15*, 2019, <https://unfccc.int/resource/cop25/1cmp15.pdf>.

246 Source: UNFCCC, *Paris Agreement Participants*, 2020, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtldsg_no=XXVII-7-d&chapter=27&clang=_en.

247 Comparing April 1, 2019 with April 1, 2020.

248 Source: UNFCCC, *Enhanced National Climate Plans (2020)*, accessed March 13, 2020, <https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=95>.

249 Source: UNFCCC, *Chile Madrid Time for Action - Decision 1/CMA.2*, 2019, https://unfccc.int/resource/cop25/1cma2_auv.pdf.

250 Source: UNFCCC, *Chile Madrid Time for Action - Decision 1/CMA.2*, 2019, https://unfccc.int/resource/cop25/1cma2_auv.pdf.

251 This analysis is based on the number of NDCs that make a reference to forms of domestic or international carbon pricing. However, the authors recognize that there are different interpretations possible for the text in NDCs and the mention of carbon pricing in a domestic context may not necessarily mean that a domestic carbon pricing initiative is formally under consideration. Also, not all Parties that already have a carbon pricing initiative implemented, scheduled or under consideration have reported this in their NDC. The number of Parties planning or considering the use of carbon pricing in their NDC is therefore not comparable with the jurisdictions with carbon pricing initiatives implemented, scheduled or under consideration.

252 Source: UNFCCC, *NDC Registry (interim)*, accessed April 6, 2020 at <https://www4.unfccc.int/sites/ndcstaging/Pages/Home.aspx>.

4.2 International carbon pricing initiatives associated with the Paris Agreement

Agreement on Article 6 rules remained elusive at the end of COP 25. Article 6 of the Paris Agreement provides options for voluntary cooperation amongst countries in achieving their NDC targets to allow for higher climate ambition, promote sustainable development, and safeguard environmental integrity, and is briefly explained in Box 4.1.²⁵³ Modeling has shown that Article 6 has the potential to reduce the cost of implementing NDCs by about half, which

would be equivalent to a savings of US\$250 billion in 2030.²⁵⁴ While geopolitical choices and constraints may weigh against full cooperation, the gains from international cooperation versus unilateral action are significant. By reducing the cost of achieving a country's NDC target, the country may be incentivized to invest those savings in additional abatement, reducing global GHG emissions by an additional 50 percent compared to countries acting alone.²⁵⁵ This equals an additional abatement of 5 GtCO₂ in 2030—equivalent to seven times the annual GHG emissions of Canada or taking 1.1 billion cars off the road—²⁵⁶ and about a third of the amount that is needed on top of current NDC pledges to stay below a 2°C global temperature increase.^{257, 258}

Box 4.1 / Article 6 of the Paris Agreement²⁵⁹

The Paris Agreement introduced a bottom-up approach for addressing climate change by enabling countries to pledge individual commitments through NDCs. Article 6 of the Paris Agreement recognizes that Parties may engage in cooperative approaches—including through the use of internationally transferred mitigation outcomes (ITMOs)—to achieve their NDCs.

Article 6.2 covers cooperative approaches, where Parties could opt to meet their NDCs by using internationally transferred mitigation outcomes. ITMOs could provide a basis for facilitating international recognition of cross-border applications of subnational, national, regional and international carbon pricing initiatives.

Article 6.4 establishes a mechanism for countries to contribute to GHG emissions mitigation and sustainable development. The mechanism will be supervised by a body established by the Parties to the Paris Agreement. The emission reductions verified under the mechanism can be used to meet the NDC of either the host country or another country. The mechanism is intended to incentivize mitigation activities by both public and private entities.

Article 6.8 recognizes the importance of non-market approaches in assisting the implementation of NDCs to promote mitigation and adaptation ambition, enhance public and private sector participation, and enable opportunities for coordination across instruments and relevant institutional arrangements.

²⁵³ For more information, see the 2019 edition of the *State and Trends of Carbon Pricing* report.

²⁵⁴ Source: IETA, *The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges*, September 2019, https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

²⁵⁵ Source: Ibid.

²⁵⁶ Calculated based on the annual emissions of a typical passenger vehicle in the US of 4.6 tCO₂. Source: EPA, *Greenhouse Gas Emissions from a Typical Passenger Vehicle*, accessed April 10, 2020 at <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>.

²⁵⁷ Source: UNEP, *Emissions Gap Report 2019*, 2019, <https://wedocs.unep.org/bitstream/handle/20.500.11822/30797/EGR2019.pdf>.

²⁵⁸ Analysis shows that an additional abatement of 12 GtCO₂e is needed in 2030 to stay below the 2°C limit if all conditional and unconditional targets in the NDCs were implemented and 15 GtCO₂e with only unconditional targets.

²⁵⁹ Source: UNFCCC, *Draft CMA Decision on the Rules, Modalities and Procedures for the Mechanism Established by Article 6, Paragraph 4, of the Paris Agreement*, December 15, 2019, https://unfccc.int/sites/default/files/resource/CMA2_11b_DT_Art.6.4_.pdf.

The discussions at COP 25 made substantial progress on many operational aspects of the elements of article 6. However, Parties could not achieve consensus on some critical design and political issues, including:

- **The transition of Kyoto Protocol projects and credits.** One of the most contentious and key issues is whether to allow projects and units from the CDM to transition for usage under the Paris Agreement. The unagreed draft text on the implementation guidelines for Article 6.4 at the close of COP 25 proposes different options including that some projects registered under the CDM may be registered under the Article 6.4 mechanism of the Paris Agreement, subject to a consensus around the eligibility criteria for transition and approval. However, countries have expressed concerns that a full transition of Kyoto projects and units could undermine further action being taken to cut emissions. Other countries considered that not providing for transition would send a poor signal to private sector participants on the reliability of UNFCCC decisions as the UNFCCC process has previously endorsed the operation of CDM projects.
- **Share of proceeds.** Many Parties disagreed as to whether a levy on transfers of mitigation outcomes to fund adaptation efforts in more vulnerable countries should be applied to ITMOs under Article 6.2 of the Paris Agreement. The levy would be applied to transactions of units created under Article 6.4. Some Parties considered it important that the two approaches be subject to similar incentive structures for participation.²⁶⁰

- **Overall Mitigation in Global Emissions (OMGE).** Mentioned as a goal in Article 6.4, OMGE aims to ensure a net reduction in GHG emissions globally, rather than just offsetting GHG emissions in one country with abatement elsewhere. In addition to the disagreement on how to operationalize OMGE (e.g. through the automatic cancellation of a fraction of Article 6.4 units, setting conservative baselines, etc.), there were different views on whether the application of OMGE should be extended to Article 6.2 transactions. Some countries have expressed concerns that the tax-like nature of the OMGE requirement would reduce the use of Article 6 transfers, which in turn would reduce the share of proceeds to fund adaptation. The unagreed draft text, therefore, strongly encourages—but does not require—countries to cancel ITMOs to deliver on an overall mitigation of global emissions.

32 countries²⁶¹ presented the *San Jose Principles for High Ambition and Integrity in International Carbon Markets* at COP 25 to encourage more ambitious outcomes in the continuation of the Article 6 negotiations. The principles include a prohibition on pre-2020 units, including Kyoto units and allowances; avoidance of double counting; moving beyond zero-sum offsetting approaches to achieve OMGEs; using allocation and baseline methodologies that support domestic achievement of NDCs; and the use of Article 6.8 in supporting non-market approaches to implement NDCs.²⁶²

²⁶⁰ Source: UNFCCC, *Draft CMA Decision on Guidance on Cooperative Approaches Referred to in Article 6, Paragraph 2, of the Paris Agreement*, December 15, 2019, https://unfccc.int/sites/default/files/resource/DT.CMA2_i11a.v3_0.pdf.

²⁶¹ Austria, Belgium, Belize, Colombia, Cook Islands, Costa Rica, Denmark, Estonia, Fiji, Finland, France, Germany, Grenada, Ireland, Italy, Latvia, Luxembourg, Marshall Islands, the Netherlands, New Zealand, Norway, Paraguay, Peru, Portugal, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, Tuvalu, the United Kingdom, and Vanuatu.

²⁶² Source: Directorate of Climate Change (Costa Rica), *Press Release: 32 Leading Countries Set Benchmark for Carbon Markets with San Jose Principles*, January 6, 2020, <https://cambioclimatico.go.cr/press-release-leading-countries-set-benchmark-for-carbon-markets-with-san-jose-principles/>.

A wide range of research and Article 6 pilots are underway in parallel with the negotiations to support and test the operating principles of Article 6.

For example, from 2017, seven multilateral development banks (MDBs) formed a working group to support the design and operation of Article 6.²⁶³ The MDB working group announced in September 2019 its plan to increase the global climate action investments they support each year to US\$175 billion by 2025.²⁶⁴ Global annual combined MDB finance for climate-aligned activities will rise to US\$65 billion by 2025—a 50 percent increase from current levels.²⁶⁵ In addition, piloting potential Article 6 activities have already been initiated. Activities are also being initiated by countries like Switzerland, Sweden and Japan.

The **African Development Bank's Adaptation Benefit Mechanism (ABM)** focuses on non-market mechanisms under Article 6.8 through the development of a RBCF mechanism that seeks to de-risk or incentivize investments by facilitating payments for the delivery of adaptation benefits. The pilot phase of ABM was launched in March 2019 at the Africa Carbon Forum, with a target of undertaking 10–12 demonstration projects with guidance from an ABM board, methodology panel, and secretariat.

The Asian Development Bank (ADB)—together with the German government and Swedish Energy Agency—launched a US\$4 million initiative, called the **Article 6 Support Facility**. The facility aims to support ADB member countries in Asia and the Pacific to build capacity for climate markets and

provide technical support to identify, develop and test mitigation actions under Article 6 to enhance readiness for post-2020 markets.²⁶⁶ In its first stages, the ADB has engaged stakeholders to develop a Guidebook of Pilot Activities for Article 6, which sets out the principles and steps involved in piloting under the facility.²⁶⁷

The Bhutan Climate Fund is a concept developed by the National Environment Commission, with the support of the World Bank, with a view to aggregating emission reductions generated from its hydropower exports to India. The emission reductions would be marketed and monetized by the Bhutan Climate Fund, and part of the revenues would be directed towards low-carbon development activities in Bhutan. The fund would bear the upfront costs of preparing project design documents, establishing MRV systems, facilitating independent assessment, and ensuring authorization for international transfer under Article 6.

The European Bank for Reconstruction and Development (EBRD)—with financial backing of the Spanish Government—has been testing different carbon market options in the Southern and Eastern Mediterranean region under its **Integrated Carbon Programs** through two types of support: (a) policy support and capacity building, and (b) investment for emission reduction projects.²⁶⁸ While support has focused on CDM in the past, EBRD seeks to leverage international carbon pricing mechanisms to test new methodologies for operationalizing Article 6 moving forward. For example, EBRD is testing low-cost solar monitoring for solar systems in Morocco with the

263 Source: World Bank, *MDB Working Group on Article 6 of The Paris Agreement*, September 28, 2018, <https://www.worldbank.org/en/topic/climatechange/brief/mdb-working-group-on-article-6-of-the-paris-agreement>.

264 Source: EBRD, *EBRD at COP 25*, December 13, 2019, <https://www.ebrd.com/news/events/ebrd-at-cop-25.html>.

265 Source: Multilateral Development Banks, *High Level MDB Statement*, September 22, 2019, <http://www.ebrd.com/joint-mdb-statement-climate-finance>.

266 Source: ADB, *ADB to Partner on New \$4 Million Facility to Help Asia Meet Climate Commitments*, December 7, 2018, <https://www.adb.org/news/adb-partner-new-4-million-facility-help-asia-meet-climate-commitments>.

267 Source: ADB, *Regional: Establishing a Support Facility for Article 6 of The Paris Agreement*, December 20, 2018, <https://www.adb.org/projects/50404-001/main#project-pds>.

268 Source: EBRD, *Developing and Transacting an Up Scaled CDM-Based Carbon Credit Approach in SEMED*, 2019, <http://www.semedcarbonmarket.com/>.

objective of bringing down ex-post MRV costs at scale. EBRD is also closely monitoring changes in GCF policies and their implications for climate markets. The experience from these programs has been used as input in the design of Article 6.²⁶⁹

The Foundation for Climate Protection and Carbon Offset (KliK) Foundation was established under Switzerland's CO₂ Act and set up the **The International ITMO Purchase Program**. The aim of the program is to purchase emission reductions to offset a part of the carbon emissions generated by motor fuel importers in Switzerland. It aimed to establish procedures for the purchase 54 MtCO₂e in ITMOs under Article 6.2 of the Paris Agreement to offset emissions from the Swiss transport sector.²⁷⁰ KliK is building a portfolio of international activities on a provisional basis, with a view to entering into financial commitments upon finalization of the rules for Article 6 in 2021. KliK aims to procure 54 MtCO₂e over 2021–30. On January 26, 2020, the KliK Foundation held a second call for proposals for the procurement of ITMOs.²⁷¹ 25 submissions were submitted, focusing on sectors that include energy efficiency and renewable energy from projects in Africa and Asia. Three projects were selected for financial support with a combined sum of up to US\$750,000. Together with the first call for proposals held in April–May 2019, a total of 56 proposals have been submitted. Additional calls for proposals are planned for later this year.

The Joint Crediting Mechanism (JCM) is a Kyoto-era bilateral mechanism initiated by the Government of Japan to support mitigation actions in developing countries. Its structure represents one of the potential ways that countries could cooperate under Article 6.2. The Japanese Ministry of Environment now plans to acquire emission reductions through JCM under Article 6 of the Paris Agreement through the

Global Environment Centre Foundation (GEC). GEC accepted project proposals during April–November 2019 and plans to initiate a similar procurement process for FY2020. Ten projects from partner countries were shortlisted. Additional details on the status of the JCM projects and issuance volumes can be found in Section 4.

Switzerland has also made approximately CHF20 million (US\$20.7 million) available through its **Pilot Activities of the Climate Cent Foundation (CCF)** to implement pilot activities to discover and address specific issues with the implementation of Article 6. Since 2017, the CCF has been carrying out three pilot activities submitted in the first round of proposals.²⁷² These pilot activities range from scaling up efficient cookers in Peru, incentivizing landfill owners in Mexico to collect and flare landfill gas, to increasing the ownership of electric vehicles in Thailand. Bilateral agreements on crediting under Article 6 are anticipated in 2020 between the Swiss government and Peru.²⁷³

The World Bank Group also continues to develop piloting activities to support the operationalization of Article 6. These include:

The Carbon Initiative for Development (Ci-Dev) is a World Bank trust fund that mobilizes private finance for clean energy access in low-income countries. As of January 2020, nearly half of the 13 programs in the fund's portfolio are issuing carbon credits. Through 2025, Ci-Dev will have mobilized more than \$250 million in private finance to provide low-carbon energy to more than 10 million people in the communities most vulnerable to climate change. Recently, Ci-Dev efforts focus on the development of an institutional and governance process for the use of climate markets at the sector or country level through the Standardized Crediting Framework (SCF), which

269 Source: EBRD, *EBRD at COP 25*, December 13, 2019, <https://www.ebrd.com/news/events/ebrd-at-cop-25.html>.

270 Source: Climate Cent Foundation, *Pilot Activities under the Paris Agreement*, 2017, <https://www.klimarappen.ch/en/Pilot-activities-under-the-Paris-Agreement-.34.html>.

271 Source: Foundation KliK, *Second Call for Proposals: 25 Submissions Received*, January 2020, <https://www.international.klik.ch/en/News/Newsletter.277.html?nid=2085>.

272 Source: Climate Cent Foundation, *Pilot Activities under the Paris Agreement*, 2017, <https://www.klimarappen.ch/en/Pilot-activities-under-the-Paris-Agreement-.34.html>.

273 Source: Tuki Wasi, *Clean Technologies*, 2018, <https://tukiwasi.org/en/clientes/tukiwasi/#>.

are being piloted in Senegal and Rwanda. The SCF is intended to improve the transparency of national carbon crediting, reduce transaction costs, facilitate access to climate finance, and shorten the time to realize emissions reductions which could provide additional benefits and possibly additional income for communities. In December 2019, the first credits were certified in the Senegal SCF pilot. There are also plans for applying the SCF crediting approach in the other Ci-Dev portfolio countries.

The Carbon Partnership Facility brings together industrial country buyers and developing country sellers of emission reductions, as well as developing and donor country governments. In 2020, preparation of a first of its kind new generation crediting program under Article 6 of the Paris Agreement, the Sri Lanka Renewable Energy program, is being finalized, with expectations for signing an Emission Reductions Payment Agreement (ERPA) for emission reductions generated in the 2018–23 period.

By means of the **The Climate Warehouse**, the World Bank is working to support client countries through analytical and technical work to participate in post-2020 climate markets. Thus far, asset development efforts have focused on Bangladesh, Chile, India and Kenya.

The Transformative Carbon Asset Facility (TCAF) is a fund designed to fully pilot various approaches under the Paris Agreement. Capitalized at over US\$200 million, it focuses on transformative programs in middle-income countries that can help scale up climate commitments and accelerate socio-economic growth. This includes the development of innovative carbon accounting methodologies to attribute emission reductions for sector-wide programs. TCAF received contributions from the UK, Norway, Sweden, Switzerland, Germany and Canada. TCAF continues

to work on developing programs within the changing landscape of Article 6 negotiations. In parallel, TCAF is engaging with the contributing country governments, external experts, and potential host country partners to generate and disseminate knowledge on the development of Article 6 mechanisms, which it will eventually pilot. TCAF expects to develop its first programs in early 2021.

4.3 Results-based climate finance (RBCF) mechanisms

RBCF is a form of climate finance where funds are disbursed by the provider of climate finance to the recipient upon achievement of a pre-agreed set of climate-related results and is a financial modality that delivers climate finance for low-carbon development in developing countries. It supports market creation by offering an integrated approach to domestic policy and carbon markets. Some RBCF programs purchase compliance emission reduction units, including the CDM's CERs, which helps compensate for the current lack of demand for these units. Other programs not specifically designed for compliance markets use RBCF as a direct funding mechanism. However, these programs incorporate elements of the existing carbon market infrastructure, such as the CDM's MRV requirements, to help determine mitigation outcomes. In this way RBCF facilitates carbon pricing and market building and can support host countries' policy processes to achieve their NDCs, by leveraging private sector activity and financing. Various RBCF initiatives are currently in operation around the world (more than 74 programs).²⁷⁴ Some of the Article 6 pilots mentioned previously are also RBCFs and can thus play a critical role in mobilizing the resources, policies and actions needed to achieve the objectives of the Paris Agreement. Additional RBCFs which are not Article 6 piloting activities are listed in this section.

²⁷⁴ Source: World Bank, *Results-Based Climate Finance in Practice: Delivering Climate Finance for Low-Carbon Development*, May 15, 2017, <http://documents.worldbank.org/curated/en/410371494873772578/Results-based-climate-finance-in-practice-delivering-climate-finance-for-low-carbon-development>.

The World Bank's **BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL)** includes five countries in its portfolio—Colombia, Ethiopia, Indonesia, Mexico, and Zambia—that are implementing large-scale integrated landscape approaches with the support of US\$360 million in fund capital. Not only will these programs directly benefit communities and the environment, but the knowledge and learning from ISFL activities will inform subsequent land use programs as more countries focus on low-carbon development.

The Forest Carbon Partnership Facility (FCPF) currently works with 47 countries with a total of US\$1.3 billion in contributions and commitments. The Carbon Fund under the FCPF²⁷⁵ covers emission reduction programs in 19 countries with an emission reduction volume of more than 130 MtCO₂e.²⁷⁶ As of December 2019, the FCPF has signed four ERPA to date with Chile, the Democratic Republic of Congo, Ghana and Mozambique for reducing emissions from deforestation and forest degradation (REDD+). These collectively unlock performance-based payments of up to US\$181 million for emission reductions from the forest and land use sectors. Together, these four programs aim to reduce over 36 MtCO₂e by 2025 and support countries in meeting national and international climate targets. Indonesia's provincial government of East Kalimantan signaled the implementation of FCPF in late 2019. It is anticipated that the ERPA will be signed during the first half of 2020.²⁷⁷ Additionally, the FCPF has submitted an application for its emission reductions to be recognized under CORSIA.²⁷⁸

As of February 24, 2020, the Green Climate Fund (GCF) has 123 approved projects for a total value of US\$19.3 billion in the categories of adaptation and mitigation.²⁷⁹ In October 2019, ahead of COP 25, 27 countries pledged to replenish the GCF with US\$9.78 million for the next four years.²⁸⁰ On November 26, 2019, the GCF signed an agreement with the government of Mongolia to exempt GCF resources from national taxation in support of Mongolia's updated NDC.²⁸¹ The GCF Board approved support of Nepal's Alternative Energy Promotion Centre to help expand renewable power in the region.²⁸² On May 21, 2019, the second REDD+ project was approved to receive results-based payments under the GCF's REDD+ pilot program. The project, which is located in Ecuador, has a project value of US\$18.6 million with 3.6 million tCO₂e emissions avoided between 2014–2015.²⁸³

In conjunction with the CDM, the **Nitric Acid Action Group (NACAG)**²⁸⁴ recognizes the potential of market-based mechanisms to reduce nitrous oxide (N₂O) emissions. There are currently 97 registered CDM projects focused on N₂O abatement, of which 57 have issued CERs. By the end of 2020, CER issuance is estimated to be 290 million. Because N₂O abatement projects are economically unattractive and have historically struggled to maintain support, NACAG has been instrumental in revitalizing support for these projects through the Kyoto Protocol. These projects could also play a role in helping countries achieve their NDCs under Article 6 of the Paris Agreement.²⁸⁵ On December 18, 2019, Cuba became the third Latin American country to join NACAG.²⁸⁶

275 The FCPF has two complementary funding mechanisms—the Readiness Fund and the Carbon Fund—to achieve its strategic objectives. The Readiness Fund supports the development of capacity within participating countries to deliver REDD+ and/or access REDD+ finance, whereas the Carbon Fund incentivizes the development and delivery of REDD+ emission reduction programs.

276 Source: FCPF, *Annual Report*, 2019, https://www.forestcarbonpartnership.org/system/files/documents/FCPF_Annual%20Report_2019.pdf.

277 Source: FCPF, *Indonesia's Large-Scale Emission Reductions Program Gets Ready for Implementation*, September 2019, <https://www.forestcarbonpartnership.org/indonesia%E2%80%99s-large-scale-emission-reductions-program-gets-ready-implementation>.

278 Source: ICAO, *Technical Advisory Body*, 2020, <https://www.icao.int/environmental-protection/CORSIA/Pages/TAB.aspx>.

279 Source: GCF, *GCF at a Glance*, February 24, 2020, https://www.greenclimate.fund/sites/default/files/document/gcf-glance_1.pdf.

280 Source: GCF, *Countries Step up Ambition: Landmark Boost to Coeffers of the World's Largest Climate Fund*, October 25, 2019, <https://www.greenclimate.fund/news/countries-step-ambition-landmark-boost-coffers-world-s-largest-climate-fund>.

281 Source: GCF, *New GCF-Government of Mongolia Agreement Supports Country's Paris Agreement Goals*, November 26, 2019, <https://www.greenclimate.fund/news/new-gcf-government-mongolia-agreement-supports-country-s-paris-agreement-goals>.

282 Source: GCF, *New and Stories*, 2020, https://www.greenclimate.fund/news?f%5b%5d=field_date_content:2020.

283 Source: GCF, *Ecuador REDD-plus RBP for Results Period 2014*, July 8, 2019, <https://www.greenclimate.fund/project/fp110>.

284 The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety launched NACAG. The NACAG initiative aims to assure global abatement of N₂O emissions from nitric acid production estimated to have an annual emission reduction potential of 167 MtCO₂e.

285 Source: NACAG, *N₂O Abatement in the Context of Market-Based Approaches*, accessed March 5, 2020, <http://www.nitricacidaction.org/about/n2o-abatement-in-the-context-of-market-based-approaches/>.

286 Source: NACAG, *The NACAG Secretariat Welcomes Cuba as New NACAG Member Country*, December 18, 2019, <http://nitricacidaction.org/the-nacag-secretariat-welcomes-cuba-as-new-nacag-member-country/>.

Building on the work of the Pilot Auction Facility, the World Bank's Climate Auctions Program continues to explore opportunities to scale up and replicate climate auctions. The **Nitric Acid Climate Auctions Program (NACAP)** is being planned in collaboration with the NACAG. Currently, the World Bank expects that the NACAP will support price guarantees for eligible nitrous oxide emission reductions generated from nitric acid plants (not adipic acid) in the CDM or VCS from 2018 through 2024. The projects must also be hosted in countries that have signed NACAG's statement of undertaking to commit to lasting abatement from the nitric acid sector after 2020. The list of countries that have signed this commitment is available on the NACAG website.

The World Bank's **Pilot Auction Facility for Methane and Climate Change Mitigation (PAF)** supports results-based, climate finance mechanisms in the form of carbon credits. Similar to NACAP, the PAF's eligible emission reductions are delivered as CDM, VCS and Gold Standard carbon credits. The PAF hosted its fourth auction on March 3, 2020. Twenty-one companies from nine countries took part in an online auction for the right to sell carbon credits generated in 2020 to the PAF in 2021. In total, the auction allocated US\$8.25 million dollars of climate funds to the future payments, which could lead to a reduction of the equivalent of 4.2 MtCO₂e by the end of 2020. The carbon credits will come from eligible projects that reduce methane emissions from waste treatment including landfill, wastewater and agricultural waste. The PAF's auction winners pay to receive World Bank zero-coupon bonds that guarantee the price established by the auction for their future carbon credits. In November 2019, the facility made its fourth repayment of bonds issued from the first three auctions and paid US\$13 million for emission reductions coming from project sites in

Brazil, Chile, Egypt, Malaysia, Mexico, and Thailand, representing over five million tons worth of eligible carbon credits. To date, the PAF has made payments of US\$37.3 million in exchange for carbon credits representing 14.1 MtCO₂e.

4.4 International aviation

Aviation is expected to become an important sector to incentivize mitigation outcomes as it will be subject to an international carbon pricing policy, which started this year. As the sector accounts for 2 percent of global CO₂ emissions—²⁸⁷ a share that has rapidly been growing in the recent past and public awareness of the impacts of air travel has been growing. The International Civil Aviation Organization (ICAO) has continued to work towards the implementation of CORSIA, which aims to keep international aviation's emissions at a 2019–2020 baseline level. Airlines around the world have started to monitor and report emissions from their international routes to establish this baseline.

Countries and airlines started to prepare for the voluntary pilot phase of CORSIA despite some areas of disagreement remaining among countries. During the ICAO 40th General Assembly in October 2019, several countries submitted reservations centered around the potential incorporation of a difference in obligations between developed and developing countries in CORSIA and the automatic inclusion of the CDM in the list of eligible standards.²⁸⁸ Nonetheless, as of February 2020, 82 states had pledged to join the pilot phase, covering 77 percent of worldwide international aviation activity.²⁸⁹ This phase requires airlines to purchase offsets to cover their 2021–2023 emissions over the baseline. In January 2020, the

²⁸⁷ Source: The International Council on Clean Transportation, *CO₂ emissions from commercial aviation*, 2018, September 19, 2019.

²⁸⁸ Source: ICAO, *Resolutions*, 2019, <https://www.icao.int/Meetings/a40/Pages/resolutions.aspx>.

²⁸⁹ Source: ICAO, *CORSIA States for Chapter 3 State Pairs*, February 27, 2020, <https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx>.

International Aviation Transport Association, an industry body representing over 80 percent of global air traffic, launched the Aviation Carbon Exchange, a marketplace for airlines to source eligible emission units for CORSIA. The exchange is being trialed with airlines that intend to participate in the pilot phase, with the full roll-out of the exchange planned for the third quarter of 2020.²⁹⁰

Prior to the COVID-19 pandemic, ICAO estimated that the potential demand for offsets in the pilot phase would be about 104 million units.²⁹¹ Analysts estimated the total demand for offsets between 2020 and 2035 to be about 3 GtCO₂.²⁹² More recent analysis showed that the impact of the COVID-19 outbreak might increase the demand for credits in the pilot phase to 158 million units if air traffic rebounds in 2021–2023.²⁹³ This is because COVID-19 and the subsequent reduction in air travel will likely result in lower international aviation emissions in 2020 which could, in turn, lower the CORSIA baseline set at the average of 2019–2020 emissions and therefore increase offsetting obligations for airlines. However, a provision was included in the CORSIA resolution that allows states and airlines some flexibility in the calculation of their offsetting obligations. They can elect to consider airline emissions for the current year (e.g. 2021, 2022, 2023), or alternatively use 2020 emissions data to calculate their obligations. This could potentially lower the number of credits required compared to a business as usual scenario.

On March 13, 2020, six standards were approved by the council for use to comply with offsetting requirements during the first phase of CORSIA. These are the ACR, the China GHG Voluntary Emission

Reduction Program, the CDM, the Climate Action Reserve, the Gold Standard and VCS. This followed after 14 standards were submitted for eligibility assessment between June and July 2019.²⁹⁴ The standards were assessed by the Technical Advisory Body²⁹⁵ (TAB) appointed by ICAO's council after agreeing on the broad set of eligibility criteria in the Standards and Recommended Practices in March 2019. The TAB is composed of 19 international carbon market experts and is in charge of reviewing and making recommendations on the eligible emission reductions standards for use by CORSIA.

However, only emissions reductions from programs and activities within the six standards that occurred between January 1, 2016²⁹⁶ and December 31, 2020 will be eligible. The TAB recommended that not all activities within each standard be eligible. For instance, a recommendation was made that activities from afforestation or reforestation in the CDM be excluded. As part of their application, some standards also requested that some of their activities be excluded from the scope of CORSIA.²⁹⁷ The TAB further recommended that the FCPF and Global Carbon Council credits be conditionally eligible, once they are able to onboard some proposed modifications related to permanence and registries, and share additional documentation with the TAB. ICAO launched a second call for applications for carbon standards to become eligible for CORSIA on March 23, 2020.

Prior to the start of CORSIA, several countries and airlines have made voluntary commitments and made additional efforts to reduce emissions from aviation. Some countries have started

²⁹⁰ Source: IATA, *Aviation Carbon Exchange*, accessed May 13, 2020, <https://www.iata.org/en/programs/environment/ace/#tab-1>.

²⁹¹ Source: ICAO, *Committee on Aviation Environmental Protection (CAEP)*, February 2019, https://www.icao.int/environmental-protection/CORSIA/Documents/CAEP_Analysis%20on%20the%20estimation%20of%20CO2%20emissions%20reductions%20and%20costs%20from%20CORSIA.pdf.

²⁹² Source: GIZ, *Crediting Forest-Related Mitigation under International Carbon Market Mechanisms*, September 7, 2018, https://newclimate.org/wp-content/uploads/2018/09/Studie_2018_REDD_and_carbon_markets.pdf.

²⁹³ Source: EDF, *Coronavirus and CORSIA*, March 2020, https://www.edf.org/sites/default/files/documents/Coronavirus_and_CORSIA_analysis.pdf.

²⁹⁴ Source: ICAO, *2019 Programme Applications*, 2019, <https://www.icao.int/environmental-protection/CORSIA/Pages/TAB2019.aspx>.

²⁹⁵ Source: ICAO, *Technical Advisory Body*, 2020, <https://www.icao.int/environmental-protection/CORSIA/Pages/TAB.aspx>.

²⁹⁶ As of the first crediting period of the activity

²⁹⁷ Source: Ibid.

to contemplate unilateral mechanisms to levy taxes on jet fuel or airline tickets, while other countries already have such taxes already in place. Furthermore, a number of airlines have pledged voluntary commitments to address emissions from their operations. For example, EasyJet has already started offsetting its jet fuel emissions on all routes, and Air France and Jet Blue announced that they would offset all of their domestic emissions from 2020 onwards. Delta Airlines, Etihad, International Airlines Group and Qantas have set net zero targets, which are to be reached through a combination of sustainable aviation fuels, fleet replacement, technological innovation and offsets.

4.5 International shipping

The international maritime transport sector continues exploring ways how to achieve its 2050 goal of reducing GHG emissions from ships by at least 50 percent compared to 2008 levels. The International Maritime Organization (IMO) is leading the policy discussions on a global level, but carbon pricing is also discussed in other fora.

At the IMO, market-based measures such as carbon pricing are being considered as part of the potential mid-term measures listed in IMO's initial strategy, which was adopted in April 2018. While several countries have already referred to market-based measures in previous submissions, the main focus of the negotiations has so far been on short-term measures including reducing speed and increasing operational efficiency. However, a recent submission by the United Kingdom to the

IMO has elaborated on the main options for carbon pricing—carbon taxes and emissions trading—for the first time since 2011. Another submission made by an alliance of shipping industry associations suggests establishing an International Maritime Research and Development Board and related Fund - a research and development fund for low- or zero-carbon shipping financed by mandatory contributions from ships in the amount of US\$2 per ton of fuel oil purchased for consumption—equivalent to US\$0.63/tCO₂. The co-sponsors of this proposal do not declare this concept to be a market-based measure, but recognize its potential to serve as a stepping stone for a possible carbon levy in shipping.

Outside of the IMO negotiations, the European Commission is investigating the possibility of extending the EU ETS to the maritime sector as part of the European Green Deal.²⁹⁸ A legislative proposal for the sector's inclusion is set to be discussed in summer 2020. This possibility of regional carbon pricing applied to the shipping sector puts additional pressure on the IMO to act. At the same time, leading shipping executives have started advocating for a global carbon price on bunker fuels. At the Global Maritime Forum's Annual Summit in Singapore in October 2019, the fundamental aspects of a potential carbon levy were prominently discussed.²⁹⁹

²⁹⁸ The scope of the regulation includes all intra-Union voyages, all incoming voyages from the last non-Union port to the first Union port of call and all outgoing voyages from an Union port to the next non-Union port of call.

²⁹⁹ Global Maritime Forum, *Decarbonizing Shipping*, accessed April 10, 2020 at <https://www.globalmaritimeforum.org/annual-summit-2019/issues>.

5

Internal carbon pricing

In 2019, about **1,600** companies disclosed that they are already using internal carbon pricing or anticipating doing so within two years³⁰⁰

More than **400** companies reported using a carbon price as a shadow price to monetize the GHG emissions associated with their decisions

With an increasing number of companies committing to **net zero** targets and growing investor pressure, the use of internal carbon pricing for reducing supply chain emissions could grow in the future



5

Internal carbon pricing

Increasingly, more companies are recognizing that internal carbon pricing is a powerful tool to manage and contribute to the low-carbon transition. By internally assigning a monetary value to the GHG emissions associated with decisions, emissions can be translated into a financial metric that informs the decision-making process. In 2019, 699 companies reported to CDP that they are using an internal price on carbon,³⁰¹ an increase of 92 companies compared to 2017.³⁰² In addition, 915 companies indicated that they intend to internally price their carbon emissions within the next two years. This growing trend coincides with the increasing number of jurisdictions putting a price on carbon. In fact, companies regulated under a carbon pricing initiative are about seven times more likely to put an internal price on carbon.³⁰³ This indicates that the financial risk imposed by regulation has been a strong driver for companies to include an internal carbon price in their decision making. However, the objectives that companies have reported to CDP for their internal carbon pricing programs shows that their use has evolved beyond simply integrating the expected cost from an ETS or carbon tax in financial decisions.

Companies use internal carbon pricing for multiple reasons. More than half of the companies cited incentivizing low-carbon investments, driving energy efficiency and/or changing internal behavior as objectives for their internal carbon pricing program. In addition, about 40 percent of the respondents also listed navigating GHG regulations and identifying low-carbon opportunities as key objectives. The diversity in objectives is exhibited in the reported internal carbon prices companies use, ranging from less than US\$1/tCO₂e to US\$906/tCO₂e.³⁰⁴ Some companies set a low price to raise internal awareness on climate change—especially on GHG emissions that do not face a carbon price yet from government regulation—which could include the intention to ramp up the price in the future to increase the impact of internal carbon pricing. Others set their internal carbon price based on the abatement costs for reaching their emission reduction targets—which could include scope 3 emissions, the social cost of carbon, or the carbon price required for the global economy to transition to net zero. There are also companies that adopt a range of internal carbon prices to consider variations in prices in carbon pricing initiatives and implicit carbon costs inferred from regulations such as GHG emission standards and fuel taxes across jurisdictions. Some also factor in future increases of carbon prices and implicit carbon costs from other regulations to manage these policy risks.

300 Source: CDP, *CDP Disclosure 2019*, <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>

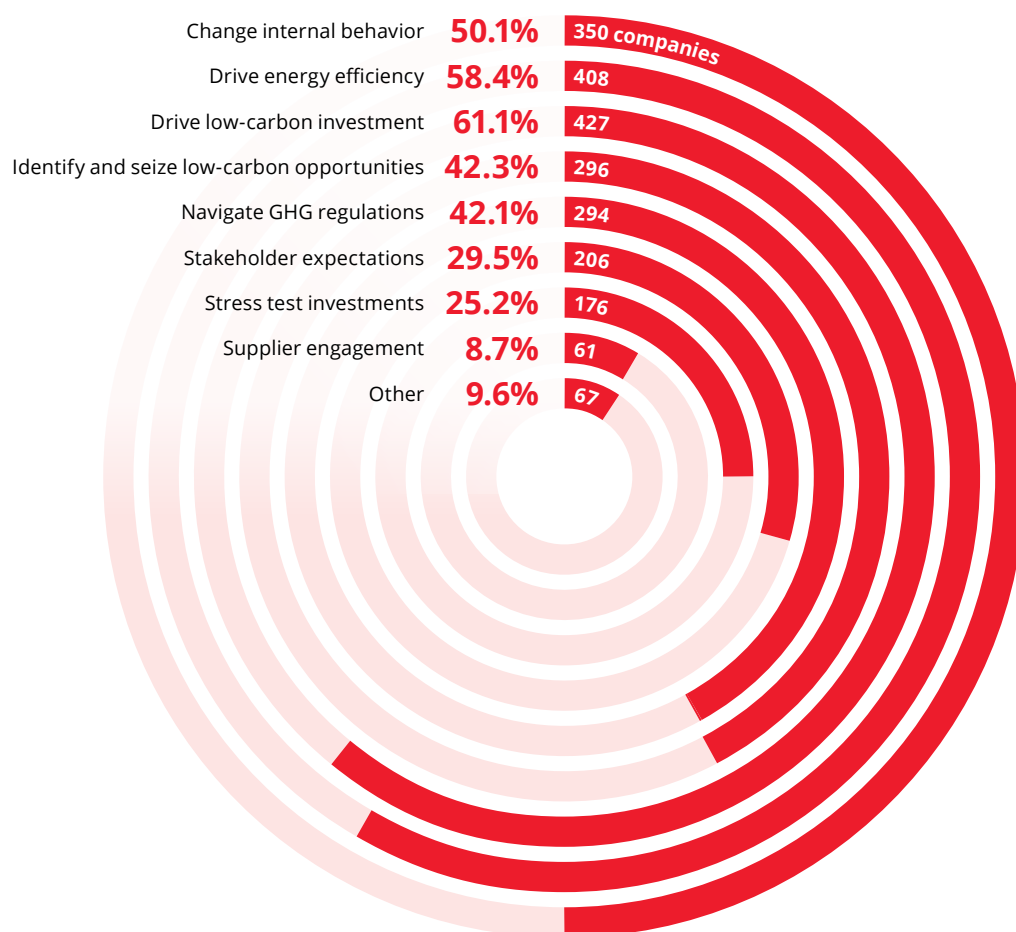
301 Source: Ibid.

302 This number includes companies that reported in 2017 that they were planning to implement an internal price on carbon within the next two years, as well as companies that did not report they were planning to use internal carbon pricing.

303 Source: *CDP Disclosure 2019*, <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>

304 Source: Ibid

Figure 5.1 / Objectives for implementing an internal carbon price³⁰⁵



The way companies use internal carbon pricing also differs. Most companies reported to CDP that they apply the carbon prices as a shadow price to monetize the GHG emissions associated with a decision. In fact, about 400 companies—which is more than half of the companies currently using internal carbon pricing—stated they use a shadow price. Furthermore, about 150 companies indicated that they use some form of an internal carbon fee or trading system. Approaches range from charging employees for the carbon footprint associated with business travel to charging business units for their GHG emissions and investing these funds back into low-carbon and energy efficiency projects. These

could be projects within the company, as well as projects outside its value chain in the form of offset credits. In total, 85 companies reported using internal carbon pricing in combination with purchasing offsets. This includes using internal carbon pricing to raise funds internally for buying offsets or charging departments internally with a carbon fee based on the cost of the purchased offsets. This number could grow further as more companies are setting carbon neutrality targets where emissions that are difficult to mitigate are neutralized with certain types of offsets. As of April 1, 2020, 760 companies and 27 investors have committed to achieving net zero by 2050 as part of the Climate Ambition Alliance.³⁰⁶

³⁰⁵ CDP, *CDP Disclosure 2019*, <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>

³⁰⁶ Source: UNFCCC, *Climate Ambition Alliance: Net Zero 2050*, 2020, <https://climateaction.unfccc.int/views/cooperative-initiative-details.html?id=94>.

The growing demand for credits for offsetting is already visible with the transactions on the voluntary carbon market reaching a seven-year high in 2018.³⁰⁷ This growth has primarily been driven by credits from nature-based solutions to store and avoid GHG emissions through conservation, restoration and improved management of forests, wetlands, grasslands and agricultural lands. As more

companies are committing to net zero targets, the demand for offsets from the corporate sector could grow further, especially in cases where companies include their scope 3 emissions³⁰⁸ in their net zero targets or aim to go carbon negative.³⁰⁹ Increasingly, internal carbon pricing is implemented as a tool to achieve net zero or carbon negative targets as described in Box 5.1.

Box 5.1 / Case studies on companies using an internal carbon price to achieve net zero or carbon negative targets³¹⁰

- **Microsoft** announced it has set a target to be carbon negative by 2030 for its entire value chain emissions.³¹¹ Part of the strategy is to extend its carbon fee program to also cover all scope 3 emissions and implement new procurement processes and tools to incentivize its suppliers to reduce their emissions. Microsoft applies an internal carbon price to its GHG emissions, with all proceeds going into a fund dedicated for low-carbon investments and energy efficiency. Where Microsoft is unable to reduce its GHG emissions, e.g. for its energy use or company travel, it uses this fund to buy offsets where needed with the aim of achieving carbon neutrality.
- **Infosys** made a voluntary commitment in 2011 to the United Nations to become carbon neutral. The company assessed the magnitude of scope 1, 2 and 3 emissions across various regions and derived the level of its carbon price by assessing the abatement cost of energy efficiency, renewable energy and offsetting measures. Infosys also has an option of using its internal carbon price to raise funds from business units and use the funds for corporate emission reduction programs.
- **Nedbank Limited** set the goal of becoming net zero. It calculates its carbon footprint and takes abatement measures to reduce GHG emissions. Where abatement is not possible, Netbank offsets the remainder of the carbon footprint. The internal carbon price is determined by deriving the price of offsets to compensate for the unabated scope 1, 2 and 3 emissions.
- **La Poste** uses an internal carbon fee approach where business units are charged and incentivized to undertake abatement measures. As a result, GHG emissions have decreased and moneys collected can be used to purchase offsets, which has helped La Poste's parcel delivery to become net zero. This information is being communicated to its clients who can, in turn, promote this information to their clients. Internally, the internal carbon price raises awareness at employees.

307 Source: Ecosystem Marketplace, *Financing Emissions Reductions for the Future*, December 2019, <https://app.hubspot.com/documents/3298623/view/63001900?accessId=eb4b1a>.

308 Scope 3 emissions are all indirect GHG emissions occurring upstream and downstream in the value chain of the organization except for indirect GHG emissions from purchased energy. For more information, see e.g. <http://ghgprotocol.org/standards/scope-3-standard>.

309 Becoming carbon negative requires a company to remove more GHG emissions from the atmosphere than it emits.

310 Source: CDP, *CDP Disclosure 2019*, <https://www.cdp.net/en/climate/carbon-pricing/carbon-pricing-connect>

311 Source: Microsoft, *Microsoft Will Be Carbon Negative by 2030*, January 16, 2020, <https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/>.

In most companies, internal carbon pricing only covers direct GHG emissions and emissions from their purchased energy (scope 1 and 2). The companies reporting to CDP showed that about a quarter use their internal carbon pricing program to cover some of their scope 3 emissions. Some companies only focus on scope 3 areas such as business travel, although there are also motor vehicle manufacturers that include the emissions related to the use of their sold products in their internal carbon pricing program. Similarly, at least one bank has reported the use of internal carbon pricing for its investments. Nonetheless, less than 10 percent of the reporting companies use internal carbon pricing for supplier engagement. This points to a large untapped potential for internal carbon pricing in addressing supply chain emissions, as these on average account for five times the direct emissions of a company.³¹² In addition, the public sector also makes large purchases with high supply chain emissions (such as in infrastructure). Internal carbon pricing can be used in multiple ways in procurement and supply chain management to reduce these emissions in steering decisions towards greener suppliers and stimulating low-carbon offerings.³¹³

Universities are also using internal carbon pricing in their efforts to contribute to climate action. Yale University has set a commitment to reach carbon neutrality by 2050³¹⁴ and implemented a revenue neutral internal fee on administrative units to incorporate the social costs of climate change into university decisions, raise awareness within the community and inform policy decisions globally. Similarly, Swarthmore College has committed to reaching carbon neutrality by 2035³¹⁵ and uses an internal fee to incentivize GHG emission reductions and provide capital for its sustainability

fund. Arizona State University uses an internal carbon price on all university-sponsored air travel, which are partially used to purchase offsets to reach carbon neutrality by 2025.³¹⁶

The financial sector is also becoming increasingly vocal on climate action and carbon pricing as organizations are moving to implement recommendations of the Financial Stability Board-Task Force on Climate-related Financial Disclosures (FSB-TCFD).³¹⁷ This includes the use of internal carbon pricing as one of the potential metrics for disclosure on climate-related risks. In the Nordics, Alecta, Folksam and Robur Asset Management, which together oversee about US\$310 billion, started a campaign aimed at forcing firms to show how they calculate the future cost of carbon emissions. Alecta and Folksam are both members of the Net-Zero Asset Owner Alliance, which represents over US\$4.6 trillion of assets under management.³¹⁸ The funds behind the alliance have pledged to transform their portfolios to net zero GHG emissions by 2050.³¹⁹ Climate action in the financial sector continues to gain momentum after Blackrock, the world's biggest asset manager with US\$6.9 trillion in assets under management, announced in January 2020 that it would put sustainability at the heart of its investments and divest from fossil fuel companies.³²⁰ This announcement came after Blackrock had just joined the Climate Action 100+ initiative, an investor initiative to ensure the world's largest corporate greenhouse gas emitters take necessary action on climate change. The companies include 100 large emitters, accounting for two-thirds of annual global industrial emissions.³²¹ This development shows the increased demand from investors for companies to take into account climate risks and opportunities in their long-term strategies and corporate governance frameworks.

312 Source: CDP, *Cascading Commitments: Driving Ambitious Action through Supply Chain Engagement*, 2019, https://6fefcbb86e61af1b2fc4-c70d8ead6ced550b4d987d7c03fcd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/004/072/original/CDP_Supply_Chain_Report_2019.pdf?1550490556.

313 Source: Guidehouse and The Generation Foundation, *Internal Carbon Pricing for Future-Proof Supply Chains*, December 17, 2019, <https://www.generationim.com/media/1621/icp-for-future-proof-supply-chains.pdf>.

314 Source: Yale University, *Greenhouse Gas Emissions*, accessed May 14, 2020, <https://sustainability.yale.edu/priorities-progress/climate-action/greenhouse-gas-emissions>.

315 Source: Swarthmore College, *Commitments*, accessed May 14, 2020, <https://www.swarthmore.edu/sustainability/commitments>.

316 Source: Arizona State University, *ASU Carbon Project launched to reach neutrality by 2025*, July 11, 2018, <https://sustainability.asu.edu/news/archive/asu-carbon-project-launched-to-reach-neutrality-by-2025/>.

317 Source: TCFD, *TCFD Overview*, March 2020, https://www.fsb-tcfd.org/wp-content/uploads/2020/03/TCFD_Booklet_FNL_Digital_March-2020.pdf.

318 Source: Bloomberg, *They Manage \$310 Billion, and They Want New Carbon Pricing Rules*, March 11, 2020, <https://www.bloomberg.com/news/articles/2020-03-11/they-manage-310-billion-and-they-want-new-carbon-pricing-rules>.

319 Source: UNEP, *UN-Convened Net-Zero Asset Owner Alliance*, 2020, <https://www.unepfi.org/net-zero-alliance/>.

320 Source: BlackRock, *A Fundamental Reshaping of Finance*, 2020, <https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter>.

321 Source: Climate Action 100+, *Global Investors Driving Business Transition*, 2019, <http://www.climateaction100.org/>.

Appendix A

Exchange rates

Table A.1 / Currency conversion rates, as of April 1, 2020

Currency	Symbol	US\$ equivalent
Argentinian Peso	ARS	0.0155
Australian Dollar	A\$	0.6124
British Pound	£	1.2380
Canadian Dollar	CAN\$	0.7034
Chilean Peso	CLP	0.0012
Chinese Yuan	CNY	0.1408
Danish Krona	DKR	0.1465
Euro	€	1.0936
Icelandic Krona	ISK	0.0071
Japanese Yen	JPY	0.0093
Kazakhstan Tenge	KZT	0.0022
Korean Won	KRW	0.0008
Mexican Peso	MXN	0.0408
New Zealand Dollar	NZD	0.5960
Norwegian Krone	NOK	0.0970
Polish Zloty	PLZ	0.2398
Singapore Dollar	S\$	0.7021
South African Rand	R	0.0556
Swedish Krona	SEK	0.1004
Swiss Franc	CHF	1.0358
Ukrainian Hryvnia	UAH	0.0385

Appendix B

Detailed overview of carbon pricing initiatives in the Canadian provinces and territories

Table B.1 / Carbon pricing developments in the Canadian provinces and territories

Jurisdiction	Type and status	Key developments
Alberta	ETS implemented Federal backstop partially imposed	<p>Following a change in government in April 2019, Alberta replaced its Carbon Competitiveness Incentive Regulation (CCIR) with the Technology Innovation and Emissions Reduction (TIER) Regulation system—a baseline-and-credit ETS—effective as of January 1, 2020.³²² Under the new system, electricity generators must continue to meet a clean-as-best gas benchmark while the emissions performance benchmark that other industrial facilities need to meet can now also be based on 90 percent of their past performance instead of only a sector-wide benchmark under the CCIR. Facility-specific benchmarks will reduce by 1% annually beginning in 2021. Facilities can meet their benchmark by reducing emissions, purchasing performance credits from other facilities, using Alberta-based emission offsets or paying into a TIER compliance fund at CAN\$30/tCO₂e (US\$21/tCO₂e)—a price consistent with the federal minimum carbon price for 2020. Use of carbon pricing revenues include investment in programs and policies to reduce emissions and reduction of government debt.</p> <p>Alberta also abolished its carbon tax on May 30, 2019,³²³ and starting January 1, 2020, the federal fuel charge of the backstop was imposed on the province.³²⁴ Alberta challenged the application of the fuel charge in court, and on February 24, 2020, the Alberta Court of Appeal sided with the province, ruling that the federal backstop is unconstitutional and violates provincial powers of jurisdiction.³²⁵ The federal government intends to defend the federal backstop in the Supreme Court of Canada.³²⁶</p>
British Columbia	ETS and carbon tax implemented Federal benchmark met	<p>The British Columbia (BC) carbon tax was scheduled to increase from CAN\$40/tCO₂e to CAN\$45/tCO₂e (US\$28/tCO₂e to US\$32/tCO₂e) on April 1, 2020 and continue to increase annually by CAN\$5/tCO₂e (US\$4/tCO₂e) until the rate is CAN\$50/tCO₂e (US\$35/tCO₂e) in 2021.³²⁷ In following this schedule, BC would achieve the rate of CAN\$50/tCO₂e (US\$35/tCO₂e) one year before the federal fuel charge. However, in response to COVID-19, the rate was frozen at CAN\$40/tCO₂e (US\$28/tCO₂e) until further notice.³²⁸ As an additional response to COVID-19, the BC climate action tax credit—a measure to help offset the impact of the carbon tax on households—will be increased and expanded in July 2020 to provide income support for BC residents.³²⁹</p> <p>The CleanBC Industrial Incentive Program (CIIP) was established in 2019 for large industrial facilities that must report their emissions under the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA). It provides payments to industrial facilities based on their emission performance (i.e. a comparison against emissions intensity benchmarks) to offset the carbon tax cost that they face above CAN\$30/tCO₂e. Participation is voluntary and operators that meet or are closer to the benchmarks may be eligible to receive a greater payment, creating an incentive to reduce their emissions intensity.</p>

322 Source: Government of Alberta, *Technology Innovation and Emissions Reduction Regulation*, January 1, 2020, <https://www.alberta.ca/technology-innovation-and-emissions-reduction-regulation.aspx>.

323 Source: Government of Alberta, *An Act to Repeal the Carbon Tax*, June 4, 2019, http://www.qp.alberta.ca/Documents/AnnualVolumes/2019/ch01_19.pdf.

324 Source: Government of Canada, *Integrating Alberta's Carbon Pollution Pricing System for Large Industrial Emitters With the Federal Fuel Charge*, December 6, 2019, <https://www.canada.ca/en/department-finance/news/2019/12/integrating-albertas-carbon-pollution-pricing-system-for-large-industrial-emitters-with-the-federal-fuel-charge.html>.

325 Source: Court of Appeal of Alberta, *Reference Re Greenhouse Gas Pollution Pricing Act*, February 24, 2020, [https://www.albertacourts.ca/docs/default-source/ca/rsn\(c\)-1903-0157ac.pdf](https://www.albertacourts.ca/docs/default-source/ca/rsn(c)-1903-0157ac.pdf).

326 Source: Government of Canada, *Government of Canada Will Defend Federal Climate Action in the Supreme Court*, February 24, 2020, 2020-03-12.

Jurisdiction	Type and status	Key developments
Manitoba	Federal backstop fully imposed ETS and carbon tax under consideration	<p>On March 5, 2020, Manitoba announced its intention to implement a Made-in-Manitoba OBPS and Green Levy as of July 1, 2020 as an alternative to the federal backstop.³³⁰ To offset the cost impact on households, the provincial sales tax will be reduced from 7 to 6 percent. The first reading of the bill to enact this legislation took place on March 19, 2020.³³¹ However, on the same day, the Manitoba Legislative Assembly voted to suspend its sittings due to COVID-19,³³² making it uncertain when these two carbon pricing initiatives could start.</p> <p>The Manitoba OBPS is a baseline-and-credit ETS covering industrial facilities with annual emissions of 50,000 tCO₂e or more, which represent about 6 percent of the province's GHG emissions. The OBPS provides opt-in provisions for smaller facilities. Facilities that exceed their limit can meet their compliance obligations by purchasing performance credits from other facilities, using Manitoba-based offsets or paying the Green Levy. The Manitoba Green Levy is an economy-wide carbon tax on all fossil fuels. The tax rate is to stay fixed at CAN\$25/tCO₂e (US\$18/tCO₂e). The revenues are to be used to lower taxes in the province.</p> <p>The federal government has yet to determine whether the Manitoba carbon pricing plans meet the federal benchmark. In addition, Manitoba launched its own challenge against the federal backstop in the federal court.³³³ Progression through the judicial system stalled in March 2020.</p>
New Brunswick	ETS under consideration Carbon tax implemented Federal backstop partially imposed	<p>New Brunswick's carbon tax came into effect on April 1, 2020 at a rate of CAN\$30/tCO₂e (US\$21/tCO₂e). This replaced the fuel charge component of the federal backstop.³³⁴</p> <p>New Brunswick also submitted a proposal for its own OBPS for large industrial emitters to the federal government as an alternative to the federal OBPS.³³⁵ The federal government is still in the process of reviewing this proposal. Meanwhile, New Brunswick remains subject to the federal OBPS.</p>
Newfoundland and Labrador	ETS and carbon tax implemented	<p>The Newfoundland and Labrador carbon tax and provincial baseline-and-credit ETS (the Performance Standards System—PSS) have been in effect since January 1, 2019. The ETS applies to large industrial facilities and electricity generation. The carbon tax covers fuels primarily used in transportation, building heating, and electricity generation and started at CAN\$20/tCO₂e (US\$14/tCO₂e). The Newfoundland and Labrador government had planned to raise its carbon tax to CAN\$30/tCO₂e (US\$21/tCO₂e) on April 1, 2020, but this has been delayed until further notice due to impacts of COVID-19.</p>
Northwest Territories	Carbon tax implemented	<p>The Northwest Territories (NWT) carbon tax entered into force as of September 1, 2019.³³⁶ The initial CAN\$20/tCO₂e (US\$14/tCO₂e) 2019 tax rate will increase annually by CAN\$10 (US\$7/tCO₂e) to reach CAN\$30/tCO₂e (US\$21/tCO₂e) on July 1, 2020 and CAN\$50/tCO₂e (US\$35/tCO₂e) in 2022. Various rebates have been introduced with the carbon tax to offset a part of the carbon cost on residents, governments and business entities.</p>

327 Source: Ministry of Finance (British Columbia), *Budget and Fiscal Plan 2018/19-2020/21*, February 20, 2018, https://bcbudget.gov.bc.ca/2018/bfp/2018_Budget_and_Fiscal_Plan.pdf.

328 Source: Government of British Columbia, *British Columbia's Carbon Tax*, 2020, <https://www2.gov.bc.ca/gov/content/environment/climate-change/planning-and-action/carbon-tax>.

329 Source: Government of British Columbia, *One-Time Enhanced July 2020 Payment for the Climate Action Tax Credit*, March 31, 2020, <https://www2.gov.bc.ca/gov/content/taxes/income-taxes/personal/credits/climate-action/enhanced-july-2020-payment>.

330 Source: Government of Manitoba, *A Made-in-Manitoba Green Levy - Moving Manitoba Forward with the Climate and Green Plan*, October 27, 2017, https://news.gov.mb.ca/asset_library/en/newslinks/2020/03/BG-Carbon_Pricing-PR.pdf.

331 Source: Government of Manitoba, *Status of Bills*, November 19, 2019, <https://www.gov.mb.ca/legislature/business/billstatus.pdf>.

332 Source: Legislative Assembly of Manitoba, *The Legislative Assembly of Manitoba*, March 19, 2020, <https://www.gov.mb.ca/legislature/index.html>.

333 Government of Manitoba, *Manitoba to challenge Ottawa's carbon tax in court*, April 3, 2019, <https://news.gov.mb.ca/news/index.html?item=45161&posted=2019-04-03>.

334 Source: Government of Canada, *FCN13 New Brunswick No Longer a Listed Province Under Part 1 of the Greenhouse Gas Pollution Pricing Act Effective April 1, 2020*, March 26, 2020, 13, <https://www.canada.ca/en/revenue-agency/services/forms-publications/publications/fcn13.html>.

335 Source: Government of New Brunswick, *Holding Large Emitters Accountable: New Brunswick's Output-Based Pricing System*, June 2019, <https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Climate-Climatiquess/HoldingLargeEmittersAccountable.pdf>.

336 Source: Government of Northwest Territories, *Bill 42 An Act to Amend the Petroleum Products Tax Act*, June 2019, https://www.ntassembly.ca/sites/assembly/files/bill_42_plain_language_summary.pdf.

Jurisdiction	Type and status	Key developments
Nova Scotia	ETS implemented	Nova Scotia launched its ETS in January 2019. ³³⁷ Its first allocation of allowances occurred in April 2019 and auctioning will begin later in 2020. The minimum price for auctions held in 2020 are CAN\$20/tCO ₂ e (US\$14/tCO ₂ e) and each subsequent year the minimum price will increase by 5% plus inflation. ³³⁸ To improve market liquidity, regulated entities can have their allowances auctioned by the government, also known as consignment. In addition, purchase limits apply in order to secure market functionality. Banking is not allowed between compliance periods. ³³⁹
Nunavut	Federal backstop opt-in	As of July 1, 2019, both the federal carbon fuel charge and OBPS apply to Nunavut. Given Nunavut's unique circumstances, including high costs of energy and general living, and challenges with food security, the territory established the Nunavut Carbon Rebate program. ³⁴⁰ This program helps manage the cost of the federal fuel charge by reducing its price impact by 50% in 2019–2022 at the point of purchase, halving the effective carbon price faced. From 2022, this subsidy will be reduced annually in 10%-point steps until it is phased out in 2028 and the full rate of the federal fuel charge is faced.
Ontario	ETS under consideration Federal backstop fully imposed	Ontario has proposed its own alternative to the federal OBPS for large emitters—called the Emissions Performance Standard (EPS). The EPS is under review by the federal government and Ontario is still subject to the federal backstop OBPS. ³⁴¹ Ontario is also subject to the federal fuel charge.
Prince Edward Island	Carbon tax implemented Federal OBPS only opt-in	The Prince Edward Island carbon tax has been in force since April 1, 2019. ³⁴² The carbon tax is in line with the federal fuel charge and is currently at CAN\$30/tCO ₂ e (US\$21/tCO ₂ e). At the request of the province, the federal OBPS for large emitters was implemented as of January 1, 2019. ³⁴³
Québec	ETS implemented Federal benchmark met	Québec has been developing a reform to free allocation for 2024–2030 in consultation with industrial emitters. The plan would gradually reduce free allocation and auction a portion of those allowances to use the revenue to finance emissions reductions for emissions-intensive industries. This proposed reform is expected to be introduced in regulation in 2020.
Saskatchewan	ETS implemented Federal backstop partially imposed	<p>The Saskatchewan OBPS entered into force as of January 1, 2019. It covers large industrial facilities across 11 sectors in the province that emit over 25 ktCO₂e with a voluntary opt-in for facilities emitting between 10 to 25 ktCO₂e. The federal OBPS applies only to sectors not covered by the provincial OBPS.³⁴⁴</p> <p>Saskatchewan has challenged the constitutionality of the backstop. The province's own Court of Appeals ruled on May 3, 2019 that the backstopping arrangement introduced by the federal government is constitutional. Saskatchewan has appealed the decision to the Supreme Court of Canada with the hearing date of the appeal scheduled for March 24, 2020.³⁴⁵ However, due to COVID-19, the Supreme Court suspended all hearings scheduled in March to May 2020 until June 2020 at the earliest.³⁴⁶</p>

337 Source: Government of Nova Scotia, *Cap-and-Trade Program Regulations Made under Section 112Q of the Environment Act*, November 13, 2018, <https://www.novascotia.ca/just/regulations/regs/envcapandtrade.htm>.

338 Source: Government of Nova Scotia, *Nova Scotia's Cap and Trade Program Regulatory Framework*, May 2019, <https://climatechange.novascotia.ca/sites/default/files/Nova-Scotia-Cap-and-Trade-Regulatory-Framework.pdf>.

339 Source: Government of Nova Scotia, *Nova Scotia's Cap and Trade Program Regulatory Framework*, May 2019, <https://climatechange.novascotia.ca/sites/default/files/Nova-Scotia-Cap-and-Trade-Regulatory-Framework.pdf>.

340 Source: Government of Nunavut, *The Carbon Tax in Nunavut - FAQ*, July 2019, https://gov.nu.ca/sites/default/files/faq_-_carbon_tax_in_nunavut-eng.pdf.

341 Source: Government of Ontario, *Making Polluters Accountable: Industrial Emission Performance Standards*, July 5, 2019, <https://ero.ontario.ca/notice/013-4551#decision-details>.

342 Source: Government of Prince Edward Islands, *Climate Leadership Regulations, PEI Reg EC57/2019*, March 9, 2020, <https://www.canlii.org/en/pe/laws/regu/pei-reg-ec57-2019/latest/pei-reg-ec57-2019.html>.

343 Source: Government of Canada, *Prince Edward Island and Pollution Pricing*, November 23, 2018, <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/prince-edward-island.html>.

344 Source: Government of Saskatchewan, *Upstream Oil and Gas Aggregate Facility*, May 2020, <https://publications.saskatchewan.ca/api/v1/products/102207/formats/113043/download>.

345 Source: Supreme Court of Canada, *Scheduled Hearings*, March 2020, <https://www.scc-csc.ca/case-dossier/info/hear-aud-eng.aspx?ya=2020&mo=3&submit=Search>.

346 Source: Supreme Court of Canada, *News Release*, March 25, 2020, <https://decisions.scc-csc.ca/scc-csc/news/en/item/6833/index.do>.

Jurisdiction	Type and status	Key developments
Yukon	Federal backstop opt-in	As of July 1, 2019, the federal backstop applies to Yukon. Following discussions with the federal government on a carbon pricing approach that considers its unique circumstances, there are additional rebates for aviation fuel, diesel for electricity generation in remote communities and greenhouse operators. ³⁴⁷

³⁴⁷ Source: Government of Yukon, *Learn about the Federal Price on Pollution and Yukon's Carbon Rebate*, July 2019, <https://yukon.ca/en/carbon-rebate#learn-about-the-federal-price-on-pollution>.



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