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# State and Trends of Carbon Pricing 2018

Washington DC, May 2018





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Since it was first launched more than a decade ago, the annual State and Trends report has established itself as perhaps the most important reference document—first on carbon markets and, later, on carbon pricing more broadly—by providing readers with up-to-date information on developments in initiatives and policies around the world. Previous editions also included analytical discussions on issues that related to these developments. In 2017, an online dashboard was launched to complement the publication, which is available at: <http://carbonpricingdashboard.worldbank.org>.

The 2018 edition of the report focuses exclusively on data and information on the evolving initiatives that put a price on carbon, in terms of their most current status and emerging trends. It includes an expanded discussion on what the trends are telling us about the underlying motivations of and the direction the world is moving in when it comes to carbon pricing.

The growing momentum for carbon pricing and the increasing prevalence of the topic in climate change discussions in recent years take us in a new direction for the report. More national and subnational jurisdictions and private sector entities are adopting carbon pricing. These encouraging developments warrant due attention and require tracking each scheme with enhanced detail. The expected Paris “rulebook” is likely to drive this momentum further with guidance on operationalization of Article 6 of the Paris Agreement. We will continue to make deep analytical dives in a forthcoming series of technical papers that will add additional context to the data shared here.

This report also includes a reflection on the engagement of non-state actors on climate action and carbon pricing—a development that characterizes the implementation phase the world has embarked on since the adoption of the Paris Agreement. The inclusion of internal carbon prices in business operations, and how this is incentivizing action on climate change, has raised the need to expand the focus to include an important discussion on how carbon pricing is considered in other economies and the indirect measures taken to provide a carbon price signal.

We hope that this year’s State and Trends of Carbon Pricing report will expand the understanding of what is quickly becoming a global trend in accelerating climate action and achieving sustainable development objectives.

The report benefited greatly from the valuable contributions and perspectives of our colleagues in the climate and carbon finance community, who have ensured the quality and clarity of this report: Santiago Afonso, Olzhas Agabekov, Erik van Andel, Conor Barry, Benedikt Benediktsson, Pablo Benitez, Daniel Besley, Tanguy de Bienassis, Rachel Boti-Douayoua, David Brock, Juan Carlos Arredondo Brun, Marcelo Andres Mena Carrasco, Usayd Casewit, Marcos Castro Rodrigues, David Coney, Monica Crippa, Hannah Cushing, Timila Dhakhwa, Yue Dong, Dominik Englert, Susana Escária, Harikumar Gadde, Víctor Hugo Escalona Gómez, Greenhouse Gas Inventory and Research Center of Korea, Stefany Gutu, Madeleine Hardy, Dafei Huang, Huang Xiaochen, Thomas Kerr, Minyoung Kim, Alexandre Kossoy, Lai Han, Liu Ying, Pedro Martins Barata, Taisei Matsuki, Rachel Mok, Sarah Moyer, Norwegian Ministry of Finance, Klaus Oppermann, Grzegorz Peszko, Neeraj Prasad, Venkata Putti, Ulrika Raab, Smita Rana, Rama Reddy, Kathleen Rich, Fernanda Rocha, John Roome, Isabel Saldarriaga Arango, Robert Savage, Reed Schuler, William Space, Katie Sullivan, Ilari Valjus, Olga Yukhymchuk, Peter Zapfel and Zou Xiang.

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We also acknowledge support from the Carbon Pricing Leadership Coalition, CDP, Climate Transparency, the Institute for Climate Economics, the International Climate Action Partnership, and the Partnership for Market Readiness for the preparation of this report.

# List of abbreviations and acronyms

	°C	Degrees Celsius			
<b>A</b>	<b>AFD</b>	French Development Agency		<b>F</b>	<b>FSB</b> Financial Stability Board
				<b>F</b>	<b>F-gas</b> Fluorinated greenhouse gas
<b>C</b>	<b>CAR</b>	Clean Air Rule		<b>G</b>	<b>GCF</b> Green Climate Fund
	<b>CARB</b>	California Air Resources Board			<b>GHG</b> Greenhouse gas
	<b>CCIR</b>	Carbon Competitive Incentive Regulation			<b>GtCO<sub>2</sub>e</b> Gigaton of carbon dioxide equivalent
	<b>CDM</b>	Clean Development Mechanism		<b>I</b>	<b>I4CE</b> Institute for Climate Economics
	<b>CDSB</b>	Climate Disclosure Standards Board			<b>ICAO</b> International Civil Aviation Organization
	<b>CER</b>	Certified Emission Reduction			<b>IEA</b> International Energy Agency
	<b>CO<sub>2</sub></b>	Carbon dioxide			<b>IFC</b> International Finance Corporation
	<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent			<b>IMO</b> International Maritime Organization
	<b>COP</b>	Conference of the Parties			<b>INDC</b> Intended Nationally Determined Contribution
	<b>CORSIA</b>	Carbon Offset and Reduction Scheme for International Aviation			<b>ITMO</b> Internationally Transferred Mitigation Outcome
	<b>CPLC</b>	Carbon Pricing Leadership Coalition			
<b>E</b>	<b>EBRD</b>	European Bank for Reconstruction and Development		<b>K</b>	<b>ktCO<sub>2</sub>e</b> Kiloton of carbon dioxide equivalent
	<b>EC</b>	European Commission			
	<b>ECR</b>	Emissions Containment Reserve		<b>M</b>	<b>MDB</b> Multilateral Development Bank
	<b>EIB</b>	European Investment Bank			<b>MRV</b> Monitoring, Reporting and Verification
	<b>EPA</b>	Environmental Protection Agency			<b>MSR</b> Market Stability Reserve
	<b>ERF</b>	Emissions Reduction Fund			<b>MtCO<sub>2</sub>e</b> Megaton of carbon dioxide equivalent
	<b>ETS</b>	Emissions Trading System			
	<b>EU</b>	European Union			
	<b>EUA</b>	European Union Allowance			
	<b>EU ETS</b>	European Union Emissions Trading System			

<b>N</b>	<b>NDC</b>	Nationally Determined Contribution	<b>T</b>	<b>t</b>	Ton (note that, unless specified otherwise, ton in this report refers to a metric ton = 1,000 kg)
	<b>NDRC</b>	The National Development and Reform Commission of the People's Republic of China		<b>TCAF</b>	Transformative Carbon Asset Facility
<b>O</b>	<b>OECD</b>	Organisation for Economic Co-operation and Development	<b>TCFD</b>	Task Force on Climate-related Financial Disclosures	
	<b>P</b>	<b>PAF</b>	Pilot Auction Facility	<b>tce</b>	tons of standard coal equivalent
<b>PDC</b>		Portfolio Decarbonization Coalition	<b>tCO<sub>2</sub></b>	Ton of carbon dioxide	
<b>PMR</b>		Partnership for Market Readiness	<b>tCO<sub>2</sub>e</b>	Ton of carbon dioxide equivalent	
<b>R</b>	<b>RBCF</b>	Results-based Climate Finance	<b>U</b>	<b>UK</b>	United Kingdom
	<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation		<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
	<b>REDD+</b>	Extends REDD by including sustainable forest management, conservation of forests, and enhancement of carbon sinks		<b>US</b>	United States
	<b>RGGI</b>	Regional Greenhouse Gas Initiative			
<b>S</b>	<b>SARPs</b>	Standards and Recommended Practices			
	<b>SBSTA</b>	Subsidiary Body for Scientific and Technological Advice			
	<b>SGER</b>	Specified Gas Emitters Regulation			

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# Executive summary

**2017 saw continued progress on carbon pricing initiatives at the subnational, national, and regional levels, and 2018 will be a critical year for implementing international carbon pricing mechanisms.**

**Carbon pricing continues to gain traction and there is progress towards scaling up international climate finance.** At the One Planet Summit in December 2017—on the second anniversary of the adoption of the Paris Agreement—leaders of governments, businesses and international organizations, including the French President Emmanuel Macron, United Nations Secretary General Antonio Guterres, and World Bank Group President Jim Yong Kim, came together to discuss approaches to support and accelerate global efforts to fight climate change. Ambitious announcements were made to progress carbon pricing at the regional and national levels, demonstrating a renewed leadership, both from the private and public sectors, to drive the climate agenda forward.<sup>1</sup>

**The Talanoa Dialogue has set the stage for discussions on strengthening climate action.** The 23<sup>rd</sup> Conference of the Parties (COP 23) held in November 2017 was an important step toward the operationalization of the Paris Agreement, and COP 24, which will take place in Katowice, Poland in December 2018, is expected to further drive the global climate agenda. Another key outcome of COP 23 was the adoption of the “Fiji Momentum

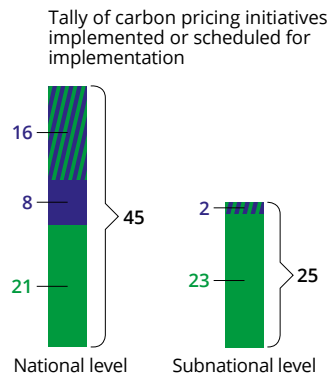
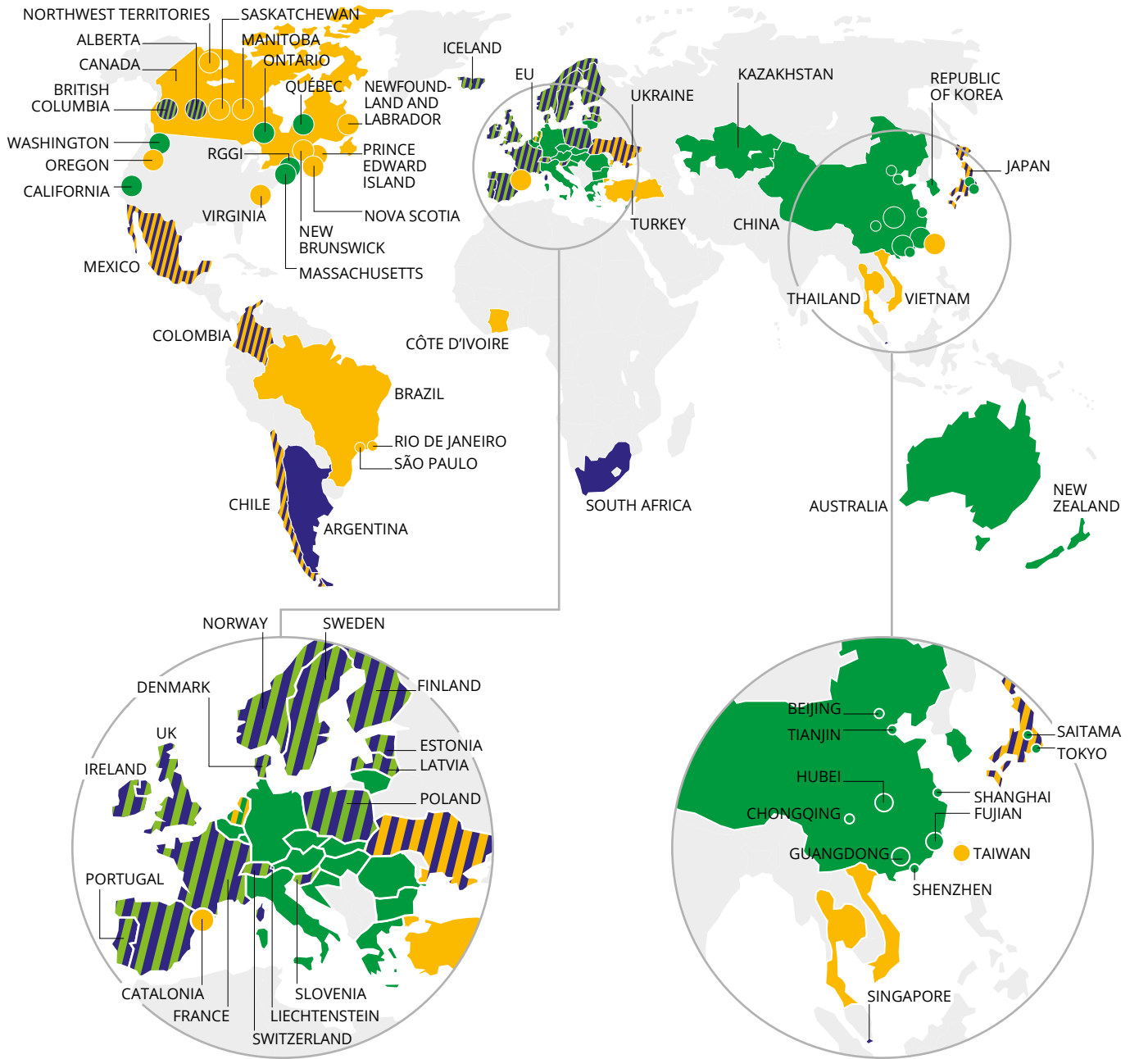
for Implementation” that sets out the design for the Talanoa dialogue, a process by which Parties will take stock of their collective progress toward meeting the goals of the Paris Agreement in order to promote enhanced ambition.

**88 Parties that have submitted their nationally determined contributions to the Paris Agreement, which represents 56 percent of global GHG emissions, have stated that they are planning or considering the use of carbon pricing as a tool to meet their commitments.** Three of these Parties did not initially mention carbon pricing in their intended nationally determined contributions: Argentina, Mali and Uruguay.

**In addition to developments at the international level, regional, national and subnational jurisdictions continue to implement new initiatives.** To date, 51 carbon pricing initiatives have been implemented or are scheduled for implementation, as shown in Figure 1. This consists of 25 emissions trading systems (ETs), mostly located in subnational jurisdictions, and 26 carbon taxes primarily implemented on a national level. These carbon pricing initiatives would cover 11 gigatons of carbon dioxide equivalent (GtCO<sub>2</sub>e) or about 20 percent of global greenhouse gas (GHG) emissions, as shown in Figure 2. In 2018, the total value of ETs and carbon taxes is US\$82 billion, representing a 56 percent increase compared to the 2017 value of US\$52 billion.

<sup>1</sup> 12 commitments were made to scale up action against climate change: one of the commitments focused on supporting carbon prices compatible with the Paris Agreement; in particular, commitments were made by several countries to implement a more significant carbon price, the Paris Declaration on Carbon Pricing in the Americas was launched, the Chinese government officially launched the national ETS, and businesses called for action on carbon pricing.

**Figure 1 / Summary map of regional, national and subnational carbon pricing initiatives implemented, scheduled for implementation and under consideration (ETS and carbon tax)**

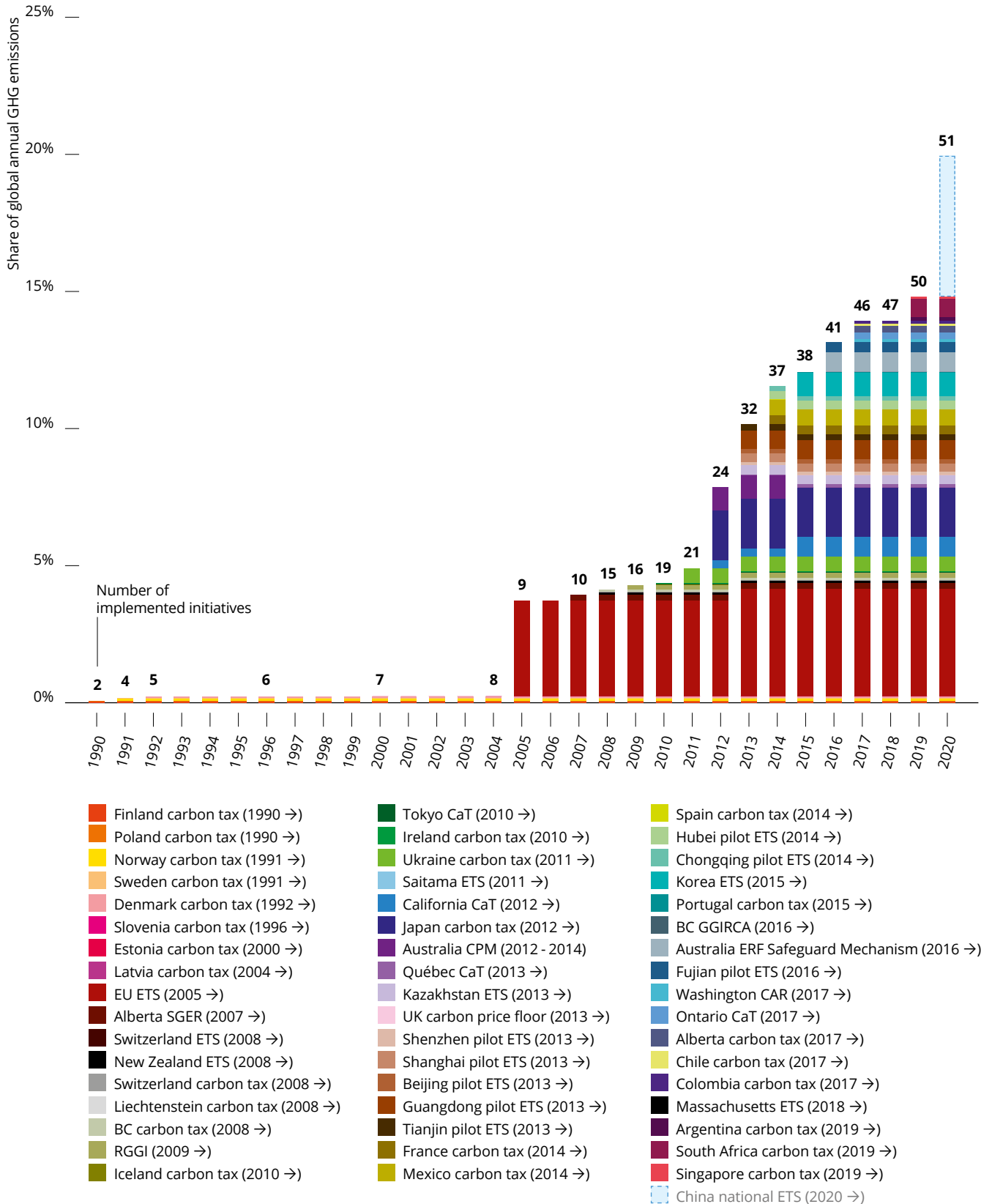


- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- Carbon tax implemented or scheduled, ETS under consideration
- ETS implemented or scheduled, carbon tax under consideration

The circles represent subnational jurisdictions. The circles are not representative of the size of the carbon pricing instrument, but show the subnational regions (large circles) and cities (small circles).

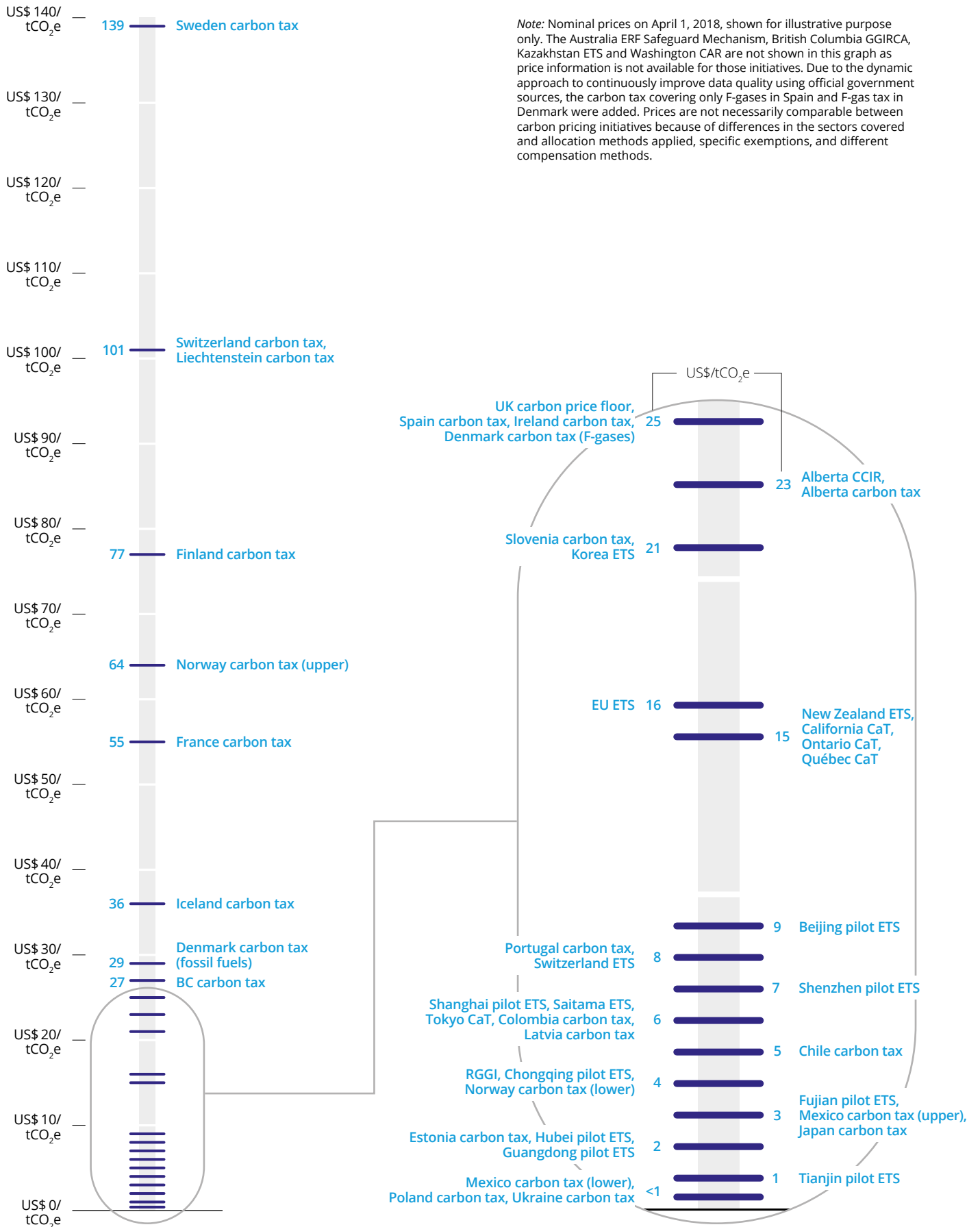
*Note:* Carbon pricing initiatives are considered “scheduled for implementation” once they have been formally adopted through legislation and have an official, planned start date. Carbon pricing initiatives are considered “under consideration” if the government has announced its intention to work towards 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. Due to the dynamic approach to continuously improve data quality, changes to the map not only reflect new developments, but also corrections following new information from official government sources, resulting in the addition of the carbon tax covering only F-gases in Spain.

**Figure 2 / Regional, national and subnational carbon pricing initiatives: share of global emissions covered**



Note: Only the introduction or removal of an ETS or carbon tax is shown. Emissions are presented as a share of global GHG emissions in 2012 from (EDGAR) version 4.3.2 including biofuels emissions. Annual changes in GHG emissions are not shown in the graph. Due to the dynamic approach to continuously improve data quality using official government sources, the carbon tax only covering F-gases in Spain was added. 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 3 / Prices in implemented carbon pricing initiatives**



Multiple trends are emerging in terms of how the public and private sectors are employing carbon pricing and these provide an indication of how carbon pricing could possibly unfold in the future. At the same time, experience gained through the development of carbon pricing initiatives will help to accelerate action needed to mitigate emissions in line with the Paris Agreement.

**Carbon pricing initiatives are making headway in Asia and the Americas.** The China national ETS was officially launched in December 2017 and work is underway to prepare for its implementation. Furthermore, the Kazakhstan ETS was restarted in 2018 following a two-year suspension. Looking ahead, carbon taxes in Argentina and Singapore are scheduled to come into force in 2019. In addition, most of the recent developments in carbon pricing initiatives came from the Americas, with all six newly implemented carbon pricing initiatives in 2017–2018 located in this region.

#### **In 2017:**

- A carbon tax in Alberta, covering all GHG emissions from combustion that are not covered by its baseline-and-credit ETS for large emitters;
- A carbon tax in Chile, which applies to CO<sub>2</sub> emissions from large emitters in the power and industrial sectors;
- An economy-wide carbon tax in Colombia on all liquid and gaseous fossil fuels used for combustion;
- An ETS in Ontario, covering GHG emissions from industry, electricity generators and importers, natural gas distributors and fuel suppliers; and
- The Clean Air Rule in Washington State, establishing a baseline-and-credit system which initially covers fuel distributors and industrial companies that are not considered to be energy intensive nor trade exposed. Currently, facilities are required to report emissions, but compliance obligations are suspended.

#### **In 2018:**

- An ETS in Massachusetts for power plants; power plants in the state will also continue to be subject to the Regional Greenhouse Gas Initiative.

The Paris Declaration on Carbon Pricing in the Americas, launched at the One Planet Summit held in December 2017, affirmed further development of carbon pricing in this region. Through this declaration, 12 national and subnational governments in the Americas committed to implement carbon pricing as a central policy instrument for climate change action and to deepen regional integration of carbon pricing instruments. This was brought together initially from a presidential declaration in Cali, Colombia, in which the Pacific Alliance leaders committed to build on a common transparency framework as the basis for a future voluntary carbon market.

**Carbon pricing initiatives can serve multiple environmental and social objectives.** While the main objective of implementing carbon pricing initiatives is to stimulate cost-effective emissions mitigation, such initiatives can also help achieve broader outcomes. For example, China, the Republic of Korea, Québec, and Singapore mentioned the stimulation of low-carbon innovation as a complementary objective. Some jurisdictions also use carbon pricing initiatives to tackle other environmental issues beyond climate change. For example, the Beijing pilot ETS is intended as a key instrument in lowering air pollution, while in Chile, a carbon tax was introduced as part of a package of environmental taxes to reduce the negative environmental and health impacts from fossil fuel use.

**Many jurisdictions are incorporating phased approaches to plan for changes to the system design.** The implementation of carbon pricing initiatives often brings challenges—including capacity and infrastructure concerns. To address these challenges, many initiatives include phased approaches to plan for adjustments to the system design. For example, California is proposing to modify components of its ETS design for the post-2020 phases, including the allocation approach and the establishment of a price ceiling. Also, the China national ETS will first undergo infrastructure development and simulation phases. Depending on the results from these phases, the China national ETS will start actual implementation and possibly expand and deepen its coverage.

**Climate-related financial disclosure is evolving and carbon pricing is a metric increasingly used to integrate climate-related risks.** A growing number of organizations, businesses and investors, are using internal carbon pricing as a tool to mitigate climate-related financial risks, discover new low-carbon business opportunities and prepare for the transition to a low-carbon economy. The industry-led Task Force on Climate-related Financial Disclosure (TCFD) published its recommendations in June 2017, which aim to improve the reporting and management of climate-related financial risks and opportunities. The TCFD recommends, among others, to disclose internal carbon pricing where relevant. Investors and businesses in different sectors are now considering how best to incorporate and voluntarily comply with the TCFD recommendations. Better access to consistent and reliable data will enhance how climate-related financial risks are assessed, priced and managed.

**A technological evolution is taking place, with innovative tools presenting a new frontier for carbon pricing.** Emerging digital innovations in data gathering (satellite and sensors) and processing allow for applications in areas such as air pollution and GHG monitoring. New systems that enable more efficient development of monitoring, reporting and verification standards with compatible and extensible methods and rules, big data, blockchain, the internet of things (e.g. smart meters), smart contracts<sup>2</sup> and other disruptive technologies hold out the promise of addressing the needs of a new generation of carbon markets post-2020. The potential of these developments should be taken into account in the design and governance of carbon pricing initiatives.

**Increased cooperation across stakeholders can accelerate implementation and increase ambition.** There are a growing number of initiatives that facilitate knowledge sharing and explore modalities for cooperation on carbon pricing between governments. These include the existing

linkage between the Ontario, Québec and California ETSS and the scheduled linkage between the EU and Switzerland ETSS. Broader collaborations that bring together businesses, non-state actors, non-governmental organizations, and other stakeholders are also on the rise.

**There is an increased emphasis on aligning policy frameworks to enable coherence with carbon pricing initiatives.** Carbon pricing operates in conjunction with other climate, fiscal, energy, environmental, planning and industrial policies, which can directly or indirectly impact the effectiveness of a carbon price signal. There is momentum to divest from fossil fuel assets, as well as phase out countervailing policies that undermine the overall carbon price signal such as fossil fuel subsidies.

**These trends highlight the importance of integrating climate change impacts and opportunities in investment choices. While they have resulted in increased engagement by governments and uptake of internal carbon pricing by businesses, further rises in carbon prices and coverage are needed to stimulate emission reductions in line with the Paris Agreement.** Most initiatives saw increases in carbon prices in 2018 compared to price levels in 2017. One substantial change was the growth in the European Union Allowance price from €5/tCO<sub>2</sub>e to €13/tCO<sub>2</sub>e (US\$7/tCO<sub>2</sub>e to US\$16/tCO<sub>2</sub>e) as more certainty developed on the future of the European Union ETS in the post-2020 period. Despite these increases in prices, most initiatives are still below the US\$40/tCO<sub>2</sub>e to US\$80/tCO<sub>2</sub>e range needed in 2020 to stay consistent with achieving the temperature goal of the Paris Agreement as identified by the High-level Commission on Carbon Prices, as shown in Figure 3.<sup>3</sup> Even taking planned price increases into account in existing and upcoming initiatives, there remains a clear gap and a crucial need for significant progress to align these initiatives with the ambition of the Paris Agreement.

<sup>2</sup> A “smart contract” refers to transactional terms and conditions embedded in computer code which allow automatic execution of the relevant transaction once precise conformity with those terms and conditions has been established.

<sup>3</sup> Source: High-Level Commission on Carbon Prices, *Report of the High-Level Commission on Carbon Prices*, 2017, Washington, DC: World Bank.



# 1

## Introduction





## 1

## Introduction

“To meet the objective of the Paris Agreement, we need to get to ... scale. None of the critical investments will be possible unless we get the policies right. That means creating incentives for change—removing fossil fuels subsidies, introducing carbon pricing, increasing energy efficiency standards, and implementing auctions for lowest cost renewable energy.” stated the World Bank President Jim Yong Kim at the One Planet Summit in December 2017.<sup>4</sup>

» We’re going to reduce pollution by putting a price on it. We all contribute to carbon pollution and we can all be a part of the solution. «

*Rachel Notley, Premier of Alberta*

This report takes stock of the latest developments in carbon pricing initiatives across the globe. It also investigates trends surrounding the development of carbon pricing instruments and how they could accelerate to deliver long-term mitigation goals. For the purpose of this report, carbon pricing refers to initiatives that put an explicit price on greenhouse gas (GHG) emissions. This includes emissions trading systems (ETSs), offset mechanisms, carbon taxes, and results-based climate finance (RBCF). Such initiatives, which will be discussed at length in this report, are being planned and implemented at international, regional, national, and subnational levels. Other policies that

implicitly price GHG emissions, such as the removal of fossil fuel subsidies (which are also sometimes referred to as “negative carbon pricing”), fuel taxation, support for renewable energy, and energy efficiency certificate trading, are also necessary, but this report focuses on initiatives that put an explicit price on emissions.

Section 2 of this report provides an overview of carbon pricing initiatives and recent developments. For the first time in this report series, this section also explores how emerging political and technological developments could help shape new trends in carbon pricing. Section 3 summarizes the latest developments of international cooperation, including the status of the implementation of the Paris Agreement and nationally determined contributions (NDCs). Section 4 reports on carbon pricing initiatives at regional, national and subnational levels, while Section 5 reviews internal carbon pricing approaches and prices used by private organizations and Multilateral Development Banks (MDBs) for decision making purposes.

» A price on carbon unlocks the potential of the private sector, like business and investors to contribute more and faster to addressing climate change by ensuring an economic incentive. «

*Feike Sijbesma, CEO of Royal DSM, World Bank Climate Leader and Carbon Pricing Leadership Coalition Champion and former co-chair*

<sup>4</sup> Source: World Bank, *High-Level Session Opening Remarks by World Bank Group President Jim Yong Kim*, December 12, 2017, <http://www.worldbank.org/en/news/speech/2017/12/12/high-level-session-opening-remarks-by-world-bank-group-president-jim-yong-kim>.

# 2

## Carbon pricing overview, emerging developments and new trends



# 2

## Carbon pricing overview, emerging developments and new trends

### 2.1 Global overview of carbon pricing initiatives

As of 2018,<sup>5</sup> **45 national and 25 subnational jurisdictions<sup>6</sup> are putting a price on carbon**, as shown in Figure 4.<sup>7</sup> Carbon pricing initiatives implemented and scheduled for implementation would cover 11 gigatons of carbon dioxide equivalent (GtCO<sub>2</sub>e) or about 20 percent of global GHG emissions, as displayed in Figure 5, compared to 8 GtCO<sub>2</sub>e or about 15 percent in 2017.<sup>8</sup> This increase primarily due to the expected coverage of the China national ETS. While this trend brings the global coverage of GHG emissions closer to the Carbon Pricing Leadership Coalition's (CPLC's) target of 25 percent by 2020, further progress will be needed to reach this goal.<sup>9</sup>

**Carbon prices vary substantially, from less than US\$1/tCO<sub>2</sub>e to a maximum of US\$139/tCO<sub>2</sub>e**, as shown in Figure 6 and Figure 7. Most initiatives saw an increase in their 2018 price levels compared to those in 2017. One substantial change was the growth in the European Union Allowance (EUA) price from €5/tCO<sub>2</sub>e to €13/tCO<sub>2</sub>e (US\$7/tCO<sub>2</sub>e to US\$16/tCO<sub>2</sub>e) as more certainty developed on the future of the European Union (EU) ETS in the post-2020 period. In addition,

planned tax rate increases occurred, including the escalation of the France carbon tax rate from €30.5/tCO<sub>2</sub>e to €44.6/tCO<sub>2</sub>e (US\$38/tCO<sub>2</sub>e to US\$55/tCO<sub>2</sub>e) and the Switzerland carbon tax rate from CHF84/tCO<sub>2</sub>e to CHF96/tCO<sub>2</sub>e (US\$88/tCO<sub>2</sub>e to US\$101/tCO<sub>2</sub>e). Despite these developments over the past year, most jurisdictions have carbon prices that are substantially lower than those needed to be consistent with the Paris Agreement, as displayed in Figure 7.

**Governments raised approximately US\$33 billion in carbon pricing revenues in 2017**, the source of which was allowance auctions, direct payments to meet compliance obligations and carbon tax receipts. This represents an increase of nearly US\$11 billion compared to the US\$22 billion raised in 2016. Reasons for this increase include auction revenues from the newly launched Ontario ETS and revenues from the new carbon taxes in Alberta, Chile and Colombia. Existing initiatives also contributed to this trend, including a larger number of allowances bought at auctions in the California ETS combined with higher auction sale prices,<sup>10</sup> and an increase in the EUA price and the carbon tax rate in France. The EU ETS remains the largest source of carbon pricing revenues due to its size, followed by the carbon taxes in France, Sweden and Japan, as illustrated in Figure 8.

<sup>5</sup> This report covers developments from January 1, 2017 until April 1, 2018.

<sup>6</sup> Cities, states, and subnational regions.

<sup>7</sup> The authors have kept the format of presenting this information consistent with the previous editions of the *State and Trends of Carbon Pricing* for comparison purposes.

<sup>8</sup> The 2012 GHG emissions data of the Emissions Database for Global Atmospheric Research (EDGAR) version 4.3.2 including biofuels emissions has been used in this report. Source: EC JRC and PBL, *EDGAR's Global Greenhouse Gas Emissions from 1970 to 2012 (EDGARv4.3.2 dataset)*, October 2017.

<sup>9</sup> If all carbon pricing initiatives under consideration were implemented with a coverage of 50 percent, the global GHG coverage would be 24 percent. Source: Authors' calculation.

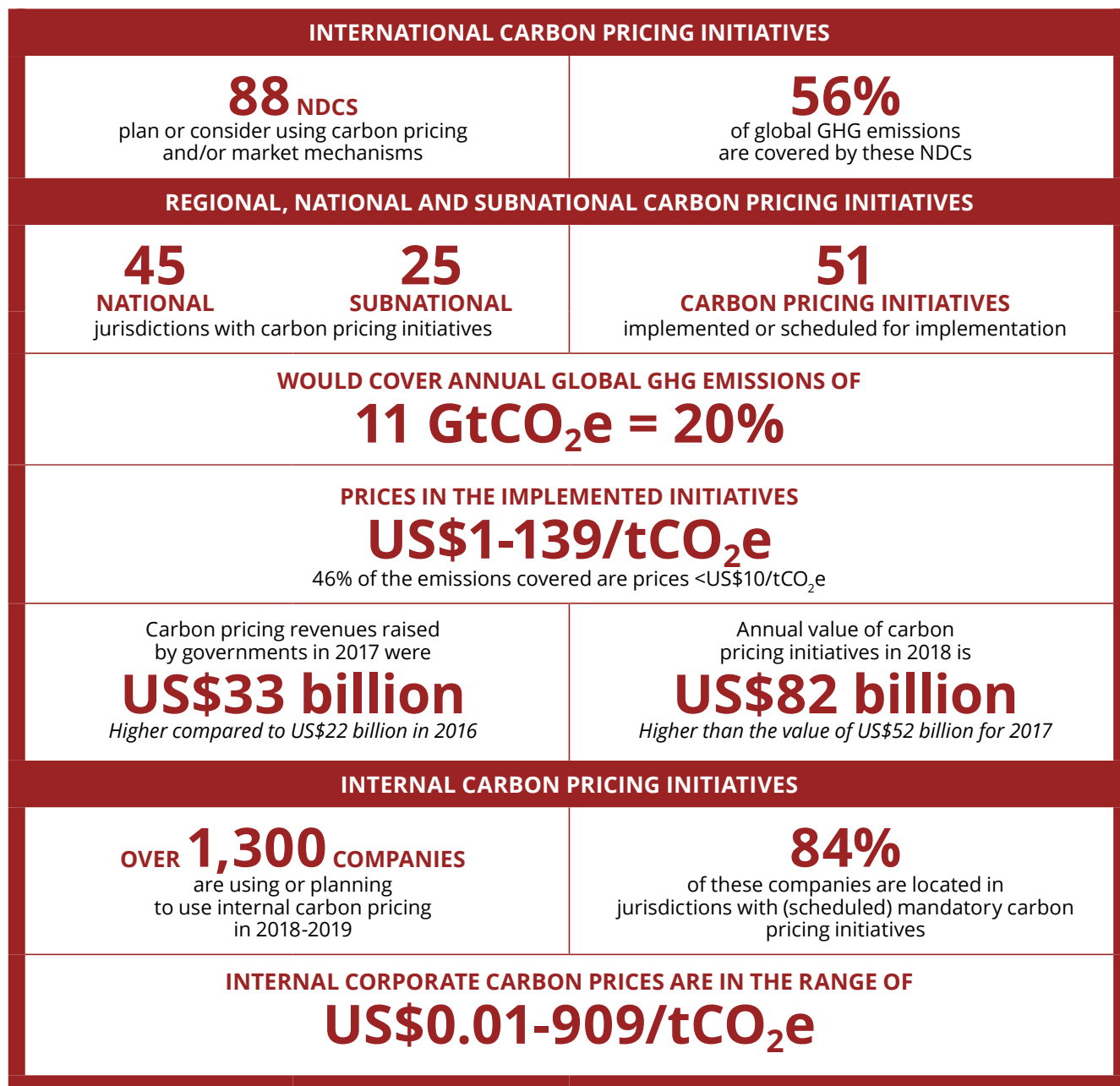
<sup>10</sup> Source: California Air Resources Board, *Archived Auction Information and Results*, accessed March 13, 2018, [https://www.arb.ca.gov/cc/capandtrade/auction/auction\\_archive.htm](https://www.arb.ca.gov/cc/capandtrade/auction/auction_archive.htm).



In 2018, the total value of ETSs and carbon taxes is US\$82 billion,<sup>11</sup> representing a 56 percent increase compared to the 2017 value of US\$52 billion. About

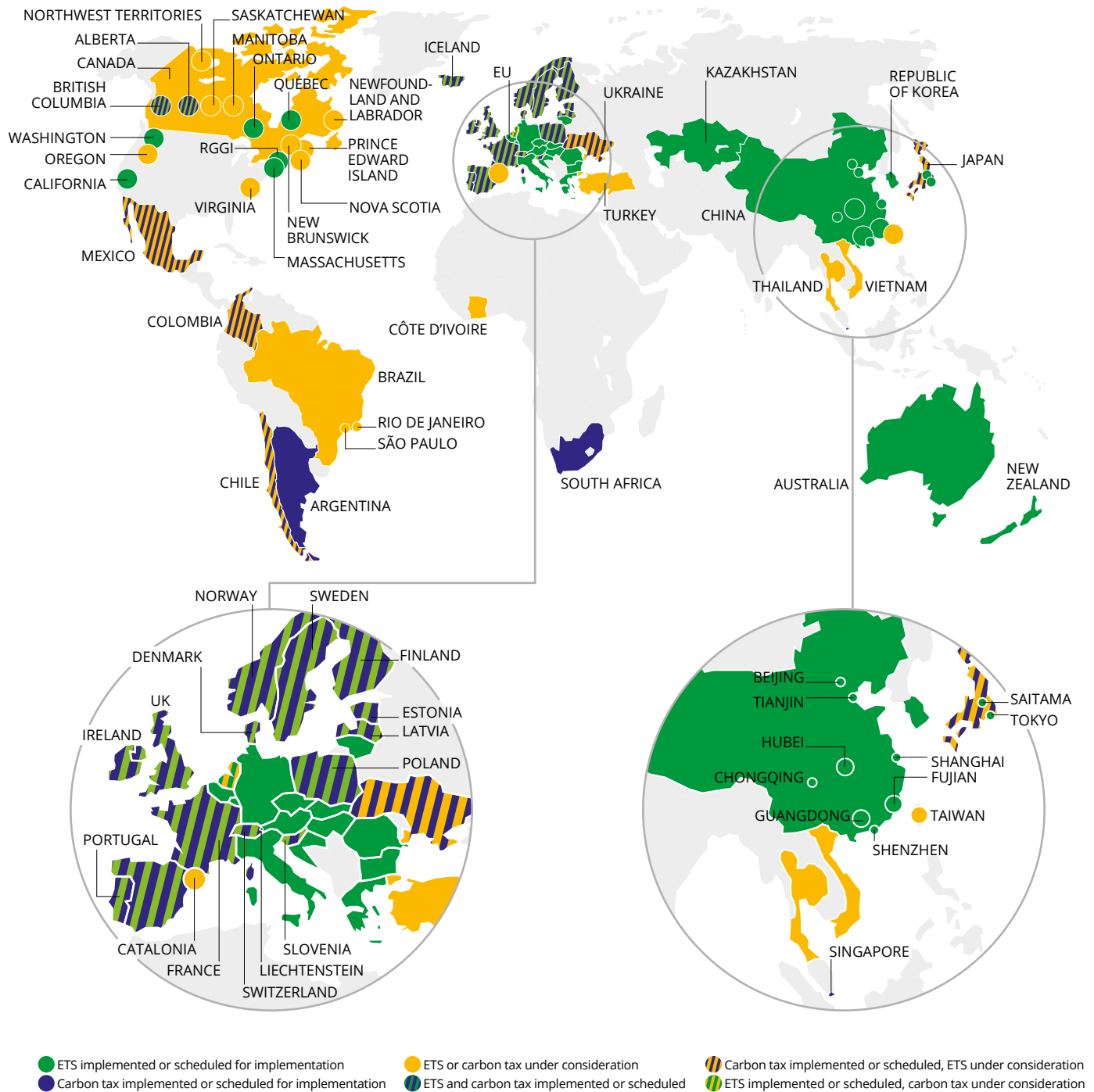
US\$22 billion of this rise is attributed to the higher EUA price. Other substantial changes include increases in the carbon tax rates in Alberta and France.

### Box 1 / Carbon pricing in numbers



11 The value of ETSs and carbon taxes considers implemented carbon pricing initiatives as of April 1, 2018; it does not include initiatives that are scheduled or under consideration. The total value of ETS markets was estimated by multiplying each ETS' annual allowance or credit volume for 2018, or the most recent yearly volume data, with the price of the emission unit on April 1, 2018. The total value for carbon taxes was derived from official government budgets for 2018. Where the allowance or credit volume (for an ETS) or budget information (for a carbon tax) was unavailable, the value of the carbon pricing initiative was calculated by multiplying the GHG emissions covered with the nominal carbon price on April 1, 2018. The numbers shown are rounded. No information was available on the amount of emission reduction credits which could be generated by facilities under the Australian safeguard mechanism. Following the suspension of compliance obligations in the Washington ETS, there is no price on emission units in this initiative. Additionally, no information was available for the ETSs in Kazakhstan and Massachusetts.

**Figure 4 / Summary map of regional, national and subnational carbon pricing initiatives implemented, scheduled for implementation and under consideration (ETS and carbon tax)**

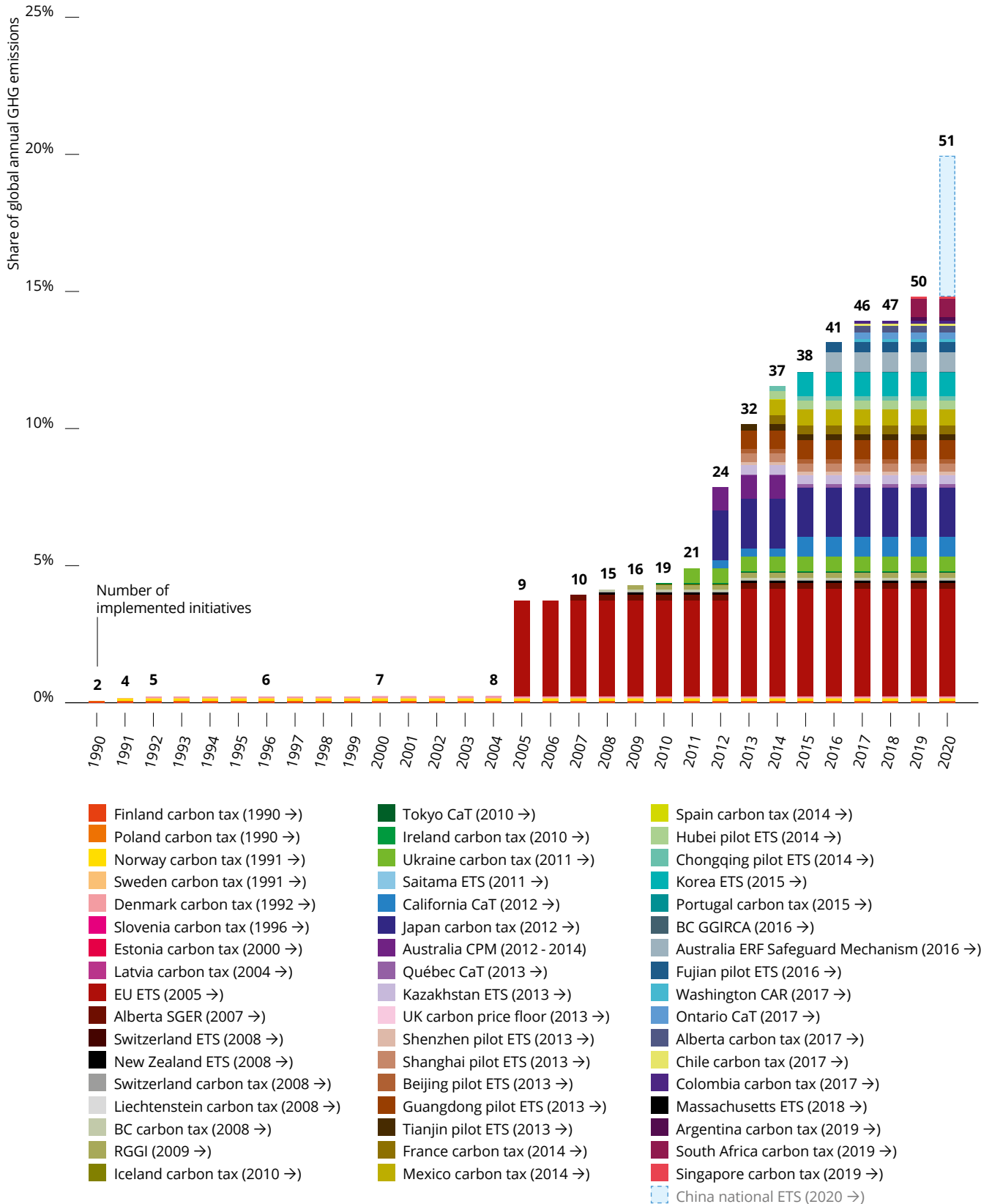


The circles represent subnational jurisdictions: subnational regions are shown in large circles and cities are shown in small circles. The circles are not representative of the size of the carbon pricing initiative.

*Note:* RGGI = Regional Greenhouse Gas Initiative. 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. Due to the dynamic approach to continuously improve data quality, changes to the map not only reflect new developments, but also corrections following new information from official government sources, resulting in the addition of the carbon tax covering only F-gases in Spain.

**Initiatives implemented or scheduled for implementation:** *National ETSs:* Australia, Austria, Belgium, Bulgaria, China, Croatia, Cyprus, Czech Republic, Germany, Greece, Hungary, Italy, Kazakhstan, Lithuania, Luxembourg, Malta, the Netherlands, New Zealand, the Republic of Korea, Romania, and Slovakia. *National carbon taxes:* Argentina, Chile, Colombia, Japan, Mexico, Singapore, South Africa, and Ukraine. *Both national ETSs and carbon taxes:* Denmark, Estonia, Finland, France, Iceland, Ireland, Latvia, Liechtenstein, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. *Subnational ETSs:* Beijing, California, Chongqing, Connecticut, Delaware, Fujian, Guangdong, Hubei, Maine, Maryland, Massachusetts, New Hampshire, New York, Ontario, Québec, Rhode Island, Saitama, Shanghai, Shenzhen, Tianjin, Tokyo, Vermont, and Washington State. *Both subnational ETSs and carbon taxes:* Alberta and British Columbia. **Initiatives under consideration:** *National ETS or carbon tax:* Brazil, Canada, Chile (ETS), Colombia (ETS), Côte d'Ivoire, Japan (ETS), Mexico (ETS), the Netherlands (carbon tax), Thailand, Turkey, Ukraine (ETS), and Vietnam. *Subnational ETS or carbon tax:* Catalonia, Manitoba, New Brunswick, Newfoundland and Labrador, New Jersey, Northwest Territories, Nova Scotia, Oregon, Prince Edward Island, Rio de Janeiro, São Paulo, Saskatchewan, Taiwan, China, and Virginia.

**Figure 5 / Regional, national and subnational carbon pricing initiatives: share of global emissions covered**



Note: Only the introduction or removal of an ETS or carbon tax is shown. Emissions are presented as a share of global GHG emissions in 2012 from (EDGAR) version 4.3.2 including biofuels emissions. Annual changes in GHG emissions are not shown in the graph. Due to the dynamic approach to continuously improve data quality using official government sources, the carbon tax only covering F-gases in Spain was added. 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 6 / Prices in implemented carbon pricing initiatives

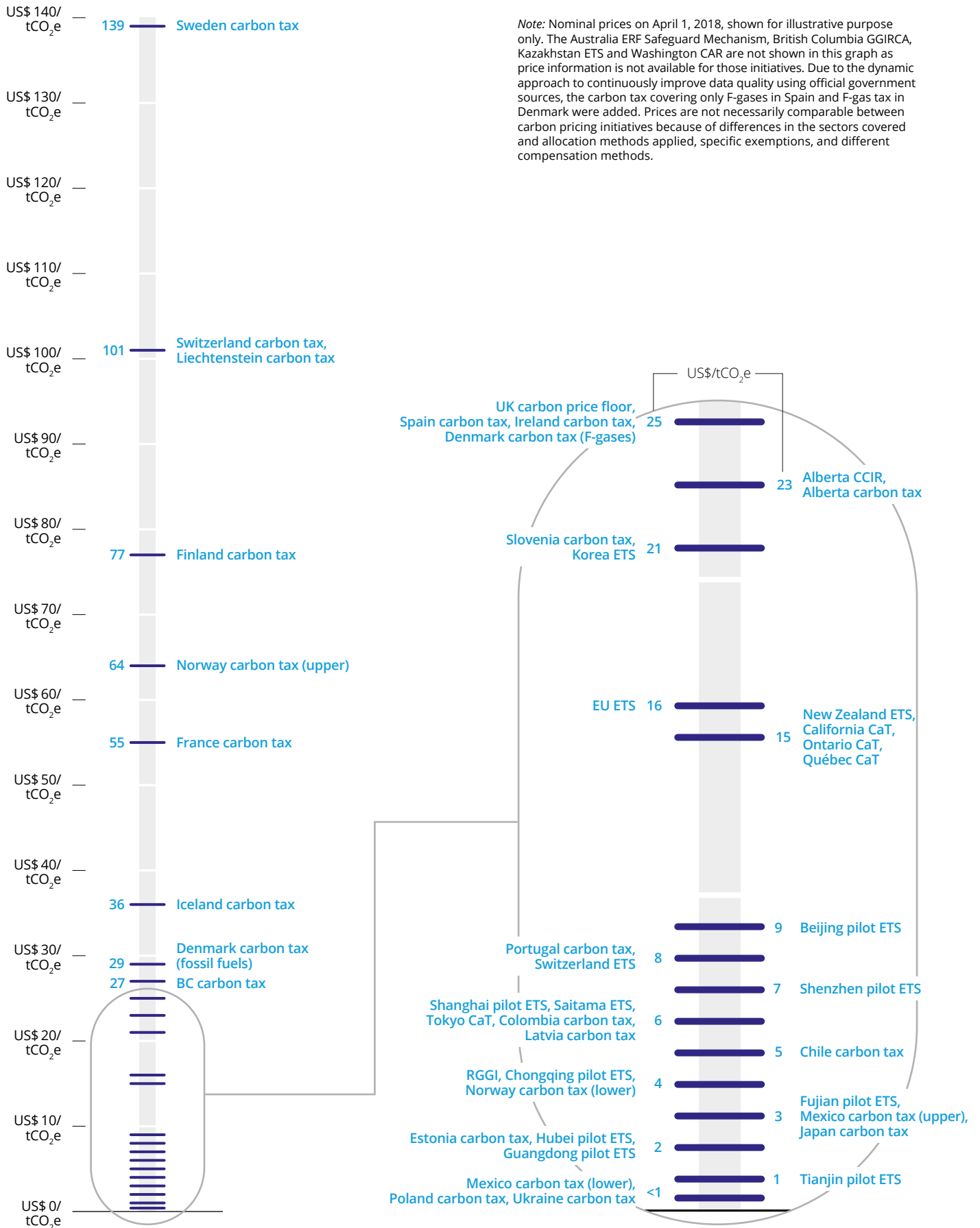
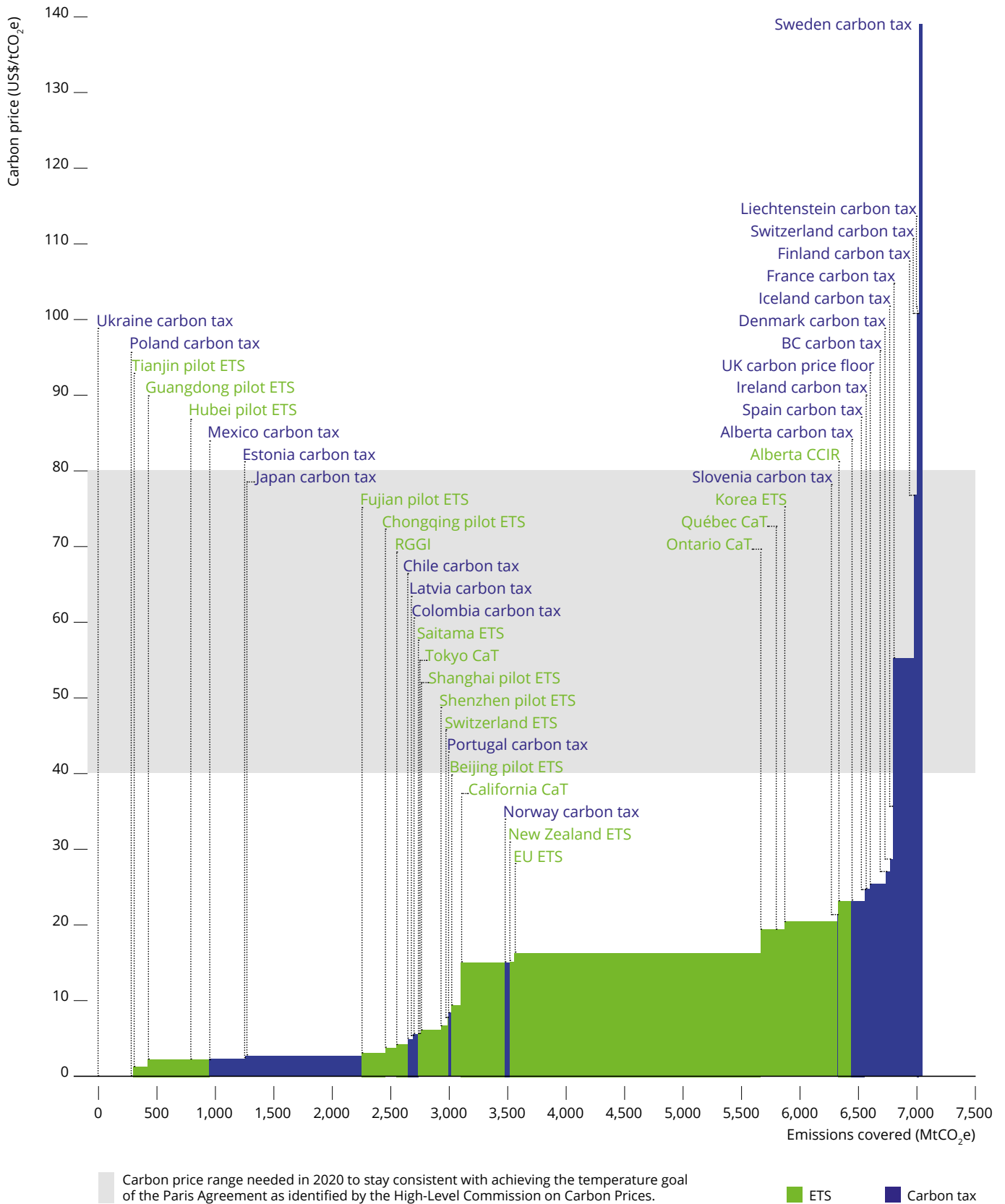


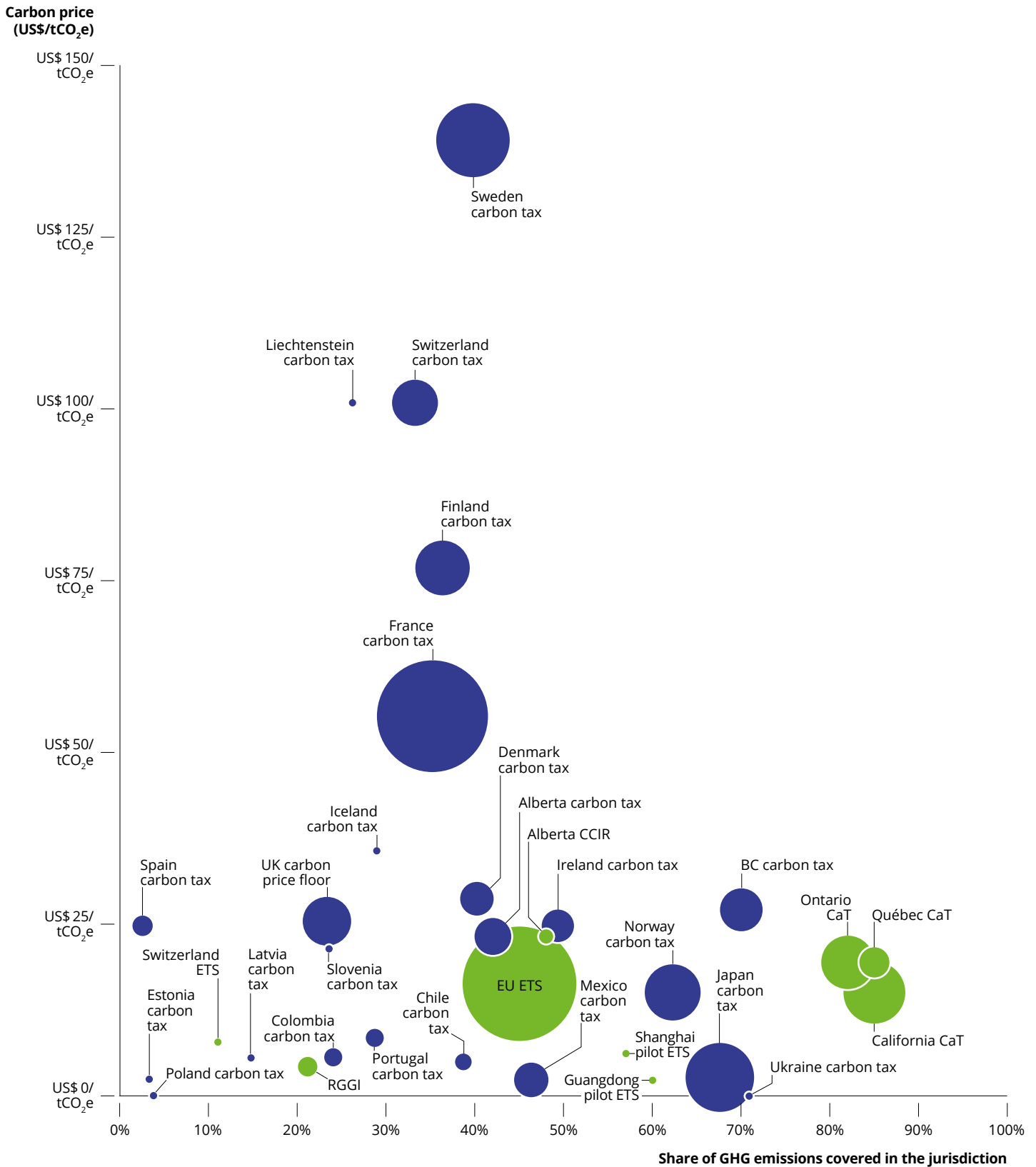
Figure 7 / Carbon price and emissions coverage of implemented carbon pricing initiatives



Note: The Australia ERF Safeguard Mechanism, British Columbia GGIRCA, Kazakhstan ETS and Washington CAR are not shown in this graph as price information is not available for those initiatives. The carbon tax rate applied in Mexico and Norway varies with the fossil fuel type and use. The carbon tax rate applied in Denmark 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 8 / 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 2017; the circles of these initiatives have an equal size. For illustrative purposes only, the nominal prices on April 1, 2018 and the coverages in 2018 are shown. The carbon tax rate applied in Mexico and Norway varies with the fossil fuel type and use. The carbon tax rate applied in Denmark 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 Recent developments, emerging and future trends

This section provides an overview of recent developments and the main emerging trends on carbon pricing.

### 2018 is a year for implementing international carbon pricing mechanisms

At the international level, relatively limited progress has been made so far in the negotiations of the Paris Agreement guidelines, which are scheduled to be adopted at the 24<sup>th</sup> Conference of the Parties (COP 24) to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2018. In order to meet this deadline, Parties must accelerate the development of common positions and advance toward building a consensus.

Through Article 6, the Paris Agreement lays the foundation for the development of international carbon pricing mechanisms and for an expansion of countries' collaboration on the implementation of their NDCs. The informal documents published in March 2018 by the Subsidiary Body for Scientific and Technological Advice (SBSTA) compile design options as suggested by various negotiators of the approaches under Article 6.<sup>12</sup> The provision for Internationally Transferred Mitigation Outcomes (ITMOs) in Article 6 will be instrumental to achieving cost-efficient emission reductions. It also creates an opportunity to expand cooperation for a broader range of climate actions and a need to build the infrastructure to enable countries to collaborate using market-based mechanisms.

The international aviation sector initiative, which is referred to as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), is also working toward an implementation deadline in 2018. Standards and Recommended Practices<sup>13</sup> (SARPs) are under development and are expected to be adopted by the International Civil Aviation Organization (ICAO) council in June 2018.

### National and subnational carbon pricing initiatives continue to emerge around the world

In Asia, the China national ETS was officially launched in December 2017 and the initial phase of its ETS roadmap is underway, with a focus on completing the infrastructure and legal foundation for the ETS. Once it is operational, China will host the largest carbon market in the world.<sup>14</sup> Also in 2018, the Kazakhstan ETS was restarted following a two-year suspension. Looking ahead, carbon taxes are scheduled to come into force in 2019 in Argentina and Singapore.

The Americas region is also seeing substantial carbon pricing developments, with all six newly implemented initiatives in 2017–2018<sup>15</sup> located in this region: carbon taxes were launched in Alberta,<sup>16</sup> Chile and Colombia, and ETSs were implemented in Massachusetts, Ontario and Washington State.<sup>17</sup> Also, the pan-Canadian approach to carbon pricing will require all Canadian provinces and territories to be on track in 2018 to adopt a carbon pricing initiative that aligns with the federal standard.<sup>18</sup> Additionally, Mexico intends to finalize drafting of proposed ETS regulation and launch a three-year pilot ETS, which would be followed by a formal start of its ETS in 2022.

12 Source: UNFCCC, *Informal Document Containing the Draft Elements of Guidance on Cooperative Approaches Referred to in Article 6, Paragraph 2, of the Paris Agreement*, March 16, 2018.

13 Included in the SARPs are rules on the MRV system and eligibility rules for using carbon credits to offset emissions.

14 The national ETS will initially only cover the power sector, which annually emits about 3 GtCO<sub>2</sub>. Source: China Carbon Trading Network, *The National Carbon Market, What Does It Mean for the Power Industry?*, December 19, 2017, <http://www.tanjiaoyi.com/article-23437-1.html>; China Network, *National Development and Reform Commission Holds Press Conference on Launch of National Emissions Trading System*, December 19, 2017, [http://www.china.com.cn/zhibo/2017-12/19/content\\_41997462.htm](http://www.china.com.cn/zhibo/2017-12/19/content_41997462.htm).

15 The report covers developments and trends in the period from January 1, 2017 to April 1, 2018.

16 Alberta also replaced its Specified Gas Emitters Regulation (SGER) with the Carbon Competitive Incentive Regulation (CCIR) in 2018. While both the SGER and CCIR are baseline-and-credit ETSs, the method of baseline determination is different: under the SGER, baselines were determined based on a facility's historical emissions intensity, whereas baselines in the CCIR are set by sector-specific product benchmarks.

17 The Clean Air Rule in Washington State established a baseline-and-credit system. Currently facilities are required to report emissions, but compliance obligations are suspended.

18 Provinces and territories that do not meet the federal requirements will have the federal backstop system imposed on their jurisdictions. Canadian provinces and territories that do not already have existing or scheduled carbon pricing initiatives are developing plans ahead of the deadline of September 1, 2018.

Despite hosting some of the longest-running carbon pricing initiatives, new ones continue to emerge in Europe. Proposals include a carbon price floor on electricity generators in the Netherlands from 2020 and the introduction of a carbon tax in Catalonia, Spain in 2019. Ukraine is also considering the implementation of an ETS and is developing Monitoring, Reporting and Verification (MRV) legislation to support the realization of this objective.

### Carbon pricing initiatives can serve multiple environmental and social objectives

While the main objective of implementing carbon pricing initiatives is to stimulate cost-effective emissions mitigation, such initiatives can also help achieve broader outcomes. For example, the China national ETS,<sup>19</sup> ETSs in the Republic of Korea<sup>20</sup> and Québec,<sup>21</sup> and the Singapore<sup>22</sup> carbon tax mentioned the stimulation of low-carbon innovation as an additional objective. Furthermore, many Chinese ETS pilots mention the improvement of production processes and optimization of their industrial structure as complementary objectives. In addition, the Tianjin pilot ETS intends to raise awareness among companies on the impacts of GHG emissions.<sup>23</sup> In Argentina, the carbon tax was the result of an integral taxation reform and fiscal rationalization.<sup>24</sup>

Some jurisdictions use carbon pricing initiatives to tackle other environmental issues beyond climate change. Beijing's pilot ETS is intended as a key instrument in lowering air pollution,<sup>25</sup> while in Chile,<sup>26</sup> a carbon tax was introduced as part of a package

of environmental taxes to reduce the negative environmental and health impacts from fossil fuel use. This has proven effective in driving investments in sources that have a large tax base due to large local air pollution.<sup>27</sup> Other jurisdictions have earmarked carbon pricing revenues to fund broader social or environmental policies.<sup>28</sup>

### Challenges to the implementation of carbon pricing initiatives can result in deviations from the original plan

Common challenges include developing the capacity of compliance entities to understand the rules and operation of the initiative, developing the infrastructure and legal framework for a carbon pricing initiative, improving data accuracy, overcoming competitiveness concerns, building stakeholder acceptance, addressing over-allocation, and political circumstances. Such challenges could affect implementation in various ways. For example, the Australia Carbon Pricing Mechanism, which came into force in 2012, was repealed in 2014 following a change of government.<sup>29</sup> A new initiative—the Emission Reduction Fund (ERF) Safeguard Mechanism—was subsequently introduced in 2016.<sup>30</sup> The implementation of South Africa's carbon tax was also delayed several times—originally scheduled for 2015, it is now slated for 2019 following revisions to earlier drafts of its carbon tax bill. Additionally, compliance obligations to the Washington State ETS were suspended following a court ruling in December 2017—less than a year after the ETS launch—which found that the Department of Ecology did not have

19 Source: National Development and Reform Commission, *National Carbon Emissions Trading System Started*, December 19, 2017, [http://www.ndrc.gov.cn/xwxz/xwfb/201712/t20171219\\_871024.html](http://www.ndrc.gov.cn/xwxz/xwfb/201712/t20171219_871024.html).

20 Source: Greenhouse Gas Inventory and Research Center, *Current Status of the Korean ETS*, March 20, 2017.

21 Source: Québec, *The Québec Cap and Trade System for Greenhouse Gas Emissions Allowances*, accessed March 23, 2018, <http://www.mddelcc.gouv.qc.ca/changes/carbone/Systeme-plafonnement-droits-GES-en.htm>.

22 Source: Singapore Ministry of Finance, *Budget 2018*, February 2018.

23 Source: Tianjin Municipal Government, *Printing and Distributing the Implementation Plan of the Pilot Program for Carbon Emissions Trading in Tianjin*, accessed March 23, 2018, <http://www.tjzb.gov.cn/2013/system/2013/03/26/000290474.shtml>.

24 Source: Unidad de Conferencias CEPAL, *Promoting Carbon Markets in the Americas; High Level Regional Dialogue on Carbon Pricing and MRV in the Americas*, accessed March 30, 2018, <http://conferencias.cepal.org/carbon2018/>.

25 Source: Beijing Municipal Government, *Report on the Work of the City's Carbon Emissions Trading Pilot Project*, accessed March 23, 2018, [http://www.bjrd.gov.cn/zdggz/zyfb/bg/201403/t20140321\\_129641.html](http://www.bjrd.gov.cn/zdggz/zyfb/bg/201403/t20140321_129641.html).

26 Source: Government of Chile, *Declaration and Payment of Tax on Emissions*, accessed March 23, 2018, <http://reformatributaria.gob.cl/wp-content/uploads/2016/07/circu47.pdf>.

27 Source: Chile Ministry of the Environment, *General Analysis of the Economic and Environmental Impacts of the Pollution Attainment Program for Gran Concepción*, 2017.

28 The Institute for Climate Economics (I4CE), the World Bank's Partnership for Market Readiness (PMR) and the French Development Agency (AFD) are preparing a report that will provide practical guidance and insights on the use of revenues generated by carbon pricing initiatives to support policymakers, particularly in developing countries. The report will be based on state-of-the-art academic knowledge, existing international expertise and concrete case studies. This report will be published in the course of 2018.

29 Source: Government of Australia, *Clean Energy Legislation Act 2014*, accessed March 26, 2018, <https://www.legislation.gov.au/Details/C2016C00166>.

30 Together with Australia's National Greenhouse and Energy Reporting Scheme, the Safeguard Mechanism provides a framework for large industrial facilities to measure, report and manage their emissions.

the authority to cover suppliers of natural gas and petroleum products under its ETS because they are not direct emitters of GHGs.

A common challenge facing ETSs is market imbalance, which could be due to a mismatch between the cap or emission baseline that was set and expected emissions, the introduction of other policies that affect emissions covered by an ETS,<sup>31</sup> or unforeseen circumstances such as an economic downturn. Jurisdictions are addressing market imbalances using different measures. The EU ETS is introducing a market stability reserve (MSR) in 2019 following a long period of oversupply; the Kazakhstan ETS was suspended for two years to allow for adjustments to rules to address imbalances in the system;<sup>32</sup> and reforms to the allowance supply, allocation and borrowing provisions were made in the Korea ETS over 2016–2017 to respond to the limited liquidity of the market.<sup>33</sup>

### **Many jurisdictions incorporate phased approaches to plan for changes to the system design**

California, for example, is proposing to modify components of its ETS design for the post-2020 phases, including the allocation approach and the establishment of a price ceiling. In addition, lawmakers formally passed reforms to the EU ETS in February 2018. These reforms will be implemented in phase 4, and include changes to the allocation of free allowances and the auction share.

Better data to inform emission projections in participating sectors of an ETS and improved projections of the drivers of GHG emissions support regulators and policymakers in addressing over-allocation. For example, the review of the Regional Greenhouse Gas Initiative (RGGI) in 2017 resulted

in amendments, including an adjustment to the emissions cap where the cap will decrease annually by about 3 percent from 2021. An Emissions Containment Reserve will also be established for the post-2020 period, which will withdraw allowances from auctions if predefined price triggers are exceeded.

The transition to a new phase can also result in a change in coverage. Such changes were seen, for instance, at the start of phase 3 of the EU ETS in 2013 and at the beginning of the second compliance period of the California ETS in 2015.<sup>34</sup>

Many emerging initiatives are adopting such phased approaches. For example, the China national ETS will first undergo two phases—infrastructure development and simulation—and, depending on the results, it will start actual implementation and possibly expand and deepen its coverage. Under the current planning, the ETS will be gradually expanded to include another seven sectors. Mexico is operating an ETS simulation exercise to help business representatives and companies enhance their understanding of the technical aspects of an ETS and to engage meaningfully in the drafting of Mexico's ETS regulation.<sup>35</sup> The exercise will conclude before the start of the pilot phase of the national ETS. The Pacific Alliance is also cooperating with the vision of developing a common MRV system, before potentially moving toward a regional initiative.<sup>36</sup>

In Brazil, where the government is in an exploratory phase of considering carbon pricing, the private sector is taking the lead in building capacity by organizing their own simulation. Over 30 major Brazilian companies are participating in the simulation, which is entering its fourth year of operation. Based on the lessons learned from the simulation, the participating companies issued a

31 For a discussion on aligning carbon pricing with the broader policy landscape, please refer to World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, October 2016.

32 Source: Ministry of Energy of the Republic of Kazakhstan, *Press Release on the Improvement of the Ecological Legislation of the Republic of Kazakhstan*, March 10 2016, <http://energo.gov.kz/index.php?id=5181>.

33 For further information, please refer to World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2017*, November 2017.

34 Source: European Union, *EU Emissions Trading System*, accessed March 23, 2018, [https://ec.europa.eu/clima/policies/ets\\_en](https://ec.europa.eu/clima/policies/ets_en); California Air Resources Board, *Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*, October 2017.

35 Source: MÉXICO, *Emissions Market Exercise in Mexico*, accessed March 6, 2018, <http://www.mexico2.com.mx/medio-ambiente.php?id=13>.

36 Source: World Bank, *The Pacific Alliance and Climate Change*, October 17, 2017, <http://blogs.worldbank.org/climatechange/pacific-alliance-and-climate-change>.

communiqué to the government on principles for carbon pricing policy design. In India, the CPLC has helped share the Brazilian corporate leadership example, and over 20 companies from diverse sectors are now launching an ETS simulation of their own.<sup>37</sup>

### **While some carbon prices are increasing, further rises are needed to stimulate emission reductions in line with the Paris Agreement**

Overall, carbon price increases were seen in most initiatives from 2017 to 2018, as observed in section 2.1. Currently,<sup>38</sup> about half of the emissions covered by carbon pricing initiatives are priced at less than US\$10/tCO<sub>2</sub>e, as shown in Figure 7, compared to three-quarters of emissions covered in 2017. Looking ahead, this trend is set to continue, as indicated by some of the jurisdictions which are planning carbon price increases. This includes emerging carbon pricing initiatives, which are launching at relatively low price levels, with the intention of scaling up over time. For example, Singapore will begin with a carbon tax rate of S\$5/tCO<sub>2</sub>e (US\$4/tCO<sub>2</sub>e) in 2019, with the intention to increase it to S\$10-15/tCO<sub>2</sub>e (US\$8-11/tCO<sub>2</sub>e) by 2030.

Carbon price rises are also planned in jurisdictions with comparatively higher prices. This includes: the British Columbia carbon tax, which will increase from CAN\$35/tCO<sub>2</sub>e (US\$27/tCO<sub>2</sub>e) in 2018 to CAN\$50/tCO<sub>2</sub>e (US\$39/tCO<sub>2</sub>e) in 2021; the proposed carbon tax rate for the Canada federal backstop, which will begin at CAN\$20/tCO<sub>2</sub>e (US\$16/tCO<sub>2</sub>e) in 2019 and scale up to CAN\$50/tCO<sub>2</sub>e (US\$39/tCO<sub>2</sub>e) in 2022; and the France carbon tax, which is scheduled to increase from €44.6/tCO<sub>2</sub>e (US\$55/tCO<sub>2</sub>e) in 2018 to €86.2/tCO<sub>2</sub>e (US\$107/tCO<sub>2</sub>e) in 2022.

Compared to the price levels<sup>39</sup> needed to stay consistent with achieving the temperature goal of the Paris Agreement—US\$40/tCO<sub>2</sub>e to US\$80/tCO<sub>2</sub>e in 2020—most of these planned price trajectories are not sufficient. Further escalation in carbon prices is needed across most initiatives to stimulate emission reductions in line with the Paris Agreement.

### **Climate-related financial disclosure is evolving and carbon pricing is a consistent metric that can be used to quantify climate-related risks**

Recognition of climate change as material risk for financial stability was an important milestone in climate action. In spring 2015, the G20 requested the Financial Stability Board (FSB) to consider climate risks. As a result, the FSB called for the establishment of an industry-led Task Force on Climate-related Financial Disclosures (TCFD).<sup>40</sup> The TCFD published its recommendations in June 2017, which aim to improve climate-related financial disclosures. Investors and businesses in different sectors are now considering how best to incorporate and voluntarily comply with its recommendations.<sup>41</sup> In order to help understand and quantify potential climate-related risks, the TCFD recommends, among others, disclosing internal carbon pricing, where relevant.

New research by the Climate Disclosure Standards Board (CDSB) and CDP shows that there is still a clear gap between companies' awareness of climate-related risks and actions for tackling them, with only one out of every ten companies surveyed currently providing their board with incentives to manage climate-related risks and opportunities.<sup>42</sup> Companies in France,<sup>43</sup> Germany and the United Kingdom (UK) are leading the way in disclosing information across the thematic areas highlighted by the TCFD.

37 Source: Carbon Pricing Leadership Coalition, *Carbon Pricing Leadership Coalition Leadership Report 2017-2018*, April 19, 2018, Washington, DC.

38 As of April 1, 2018.

39 Source: High-Level Commission on Carbon Prices, *Report of the High-Level Commission on Carbon Prices*, 2017, Washington, DC: World Bank.

40 The TCFD was mandated to develop voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to lenders, insurers, investors and other stakeholders.

41 Organizations following the TCFD are encouraged to conduct an analysis of how they will perform under different scenarios, including a 2°C or lower world.

42 Source: CDP, *Ready or Not: Are Companies Prepared for the TCFD Recommendations?*, March 2018.

43 Currently, only one legislation exists in the world—Article 173-VI of the France Energy Transition Law for Green Growth adopted in 2015—which requires asset owners and investment managers to disclose climate-related financial risks and report on how environmental, social and governance criteria are considered in their investment decisions.

However, companies in the healthcare and financial sectors as well as companies from China are lagging behind in the four areas of disclosure. Nonetheless, China remains a disclosure market to monitor in 2018 as new mandatory reporting policies come into force.<sup>44</sup>

An impact report from Boston Common, which focuses on how the world's largest banks are looking at climate-related risks and opportunities of climate change, points toward a similar gap between awareness and action.<sup>45</sup> The positive aspect is that among the 59 global banks analyzed, 97 percent are involved at some level in industry or multi-stakeholder groups to advance knowledge sharing and collaboration around climate-related risks and solutions. 95 percent have adopted specific climate governance. However, about half are implementing risk assessments or 2 degrees Celsius (°C) scenario analysis, which means decision-making on portfolio shifts is not supported by robust analysis of a low-carbon transition. Around one-third have not performed robust due diligence or employed third-party assessments to ensure that green financial products meet the highest sustainability criteria.<sup>46</sup>

To support banks in implementing the TCFD recommendations, 16 banks and the United Nations Environment Program Finance Initiative announced a pilot initiative for developing analytical tools and indicators.<sup>47</sup> The resulting report contains scenarios, models and metrics that could contribute to a harmonized industry-wide approach to the TCFD's recommendations for banks. Better access to consistent and reliable data will enhance how climate-related financial risks are assessed, priced and managed. Through such developments, carbon pricing could grow as a uniform, internationally

understood metric that allows investors and governments to plan and manage climate-related risks and opportunities.

Furthermore, in 2017, the CPLC convened about 30 private banks and MDBs to form the Banking Sector Task Team.<sup>48</sup> The objective of the team is to monitor the development of the TCFD recommendations and explore the role of internal carbon pricing as a metric for managing climate-related risks.<sup>49</sup>

### **Increased cooperation between governments, businesses, non-state actors, non-governmental organizations and other stakeholders can accelerate implementation and increase ambition**

There is a growing number of initiatives that facilitate knowledge sharing and explore modalities for cooperation on carbon pricing between governments. For example, the EU is supporting China in the development of its national ETS through the Platform for Policy Dialogue and Cooperation. Chinese Premier Li Keqiang and Canadian Prime Minister Justin Trudeau also issued a joint statement on climate change, pledging to intensify their cooperation on climate change and clean energy issues, including carbon markets. Through the Paris Declaration on Carbon Pricing in the Americas, launched in December 2017, 12 heads of states and governments of national and subnational jurisdictions in the Americas<sup>50</sup> committed to implement and deepen regional integration of carbon pricing initiatives.<sup>51</sup> These new cooperative initiatives will join ongoing bilateral and multilateral exchanges on carbon pricing, including the memorandum of understanding signed between California, Mexico, Ontario and Québec and an annual conference between China, Japan and Korea.<sup>52</sup>

44 Source: CDP, *Ready or Not: Are Companies Prepared for the TCFD Recommendations?*, March 2018.

45 Source: Boston Common Asset Management, *Banking on a Low-Carbon Future*, February 2018.

46 Ibid.

47 The pilot includes the following member banks: ANZ, Barclays, BBVA, BNP Paribas, Bradesco, Citi, DNB, Itaú, National Australia Bank, Rabobank, Royal Bank of Canada, Santander, Société Générale, Standard Chartered, TD Bank Group and UBS. The report is expected to be published in the second quarter of 2018. Source: UNEP Finance Initiative, *Pilot Project on Implementing the TCFD Recommendations for Banks*, accessed March 13, 2018, <http://www.unepfi.org/banking/tcfd/>.

48 Source: Carbon Pricing Leadership Coalition, *2017-2018 Carbon Pricing Leadership Coalition Report*, 2018.

49 An executive brief on TCFD and Carbon Pricing is being prepared by CPLC and CDP and will be published in May 2018.

50 National commitments came from the governments of Canada, Chile, Colombia, Costa Rica, and Mexico; subnational commitments came from the governments of Alberta, British Columbia, California, Nova Scotia, Ontario, Québec and Washington.

51 Source: Carbon Pricing in the Americas, *Paris Declaration on Carbon Pricing in the Americas*, December 12, 2017.

52 Regional Collaboration Centres (RCC) were set up to spread the benefits of the Clean Development Mechanism (CDM). Now RCC support the development and implementation of countries' NDCs, with a particular focus on markets and mechanisms.

## Box 2 / Partnership for Market Readiness

The PMR is a major initiative on carbon pricing and carbon markets, which provides targeted technical assistance to countries to make them 'ready' for implementation. Currently 20 countries receive support for their market readiness activities that include creating domestic architecture (MRV systems, registries, etc.) and building local capacity and expertise. In addition, several more countries receive support for their policy analysis and technical work programs. PMR uses a unique partnership model to bring together developed and developing countries to share and exchange knowledge and support each other in enriching their respective programs. The current PMR program ends in 2020, and by then, most of the countries receiving support will be prepared to move toward actual implementation. Recent examples of collaboration include:

### *Kazakhstan*

With support from the PMR, the Ministry of Energy of the Republic of Kazakhstan successfully launched an online platform for the MRV of emission sources and GHGs. This online platform is a critical element of the national ETS, which was relaunched in January 2018 after a two year pause.

### *Chile*

The PMR has been instrumental in preparing and implementing the Chile carbon tax. PMR activities also include building capacity in the public and private sectors for the design and implementation of an MRV framework and GHG registry.

Governments are also working together to develop linked carbon pricing initiatives. These include the existing linkage between the California, Ontario and Québec ETSs and the scheduled linkage between the EU and Switzerland ETSs. Members of the Pacific Alliance<sup>53</sup> are exploring possibilities for a regional market mechanism as well.

Broader collaborative initiatives also exist, such as the Partnership for Market Readiness (PMR), see Box 2, or the CPLC, which brings together leaders from government, private sector, academia, and civil society to expand the use of carbon pricing.<sup>54</sup>

A persistent concern in the design, development and implementation of carbon pricing initiatives is the effect it may have on the economic competitiveness

of national sectors exposed to international competition. Such competitiveness concerns cannot be resolved without international collaboration, and several initiatives have been launched to address these concerns such as the We Mean Business coalition.<sup>55</sup>

### **Innovative tools and technology—a new frontier for carbon pricing**

The Paris Agreement sets the basis for the development of a bottom-up international climate regime. The diversity of contributions, different carbon pricing initiatives, various renewable energy and energy efficiency initiatives, and the response of the private sector all point toward a more heterogeneous development of commitments and actions.

<sup>53</sup> The Pacific Alliance consists of Chile, Colombia, Mexico and Peru.

<sup>54</sup> Find out more at: [www.carbonpricingleadership.org/](http://www.carbonpricingleadership.org/).

<sup>55</sup> We Mean Business—a global non-profit coalition working with businesses to take action on climate change—together with CDP launched the Carbon Pricing Corridors initiative in 2017. This initiative has the potential to provide a platform for industrial sectors to define the carbon prices needed to be consistent with the Paris Agreement. Another relevant collaboration is the Science Based Targets initiative, which champions science-based target setting as a way of boosting companies' competitive advantage in the transition to a low-carbon economy. Currently, 362 companies have adopted science-based targets.

As a result of these initiatives, new markets will emerge bottom-up, decentralized and with the potential of linking at subnational, national, regional, and international levels.

Technology will play a leading role in facilitating new cross-jurisdictional trading arrangements such as clubs, regional and sectoral trading initiatives. It will also enable greater financial flows and types of transactions, such as peer-to-peer and RBCF. Emerging digital innovations in data gathering (satellite and sensors) and processing allow for new applications in areas such as air pollution and GHG monitoring. Innovative systems that enable more efficient development of MRV standards with compatible and extensible methods and rules, big data, blockchain<sup>56</sup>, the internet of things (e.g. smart meters), smart contracts and other disruptive technologies hold out the promise of addressing the needs of a new generation of markets post-2020.<sup>57</sup>

Governance and legal developments in the implementation and definition of emerging carbon pricing initiatives must also foresee the potential for such technology innovations, and allow for systems that are dynamic to reach new sectors and achieve scale.

### **Implicit carbon pricing and efforts to divest**

The effectiveness of carbon pricing and its impact on the economy depend on the broader context in which it is implemented. Carbon pricing operates in conjunction with other climate, fiscal, energy, environmental, planning and industrial policies.

Many of these policies directly or indirectly impact the effectiveness of a carbon pricing initiative. Reducing subsidies for fossil fuels is a key measure to strengthen the overall carbon price signal, and there are ongoing attempts to phase out these subsidies. For example, the EU is committed to phasing out inefficient fossil fuel subsidies by 2025 through the G7 and has reiterated its commitment to phase out inefficient fossil fuel subsidies every year since 2009, as part of the G20, as detailed in Box 3.<sup>58</sup>

As fossil fuels subsidies are phased out, financial markets are increasingly driving decarbonization as divestment mandates spread in the foreseeable future. The Portfolio Decarbonization Coalition (PDC) is a multi-stakeholder initiative that aims to drive GHG emissions reductions on the ground by mobilizing a critical mass of institutional investors committed to gradually decarbonizing their portfolios.<sup>59</sup> As of December 2017, the PDC convenes 32 investors overseeing the gradual decarbonization of a total exceeding US\$800 billion in assets under management.<sup>60</sup>

Examples of divestment include the DivestInvest initiative<sup>61</sup> and AXA's decision in December 2017 to divest €2.4 billion (US\$3 billion) from companies that are heavily reliant on coal. AXA is also divesting over €700 million (US\$868 million) from main oil sands producers and associated pipelines, and discontinuing further investments in these businesses.<sup>62</sup> In addition, the Norwegian government is considering divesting oil stocks from its sovereign wealth fund and the World Bank Group will no longer finance upstream oil and gas, after 2019.<sup>63</sup>

56 The World Bank—through its “Blockchain Lab”—has already started to engage and partner with leading technology companies, start-ups, entrepreneurs, innovators and other development organizations.

57 Source: World Bank, *Blockchain and Emerging Digital Technologies for Enhancing Post-2020 Climate Markets*, 2018.

58 Source: Overseas Development Institute, *Phase-out 2010, Monitoring Europe's Fossil Fuel Subsidy*, December 2017.

59 Source: Portfolio Decarbonization Coalition, *Homepage*, accessed March 14, 2018, <http://unepfi.org/pdc/>.

60 Source: Portfolio Decarbonization Coalition, *CDPQ, Sarasin and SURA Join Portfolio Decarbonization Coalition: Members Now Oversee More than US\$800 Billion in Decarbonization Strategies*, accessed March 26, 2018, <http://unepfi.org/pdc/cdpq-sarasin-and-sura-join-portfolio-decarbonization-coalition-members-now-oversee-more-than-us800-billion-in-decarbonization-strategies/>.

61 DivestInvest is the commitment to sell investments in fossil fuel companies and invest in those companies providing the solutions to climate change, such as sustainable energy, reforestation, zero-carbon transport, the built environment and water management. Source: Divest Invest, *Invest in the Future*, accessed March 12, 2018, <https://www.divestinvest.org/>.

62 Source: AXA, *AXA Accelerates Its Commitment to Fight Climate Change*, December 12, 2017, <https://www.axa.com/en/newsroom/press-releases/axa-accelerates-its-commitment-to-fight-climate-change>.

63 Source: World Bank, *World Bank Group Announcements at One Planet Summit*, December 12, 2017, <http://www.worldbank.org/en/news/press-release/2017/12/12/world-bank-group-announcements-at-one-planet-summit>.



### Box 3 / Findings from the Brown to Green Report 2017 by Climate Transparency on fossil fuel subsidies and effective carbon rates in G20 countries<sup>64</sup>

Fossil fuel subsidies are effectively a negative carbon price and hinder decarbonization efforts. In 2009, G20 countries committed to phase out inefficient fossil fuel subsidies, and have reaffirmed this commitment every year since.<sup>65</sup> G20 countries initiated a voluntary peer review process of their subsidies in 2013. China and the US conducted a peer review in 2016, Germany and Mexico followed in 2017, and Indonesia and Italy will conclude their peer review in 2018. At the G20 Summit 2017, 19 out of 20 countries stated that they “will endeavor to make further progress in moving forward this commitment.”<sup>66</sup>

Overall, estimates of fossil fuel subsidies continue their downward trend, mainly driven by fuel pricing reforms in developing countries such as India and Indonesia.<sup>67</sup> However, governments are not on track to meet their commitments. According to the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA), G20 countries provided more than US\$230 billion in subsidies to coal, oil and gas in 2014.<sup>68</sup>

At the same time, nearly all G20 countries have national or subnational carbon pricing mechanisms, or are currently exploring their use. However, evidence show that 90 percent of carbon emissions are not priced at a level reflecting even a conservative estimate of their climate cost.<sup>69</sup> Almost all taxes are too low from an environmental point of view.<sup>70</sup> Effective carbon prices are used as an indicator to measure this, i.e. the price of CO<sub>2</sub> emissions resulting from taxes on carbon and energy use, and ETs. Across all G20 countries, effective carbon prices are low in sectors outside of road transport.<sup>71</sup> In the non-road sectors, which collectively account for 95 percent of CO<sub>2</sub> emissions from energy use, 81 percent of emissions are untaxed. There was no structural change to the pattern of taxes on energy use between 2012 and 2015.<sup>72</sup>

64 Source: Climate Transparency 2017: BROWN TO GREEN: THE G20 TRANSITION TO A LOW-CARBON ECONOMY, Climate Transparency, c/o Humboldt-Viadrina Governance Platform, Berlin, Germany, [www.climate-transparency.org](http://www.climate-transparency.org).

65 More recently, G7 countries (a subset of the G20) committed to phasing out fossil fuel subsidies by 2025. In addition, the European Commission has made a commitment to remove subsidies for hard coal mining by 2018, and Member States also committed to begin developing plans for phase-out by 2020.

66 The G20 Climate and Energy Action Plan also encourages G20 countries to “initiate sharing good practices and experiences on domestic mitigation and adaptation policies, including domestic economic and market-based instruments as well as emission to value approaches.” This can be read as the beginning of a G20 process for mutual dialogue on carbon pricing. Source: G20, *G20 Hamburg Climate and Energy Action Plan for Growth*, 2017, <http://www.consilium.europa.eu/media/23547/2017-g20-climate-and-energy-en.pdf>.

67 Source: OECD, *OECD Companion to the Inventory of Support Measures for Fossil Fuels 2018*, 2018.

68 This estimate only includes tax exemptions and budgetary support toward the production and consumption of fossil fuels, and does not consider broader subsidies provided through public finance and state-owned companies. The data on fossil fuel subsidies was drawn from the OECD's 2015 fossil fuel inventory. Data on Argentina and Saudi Arabia, which are not included in the OECD database, was taken from the IEA subsidies database. The IEA uses a different methodology for calculating subsidies than the OECD. It uses a ‘price-gap’ approach and covers a sub-set of consumer subsidies.

69 Source: OECD, *Effective Carbon Rates – Pricing CO<sub>2</sub> through Taxes and Emission Trading Systems*, 2016, <http://www.oecd.org/tax/effective-carbon-rates-9789264260115-en.htm>.

70 Source: OECD, *Taxing Energy Use – Companion to the Taxing Energy Use Database*, 2018.

71 The effective carbon rates presented in this report do not factor in emissions from biomass, as many countries and the UNFCCC treat them as carbon-neutral. However, in many cases biomass emissions are found to be non-carbon neutral over their lifecycle, especially due to the land use changes they cause. In the OECD's second set of calculations where biomass emissions are also counted in as carbon content, the effective carbon rates are slightly lower, but only by between 1-16 percentage points. The exceptions are Brazil, France, and India, where accounting for biomass emissions makes the effective carbon price 53 percent, 22 percent and 47 percent lower, respectively. Specific taxes on energy use, which are predominantly excise taxes, dominate the other two components of effective carbon prices (carbon taxes and ETS allowance prices). Carbon taxes are low on average and cover a small part of emissions from energy use across the G20. ETS allowance prices are also low, but contribute significantly to the coverage of non-road emissions with a carbon price. Source: OECD, *Effective Carbon Rates – Pricing CO<sub>2</sub> through Taxes and Emission Trading Systems*, 2016, <http://www.oecd.org/tax/effective-carbon-rates-9789264260115-en.htm>.

72 Source: OECD, *Taxing Energy Use – Companion to the Taxing Energy Use Database*, 2018.

# 3

## International carbon pricing initiatives



## 3

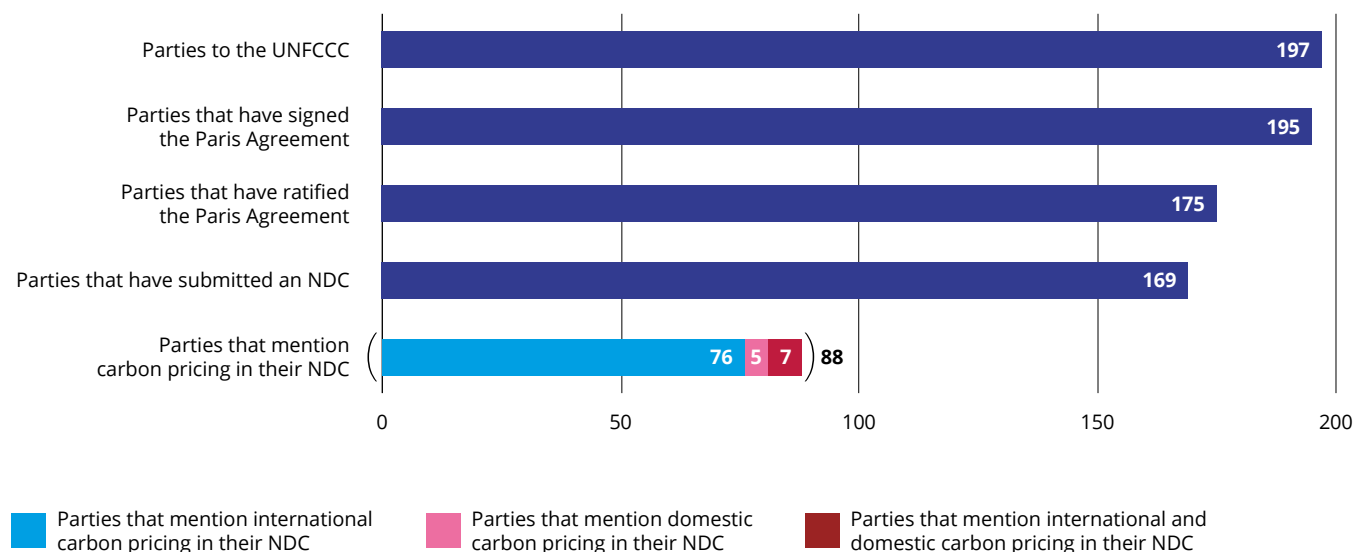
## International carbon pricing initiatives

### Implementation of the Paris Agreement and NDCs

The Paris Agreement entered into force on November 4, 2016. As of April 1, 2018, 195 Parties have signed the Agreement and 175—representing

87 percent of global GHG emissions—have deposited their instruments of ratification, as shown in Figure 9.<sup>73</sup> While it is not an international carbon pricing mechanism in itself, the Paris Agreement lays the ground for the development of such mechanisms through Article 6.

Figure 9 / Status of NDC submissions



*Note:* As the modalities and procedures for the NDC registry are not yet in place, there is currently no basis to enforce a timeline on the submission of the NDC even though the Parties are technically in breach of the provisions of the Agreement. See the discussion in the paragraphs below for an update on the development of the Paris Agreement guidelines in which requirements for NDCs will be communicated. The EU is included as a separate Party in the tally above.

73 Both Nicaragua and Syria have deposited their instruments of ratification, but have not yet formally signed the Paris Agreement. Source: UNFCCC, *Paris Agreement - Status of Ratification*, accessed March 1, 2018, [http://unfccc.int/paris\\_agreement/items/9444.php](http://unfccc.int/paris_agreement/items/9444.php).

The Paris Agreement requires all ratifying Parties to communicate an NDC. Most Parties' first NDC are their originally submitted intended nationally determined contribution (INDC), with only 11 Parties having an NDC which differs from their INDC.

» The Paris Agreement entered into force on November 4, 2016. As of April 1, 2018, 195 Parties have signed the Agreement and 175—representing 87 percent of global GHG emissions—have deposited their instruments of ratification. «

In most cases, modifications to NDCs were minor, although some countries increased their ambitions.<sup>74</sup> 88 Parties mention carbon pricing in their NDC, representing 56 percent of global GHG emissions; this includes three Parties that did not initially mention carbon pricing in their INDCs, but now do in their first NDC: Argentina, Mali and Uruguay.<sup>75</sup> Although indicative, mentioning carbon

pricing indicates that these Parties are planning or considering the use of carbon pricing to meet their NDC commitment. The way in which carbon pricing is included across the submitted NDCs differs:<sup>76</sup>

- Seven NDCs from Parties responsible for 4 percent of global GHG emissions mention that both international and domestic carbon pricing initiatives are under consideration<sup>77</sup>
- Five NDCs from Parties that represent almost a quarter of global GHG emissions mention the use of a domestic carbon pricing initiative<sup>78</sup>
- 76 NDCs from Parties that account for about 28 percent of global GHG emissions state intentions to use international carbon pricing initiatives

COP 23 ended with the adoption of the “Fiji Momentum for Implementation.”<sup>79</sup> This decision reaffirms the goal to adopt the Paris Agreement guidelines at COP 24 in Katowice, Poland in December 2018. The decision also sets out the design for the facilitative dialogue, which has been renamed the “Talanoa Dialogue”. The purpose of the dialogue is to take stock of the collective progress of Parties toward meeting the goals of the Paris Agreement in a manner that promotes enhanced ambition.<sup>80</sup> The dialogue started in January 2018 and is structured around three general topics: the current state of progress, the desired end point, and how to reach this end point.<sup>81</sup>

74 Furthermore, four Parties that did not submit an INDC submitted an NDC following ratification of the Paris Agreement, and six parties have submitted their instruments for ratification but have not yet submitted an NDC. Source: UNFCCC, *NDC Registry*, accessed March 1, 2018, <http://www4.unfccc.int/ndcregistry/Pages/All.aspx>.

75 Uruguay states that although it does not rule out taking part in international GHG emissions trading markets, priority is given to the fulfillment of the commitments in its NDC.

76 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.

77 Canada, Costa Rica, Egypt, Korea, Panama, St. Lucia and Trinidad & Tobago.

78 China, Gabon, Iceland, Norway and South Africa.

79 Formally called Decision 1/CP.23. Source: UNFCCC, *Fiji Momentum for Implementation*, November 18, 2017.

80 Source: UNFCCC, *Talanoa Dialogue*, November 16, 2017.

81 Source: *Ibid.*

### International carbon pricing mechanisms

Article 6 of the Paris Agreement recognizes that Parties can voluntarily cooperate on the implementation of their NDCs to facilitate higher ambition in mitigation and adaptation actions. In March 2018, SBSTA published, among others, informal documents on Article 6.2 and Article 6.4. These documents aim to facilitate negotiations, clarify design options for elements of both articles and develop language for the implementation of these elements:

- The informal document with draft elements of guidance on cooperative approaches referred to in Article 6.2 elaborates on: the scope and whether the guidance also applies to mitigation activities under Article 6.4; the characteristics of an ITMO; and whether units under the Article 6.4 mechanism, certified emission reductions (CERs) from the Clean Development Mechanism (CDM), as well as mitigation outcomes beyond emission reductions<sup>82</sup> can qualify as ITMOs. It also discusses the type of NDC a Party needs to have in place to undertake cooperative approaches, how and when Parties can make corresponding adjustments for emissions covered by their NDC when participating in a cooperative approach, and the modalities for the share of proceeds for adaptation.<sup>83</sup>

- The informal document with draft elements of the rules, modalities and procedures for the mechanism under Article 6.4 covers a wide range of design options, ranging from a new design to one drawing heavily on the CDM. It also discusses potential references to compliance with Article 6.2 requirements as a pre-requisite, and the start date of issuances under the new mechanism.<sup>84</sup>

While some interest in the CDM remains, as the informal documents show, its significance continues to diminish and its future under the Paris Agreement and demand for CERs remain unclear. The main regulatory development in 2017 was the adoption of a decision at COP 23 that encourages the CDM Executive Board to continue the simplification process for the development and approval of standardized baselines.<sup>85</sup> Market activity under the CDM, including registrations of projects and issuances of CERs, continues to decrease.<sup>86</sup> In 2017, the voluntary cancellation of CERs in the CDM registry originated mostly from China (38 percent), India (14 percent) and Republic of Korea (12 percent).<sup>87</sup> In the case of Korea, canceled CERs are being reissued as credits that can be used for compliance in the Korea ETS.<sup>88</sup>

82 Here, emission reductions also encompass emission removals and avoided emissions. Other mitigation outcomes might include mitigation co-benefits of adaptation actions and/or economic diversification plans.

83 Source: UNFCCC, *Informal Document Containing the Draft Elements of Guidance on Cooperative Approaches Referred to in Article 6, Paragraph 2, of the Paris Agreement*, March 16, 2018.

84 Source: UNFCCC, *Informal Document Containing the Draft Elements of the Rules, Modalities and Procedures for the Mechanism Established by Article 6, Paragraph 4, of the Paris Agreement*, March 16, 2018.

85 Source: UNFCCC, *Decision 3/CMP.13 Guidance Relating to the Clean Development Mechanism*, November 15, 2017.

86 Source: UNFCCC, *Project Activities*, accessed March 13, 2018, <https://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html>.

87 Percentage of CERs voluntarily canceled of total cancellations. Source: UNFCCC, *CDM Registry Issuance Report*, February 28, 2018, [https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20180301105932464/CDM\\_Registry\\_Issuance\\_Report\\_28Feb2018\\_for\\_publication.xlsx](https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20180301105932464/CDM_Registry_Issuance_Report_28Feb2018_for_publication.xlsx).

88 Source: UNFCCC, *CERs Cancelled to Date in the CDM Registry - 2018 Onwards*, accessed March 3, 2018, [https://cdm.unfccc.int/Registry/vc\\_attest/index.html](https://cdm.unfccc.int/Registry/vc_attest/index.html).

## Results-based climate finance<sup>89</sup>

The Green Climate Fund (GCF) currently has donor pledges totaling over US\$10.3 billion, and it aims to disburse around US\$2.5 billion a year toward climate mitigation and adaptation projects in developing countries.<sup>90</sup> Part of this will be done in a pilot program that will disburse results-based payments for Reducing Emissions from Deforestation and Forest Degradation, and sustainable forest management, conservation of forests and enhancement of carbon sink (REDD+) projects. The pilot program will be implemented with a budget of US\$500 million to be paid to eligible programs that generate up to 100 MtCO<sub>2</sub>e at a price of US\$5/tCO<sub>2</sub>e. The pilot program is expected to be operational until 2022. The GCF proposes to conduct an analysis of the early experience of implementing the pilot program until 2019. The pilot program on REDD+ is the first such program to operationalize the results-based payments referred to in Article 5 of the Paris Agreement.<sup>91</sup>

In November 2017, the World Bank's Pilot Auction Facility (PAF) made the second repayment of bonds issued under the program. The value of bonds repaid—US\$9.6 million—is linked to the performance of private sector projects that reduce GHG emissions. The payment value reflects the equivalent of 3.4 MtCO<sub>2</sub>e of emission reductions.<sup>92</sup> Building on the PAF experience, the World Bank

is expanding into a broader Climate Auctions Program. At COP 23, the World Bank and the German-hosted Nitric Acid Climate Action Group announced a collaboration on a new auctioning program to address nitrous oxide emissions from nitric acid production from projects in countries that have made a political commitment to continue mitigation activities in this sector beyond the 2020 horizon of the auctioning program.<sup>93</sup>

The Transformative Carbon Asset Facility (TCAF), which became operational in March 2017, has identified a pipeline of programs that can result in carbon assets for potential use in international compliance. In parallel, TCAF continues to discuss and analyze technical issues related to the use of RBCF within the evolving international context.<sup>94</sup>

## Sectoral-based initiatives

### Aviation

ICAO is working toward the start of CORSIA, the global carbon offsetting initiative which aims to stabilize net emissions from international aviation at 2020 levels.<sup>95</sup> As of January 11, 2018, 73 countries, representing 88 percent of international aviation activity, intend to voluntarily participate in CORSIA from the start of the pilot phase in 2021.<sup>96</sup> In December 2017, ICAO published its draft SARPs related to CORSIA.<sup>97</sup> These SARPs contain recommendations on the MRV of CO<sub>2</sub> emissions

89 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. These results are typically defined at the output or outcome level, which means that RBCF can support the development of specific low-emission technologies or the underlying climate outcomes, such as emission reductions. Source: World Bank, *Results-Based Climate Finance in Practice: Delivering Climate Finance for Low-Carbon Development*, May 2017.

90 Source: Green Climate Fund, *Status of Pledges and Contributions Made to the Green Climate Fund*, January 29, 2018.

91 Source: Green Climate Fund, *Decisions of the eighteenth meeting of the Green Climate Fund Board*, GCF/B.18/23, September 30–October 2, 2017.

92 Carbon credits came from projects such as landfill gas-to-energy projects in Brazil, Chile, Malaysia, Mexico, Thailand, and Uruguay; wastewater treatment and biogas utilization projects in Thailand; and a nitrous oxide abatement project in Egypt. Source: World Bank, *World Bank Pilot Auction Facility Unlocks Capital Markets for Climate Action*, December 7, 2017, <http://www.worldbank.org/en/news/press-release/2017/12/07/world-bank-pilot-auction-facility-unlocks-capital-markets-for-climate-action>.

93 Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, *Initiatives by the German government and its partners*, accessed 1 April 2018, <https://www.bmu.de/en/topics/climate-energy/climate/international-climate-policy/carbon-market-platform/initiatives-by-the-german-government-and-its-partners/#c12831>.

94 Source: World Bank, *Transformative Carbon Asset Facility*, accessed March 3, 2018, <https://tcaf.worldbank.org/>.

95 Any additional emissions above 2020 levels must be offset, taking into account special circumstances and respective capabilities of Member States. Source: ICAO, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, accessed March 14, 2017, <http://www.icao.int/environmental-protection/Pages/market-based-measures.aspx>.

96 Ibid.

97 SARPs are effectively the laws and regulations adopted by ICAO and are applicable to all their Member States. Source: ICAO, *Proposal for the First Edition of Annex 16, Volume IV, Concerning Standards and Recommended Practices Relating to CORSIA*, December 5, 2017.

from aviation, offsetting from international flights, CORSIA emission units and emission reductions from the use of alternative aviation fuels, among others.<sup>98</sup> A final text is due to be adopted during the June 2018 ICAO Council meeting.<sup>99</sup>

» IMO foresees for the first time in history a reduction in total GHG emissions from international shipping with a vision of putting the sector's emission reduction efforts on a pathway consistent with the Paris Agreement temperature goals. «

### Shipping

On April 13, 2018,<sup>100</sup> the International Maritime Organization's (IMO) Marine Environment Protection Committee adopted an initial strategy to reduce GHG emissions from international shipping.<sup>101</sup> In its initial strategy, IMO foresees for the first time in history a

reduction in total GHG emissions from international shipping with a vision of putting the sector's emission reduction efforts on a pathway consistent with the Paris Agreement temperature goals.<sup>102</sup> The strategy stipulates peaking GHG emissions from the sector as soon as possible, a reduction of annual GHG emissions by at least 50 percent by 2050 compared to 2008, while at the same time pursuing efforts toward full decarbonization.

Achieving the target set by the IMO for 2050 will require substantial technological innovation and the introduction of low and zero-carbon energy sources for international shipping. To drive this process, the IMO defined several possible short-, mid- and long-term measures for further consideration. Market-based mechanisms such as carbon pricing are among the possible mid-term measures which could be finalized and agreed upon between 2023 and 2030. Before any measure is adopted, its impact on Member States—especially small island developing states and least developed countries—will be assessed.

This development follows the IMO's adoption of a global data collection system for fuel consumption for ships from October 2016, which entered into force in March 2018.<sup>103</sup> Since January 2018, the EU<sup>104</sup> has also implemented monitoring measures that would facilitate a potential carbon pricing mechanism for international maritime transport in the future—either on a global or on a regional level.

<sup>98</sup> Ibid.

<sup>99</sup> Source: ICAO, *CORSIA Implementation Components*, February 28, 2018.

<sup>100</sup> While this report covers the period from January 1, 2017 until April 1, 2018, the authors decided to include the adoption of IMO's initial strategy on reducing GHG emissions from international shipping given its global significance. The authors recognize that other significant developments have occurred after April 1, 2018 and before the publication of the report. These developments will be included in the next edition of the State and Trends of Carbon Pricing report.

<sup>101</sup> Source: International Maritime Organization, *Marine Environment Protection Committee (MEPC), 72nd session, 9-13 April 2018*. Meeting summary. April 13, 2018, <http://www.imo.org/en/MediaCentre/MeetingSummaries/MEPC/Pages/MEPC-72nd-session.aspx>

<sup>102</sup> Source: International Maritime Organization, *UN body adopts climate change strategy for shipping*. April 13, 2018, <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/06GHGinitialstrategy.aspx>

<sup>103</sup> Source: International Maritime Organization, *Report of the Marine Environment Protection Committee on Its Seventieth Session*, November 11, 2016.

<sup>104</sup> European Commission, *Reducing Emissions from the Shipping Sector*, accessed March 5, 2018, [https://ec.europa.eu/clima/policies/transport/shipping\\_en](https://ec.europa.eu/clima/policies/transport/shipping_en).



# 4

Regional, national,  
and subnational carbon  
pricing initiatives





## 4

## Regional, national, and subnational carbon pricing initiatives

As of 2018, 51 carbon pricing initiatives have been implemented or are scheduled for implementation. This consists of 25 ETs, mostly located in subnational jurisdictions, and 26 carbon taxes primarily implemented on a national level. Details on the main developments in regional, national and subnational carbon pricing initiatives are presented below.<sup>105</sup> Experience gained through the development of these carbon pricing initiatives will help the development of future carbon pricing initiatives and the operationalization of Article 6 of the Paris Agreement.

### Argentina

On December 28, 2017, a carbon tax was adopted in Argentina.<sup>106</sup> The full rate of this tax is based on the local currency equivalent of US\$10/tCO<sub>2</sub>e.<sup>107</sup> Starting from January 1, 2019, the tax will be levied at the full rate for most liquid fuels. For fuel oil, mineral coal, and petroleum coke, the tax rate will start in 2019 at 10 percent of the full tax rate, increasing annually by 10 percentage points to reach 100 percent in 2028. The carbon tax is estimated to cover about 20 percent of the country's GHG emissions and is expected to

raise approximately ARS11.5 billion (US\$571 million) in revenue per year when fuel oil, mineral coal and petroleum coke face the full rate.<sup>108</sup> The revenue is designated to multiple beneficiaries, including the National Housing Fund, the Transport Infrastructure Trust, the social security system and programs to promote renewable energy and energy efficiency.<sup>109</sup> Tax exemptions apply to international aviation and shipping, export of covered fuels, the biofuel content of liquid fuels and the use of fossil fuels as raw materials in chemical processes.<sup>110</sup>

### Australia

Since its launch in 2015, the ERF has contracted 438 projects against a cost of A\$2.28 billion (US\$1.75 billion) to deliver 191 MtCO<sub>2</sub>e of emissions abatement over 2015–2029.<sup>111</sup> With a total size of A\$2.55 billion (US\$1.96 billion), about 90 percent of the ERF has been allocated. In the first year of compliance under the ERF Safeguard Mechanism (2016–17), facility operators surrendered around 448,000 Australian Carbon Credit Units to offset emissions above their baselines.<sup>112</sup>

<sup>105</sup> Countries and regions are listed in alphabetical order. This report covers developments over the period January 1, 2017 to April 1, 2018.

<sup>106</sup> Source: Argentinian Ministry of Justice and Human Rights, *Modification of the Tax Law*, December 27, 2017, <http://servicios.infoleg.gob.ar/infolegInternet/verNorma.do?id=305262>.

<sup>107</sup> The adopted carbon tax legislation differs from the initial Executive proposal of October 2017 as it is based on a lower rate than the initially proposed US\$25/tCO<sub>2</sub>e and exempts jet fuel, butane, propane and natural gas. Source: Argentinian Ministry of the Environment and Sustainable Development, *Argentina Participated in the Dialogue on Carbon Pricing Instruments in the Americas*, January 23, 2018, <http://ambiente.gob.ar/noticias/argentina-participo-del-dialogo-sobre-instrumentos-de-precio-al-carbono-en-las-americas/>.

<sup>108</sup> Source: based on correspondence with the Government of Argentina, April 11, 2018.

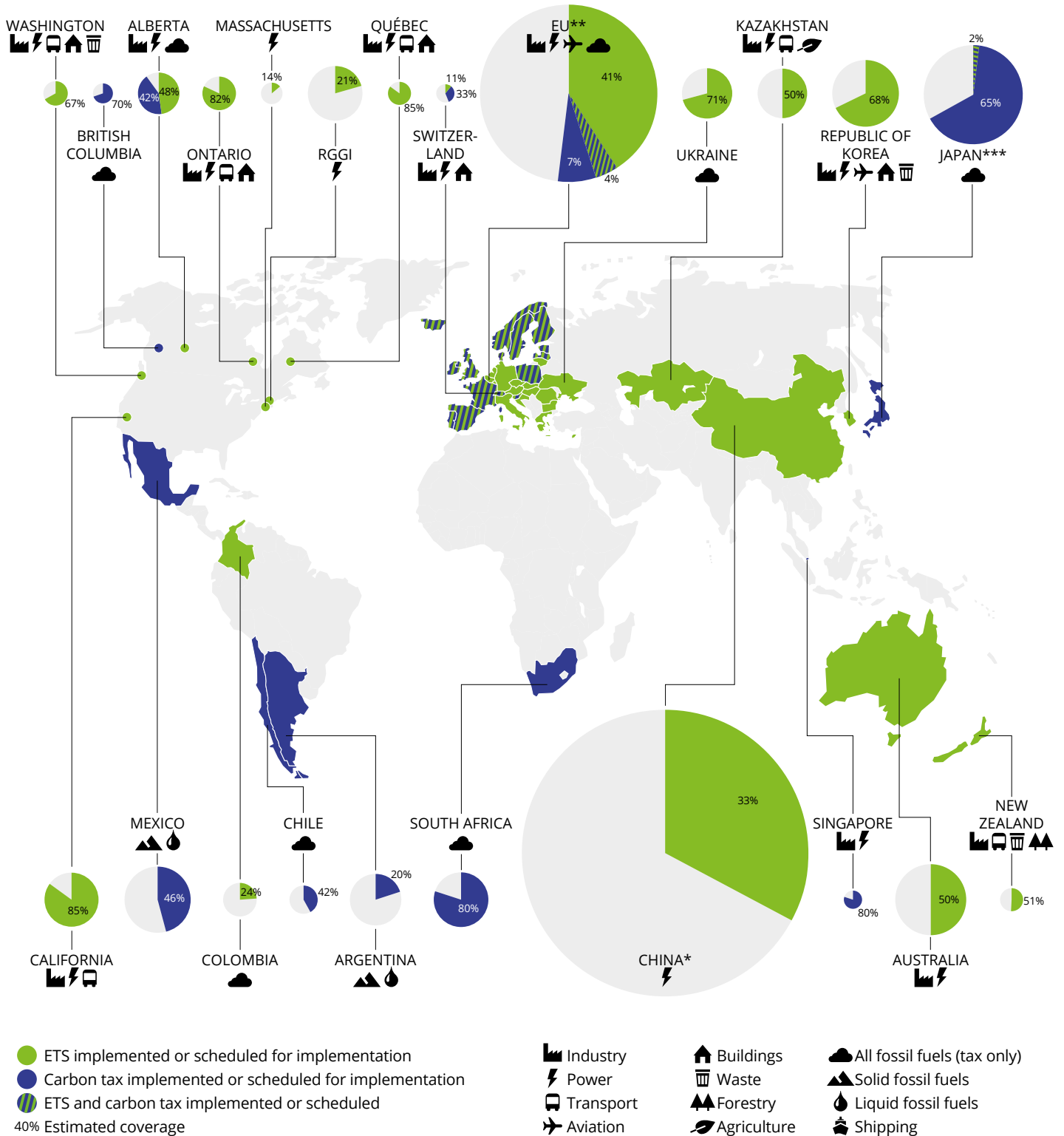
<sup>109</sup> Source: Foundation of the Environment and Natural Resources (FARN), *The Tax Reform and the Carbon Tax*, December 18, 2017, <https://farn.org.ar/archives/23151>.

<sup>110</sup> Source: Argentinian Ministry of Justice and Human Rights, *Tax on Liquid Combustibles and Natural Gas*, accessed March 5, 2018, <http://servicios.infoleg.gob.ar/infolegInternet/anexos/0-4999/365/texact.htm>.

<sup>111</sup> Source: Australian Department of the Environment and Energy, *Emissions Reduction Fund Update*, accessed March 5, 2018, <http://www.environment.gov.au/climate-change/publications/emissions-reduction-fund-update>.

<sup>112</sup> Source: Government of Australia, *2016-17 Safeguard Facility Reported Emissions*, accessed March 22, 2018, <http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/safeguard-facility-reported-emissions/safeguard-facility-emissions-2016-17>.

**Figure 10 / Carbon pricing initiatives implemented or scheduled for implementation, with sectoral coverage and GHG emissions covered**



● ETS implemented or scheduled for implementation  
● Carbon tax implemented or scheduled for implementation  
  ETS and carbon tax implemented or scheduled  
 40% Estimated coverage

Industry	Buildings	All fossil fuels (tax only)
Power	Waste	Solid fossil fuels
Transport	Forestry	Liquid fossil fuels
Aviation	Agriculture	Shipping

*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 12.4 GtCO<sub>2</sub>e and the smallest circle (Switzerland) to 0.05 GtCO<sub>2</sub>e. 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 only refers to the national ETS as the pilots cover more sectors than and vary per 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.

Following a review of climate change policies in 2017, the Australian government is currently consulting industry on potential changes to the ERF Safeguard Mechanism to bring baselines up-to-date with current circumstances and make it fairer and simpler.<sup>113</sup> The government is planning to have any changes made to the Safeguard Mechanism take effect in the 2018/19 compliance year.<sup>114</sup> In its review of climate change policies, the government also stated its in-principle support for the use of international units to meet emission reduction targets. The final decision on international units will be made by 2020.<sup>115</sup>

### Canada

The pan-Canadian approach to carbon pricing requires all Canadian provinces and territories to have a carbon pricing initiative in place in 2018 that aligns with the federal standard. The federal standard provides provinces and territories the flexibility to implement their own carbon pricing initiative according to their circumstances—either a fixed price or cap-and-trade system—and sets common criteria that all systems must meet, in order to ensure they are fair and effective. The federal standard aims to ensure that carbon pricing will apply to a broad set of emission sources throughout Canada, with increasing stringency over time.

The federal government also committed to develop and implement a federal carbon pricing backstop system in any province or territory that requests it or that is not on track in 2018 to adopt a carbon

pricing initiative that meets the federal standard. The carbon pricing backstop system would take effect in these jurisdictions on January 1, 2019.<sup>116</sup> The proposed backstop system consists of two elements: a carbon tax that is generally payable by fuel producers or distributors, and a baseline-and-credit ETS for emissions-intensive, trade-exposed industrial facilities.<sup>117</sup> The carbon tax would cover a broad range of fossil fuels (including various liquid, solid, and gaseous fuels) and combustible waste at a rate of CAN\$20/tCO<sub>2</sub>e (US\$16/tCO<sub>2</sub>) in 2019, increasing annually by CAN\$10/tCO<sub>2</sub>e (US\$8/tCO<sub>2</sub>e) to reach CAN\$50/tCO<sub>2</sub>e (US\$39/tCO<sub>2</sub>) in 2022.<sup>118</sup> The federal ETS—called the output-based pricing system—will cover industrial facilities emitting 50 kilotons of carbon dioxide equivalent (ktCO<sub>2</sub>e) per year or more, and over time, other smaller facilities will be able to opt-in to the system. The emissions limit for industrial facilities will be calculated based on an emissions intensity standard<sup>119</sup> and the facility's annual output or production. A facility whose emissions are above its limit can meet its compliance obligation by surrendering surplus credits purchased from facilities whose emissions are below their limit, surrendering eligible offsets credits, and/or paying a charge to the Government of Canada at the same rate as the carbon tax element (e.g. CAN\$50/tCO<sub>2</sub>e in 2022).<sup>120</sup>

On the subnational level, provinces and territories are working to develop carbon pricing initiatives that align with the federal standard. Key developments are listed in Table 1.

113 Source: Australian Department of the Environment and Energy, *2017 Review of Climate Change Policies*, December 2017.

114 Source: Ibid.

115 Source: Ibid.

116 Source: Government of Canada, *Next Steps in Pricing Carbon Pollution*, December 20, 2017, [https://www.canada.ca/en/environment-climate-change/news/2017/12/carbon\\_pricing\\_backgroundunderministerslettertoprovincesandterritor.html](https://www.canada.ca/en/environment-climate-change/news/2017/12/carbon_pricing_backgroundunderministerslettertoprovincesandterritor.html).

117 Source: Department of Finance Canada, *Notice of ways and Means Motion to implement certain provisions of the budget tabled in Parliament on February 27, 2018 and other measures and Explanatory Notes*, March 2018, <https://www.fin.gc.ca/drleg-apl/2018/bia-leb-0318-eng.asp>.

118 Ibid.

119 A quantity of emissions per unit of output or production.

120 Source: Government of Canada, *Carbon Pricing: Regulatory Framework for the Output-Based Pricing System*, January 31, 2018, <https://www.canada.ca/en/services/environment/weather/climatechange/climate-action/pricing-carbon-pollution/output-based-pricing-system.html>.

**Table 1 / Key carbon pricing developments in the Canadian provinces and territories<sup>121</sup>**

Jurisdiction	Type and status	Key developments
Alberta	ETS and carbon tax implemented	<ul style="list-style-type: none"> <li>– The Carbon Competitive Incentive Regulation (CCIR) came into effect on January 1, 2018, replacing the Specified Gas Emitters Regulation (SGER).</li> <li>– The CCIR is a baseline-and-credit ETS using sector-based product benchmarks and covers facilities that emit at least 100 ktCO<sub>2</sub>e per year. Smaller facilities from certain sectors can opt in the CCIR.</li> <li>– Facilities exceeding their sector benchmark(s) can comply with CCIR using credits generated at other facilities or Alberta-based offset projects. They can also contribute CAN\$30/tCO<sub>2</sub>e (US\$23/tCO<sub>2</sub>e) to Alberta's Climate Change and Emissions Management Fund.<sup>122</sup> Credits earned under the SGER can still be used for compliance, but have an expiry date depending on the vintage year of the credits and their use is subject to quantitative limits.</li> <li>– Facilities not covered by the CCIR are covered under the Alberta carbon tax.<sup>123</sup></li> <li>– Alberta's carbon tax rate, launched in 2017, increased from CAN\$20/tCO<sub>2</sub>e (US\$16/tCO<sub>2</sub>e) in 2017 to CAN\$30/tCO<sub>2</sub>e (US\$23/tCO<sub>2</sub>e) in 2018.<sup>124</sup></li> </ul>
British Columbia	ETS and carbon tax implemented	<ul style="list-style-type: none"> <li>– British Columbia's tax rate increased from CAN\$30/tCO<sub>2</sub>e to CAN\$35/tCO<sub>2</sub>e (US\$23/tCO<sub>2</sub>e to US\$27/tCO<sub>2</sub>e) on April 1, 2018 and will continue to increase annually by CAN\$5/tCO<sub>2</sub>e (US\$4/tCO<sub>2</sub>e) until the rate is CAN\$50/tCO<sub>2</sub>e (US\$39/tCO<sub>2</sub>e) in 2021.<sup>125</sup></li> <li>– Revenues generated from the carbon tax increases are used to provide carbon tax relief and support for emissions-intensive industries and new green initiatives.</li> </ul>
Manitoba	ETS and carbon tax under consideration	<ul style="list-style-type: none"> <li>– In February 2018, Manitoba announced the adoption of the Pan-Canadian Framework on Clean Growth and Climate Change. However, the province plans to implement a fixed carbon tax of CAN\$25/tCO<sub>2</sub>e (US\$19/tCO<sub>2</sub>e) from September 1, 2018, which will be reviewed in 2022. This differs from the escalating price rate under the federal standard. Manitoba has argued that its planned carbon tax will result in equivalent environmental outcomes as the federal price levels.<sup>126</sup></li> <li>– The tax will apply to gas, liquid, and solid fuel products intended for combustion in Manitoba, with exemptions for the agricultural sector, landfill and trade-exposed sectors. Fossil fuels subject to the carbon tax make up approximately 50% of Manitoba's total emissions.<sup>127</sup></li> <li>– Manitoba also plans to implement a baseline-and-credit ETS in 2019 for firms in emissions-intensive trade-exposed sectors with annual emissions over 50 ktCO<sub>2</sub>e.<sup>128</sup></li> </ul>
New Brunswick	Federal backstop under consideration	<ul style="list-style-type: none"> <li>– In December 2017, the government introduced its climate change legislation, which sets out the government's plan to meet the federal carbon pricing standard by transferring a part of existing revenues from gasoline and diesel taxes to a climate change fund.<sup>129</sup></li> <li>– The government also proposed legislation for large industrial emitters (i.e. those who emit more than 50 ktCO<sub>2</sub>e) to be covered under the federal backstop ETS.<sup>130</sup></li> </ul>
Newfoundland and Labrador	Undecided initiative under consideration	<ul style="list-style-type: none"> <li>– The government continues to consider different carbon pricing options.<sup>131</sup></li> </ul>

121 For further details on the Alberta carbon tax, the British Columbia GGIRCA, and the Ontario cap-and-trade program, please refer to World Bank, Ecofys and Vivid Economics, *State and Trends of Carbon Pricing 2016*, October 2016.

122 Source: Government of Alberta, *Climate Leadership Plan Progress Report*, December 2017.

123 The official name of the carbon tax is Alberta carbon levy. Source: Province of Alberta Order in Council, *Carbon Competitiveness Incentive Regulation*, December 18, 2017.

124 Source: Alberta, *Carbon Levy Keeps Diversifying Alberta's Economy*, January 1, 2018, <https://www.alberta.ca/release.cfm?xID=512180809BA87-A8DC-EC6B-5384E113C8E33AE5>.

125 Source: British Columbia Ministry of Finance, *Budget and Fiscal Plan 2018/19-2020/21*, February 20, 2018.

126 Source: Government of Canada, *Government of Manitoba Letter Announcing Adoption of the Pan-Canadian Framework on Clean Growth and Climate Change*, February 23, 2018, <https://www.canada.ca/en/environment-climate-change/news/2018/02/government-of-manitoba-letter-announcing-adoption-of-the-pan-canadian-framework-on-clean-growth-and-climate-change.html>.

127 Source: *Budget Paper E Made-in-Manitoba Climate and Green Plan*, March 2018.

128 Ibid.

129 Source: New Brunswick, *Climate Change Legislation Introduced*, December 14, 2017, [http://www2.gnb.ca/content/gnb/en/news/news\\_release.2017.12.1601.html](http://www2.gnb.ca/content/gnb/en/news/news_release.2017.12.1601.html).

130 Source: New Brunswick, *Update on New Brunswick Climate Change Actions*, December 2017.

131 Source: Newfoundland and Labrador, Management of Greenhouse Gas Act, accessed March 13, 2018, <http://www.assembly.nl.ca/legislation/sr/statutes/m01-001.htm>.

Jurisdiction	Type and status	Key developments
Northwest Territories	Undecided initiative under consideration	<ul style="list-style-type: none"> <li>The government is currently developing its carbon pricing approach, and has held a public consultation. It will announce more details on the carbon pricing approach in late 2018.<sup>132</sup></li> </ul>
Nova Scotia	ETS under consideration	<ul style="list-style-type: none"> <li>On February 15, 2018, legislation came into effect that allows the government to set up a cap-and-trade system, which is planned to enter into force in January 2019.<sup>133</sup></li> <li>Revenues from the ETS will be transferred to the Green Fund. The Green Fund will serve several purposes, such as financing measures to reduce emissions, research and development of innovative technologies aimed at tackling GHGs, and climate change adaptation activities.<sup>134</sup></li> <li>The province also introduced MRV legislation requiring facilities generating 50 ktCO<sub>2</sub>e or more, large petroleum producers or importers and large natural gas distributors to report GHG emissions.<sup>135</sup></li> </ul>
Nunavut	Undecided initiative under consideration	<ul style="list-style-type: none"> <li>Nunavut is evaluating carbon pricing initiatives in conjunction with the federal government.<sup>136</sup></li> </ul>
Ontario	ETS implemented	<ul style="list-style-type: none"> <li>Ontario launched its cap-and-trade system in January 2017. In November 2017, the government set emissions caps for 2021-2030. The cap is set to decline annually by 2.9%.<sup>137</sup></li> <li>On January 1, 2018, Ontario linked its ETS with the California and Québec ETs, after Ontario signed the linking agreement in September 2017.<sup>138</sup></li> </ul>
Prince Edward Island	Undecided initiative under consideration	<ul style="list-style-type: none"> <li>The province is considering a fiscally neutral carbon pricing initiative.<sup>139</sup></li> </ul>
Québec	ETS implemented	<ul style="list-style-type: none"> <li>In November 2017, the government adopted legislation to prepare its ETS for the post-2020 period. This included rules for free allocation of emission allowance from 2021-2023<sup>140</sup> and the cap for 2021-2030.<sup>141</sup></li> </ul>
Saskatchewan	ETS under consideration	<ul style="list-style-type: none"> <li>The province is the only one that has not signed the Pan-Canadian Framework on Clean Growth and Climate Change. Nonetheless, in December 2017, Saskatchewan proposed a new strategy to improve the province's resilience to climate change, to be implemented in 2019 that includes a baseline-and-credit ETS.</li> <li>The baseline-and-credit ETS would cover industrial facilities that emit over 25 ktCO<sub>2</sub>e. The baseline is proposed to be a product-specific emissions intensity benchmark. Facilities can meet their compliance obligations by reducing their emissions intensity below the baseline and those exceeding the baseline would be able to comply by purchasing approved offsets, or paying into provincial technology fund.<sup>142</sup> Emitters would also be able to comply by engaging in market mechanisms under the Paris Agreement, opening up possibilities to use international credits.<sup>143</sup></li> </ul>
Yukon	Federal backstop under consideration	<ul style="list-style-type: none"> <li>Yukon is evaluation carbon pricing initiatives in conjunction with the federal government.<sup>144</sup></li> </ul>

132 Source: Northwest Territories, *Budget Address 2018-2019*, February 8, 2018.

133 Source: Nova Scotia, *An Act to Amend Chapter 1 of the Acts of 1994-95, the Environment Act*, October 26, 2017.

134 Ibid.

135 Source: Nova Scotia, *New Greenhouse Gas Reporting Requirements in Effect*, February 16, 2018, <https://novascotia.ca/news/release/?id=20180216001>.

136 Source: Government of Canada, Annex II: Provincial and Territorial Key Actions and Collaboration Opportunities with the Government of Canada, accessed March 13, 2018, <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/annex-key-actions-collaboration.html>

137 Source: Ontario, *The Cap and Trade Program*, November 2017, <https://www.ontario.ca/laws/regulation/r17450>.

138 Source: Ontario, *Québec, Ontario and California Join Forces to Fight Climate Change*, September 22, 2017, <https://news.ontario.ca/opo/en/2017/9/quebec-ontario-and-california-join-forces-to-fight-climate-change.html>.

139 Source: Prince Edward Island, Pre-Budget Consultations, accessed March 13, 2018, <https://www.princeedwardisland.ca/en/service/pre-budget-consultations>.

140 Source: Québec, *Cap-and-Trade System for Greenhouse Gas Emission Allowances — Amendment*, November 2017.

141 Source: Québec, *Determination of Annual Caps on Greenhouse Gas Emission Units Relating to the Cap-and-Trade System for Greenhouse Gas Emission Allowances for the 2021-2030 Period*, November 2017.

142 Compliance through purchase of credits from other installations, which can only be generated by exceptionally high performers, is being explored.

143 Source: Saskatchewan, *Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy*, December 2017.

144 Source: Government of Canada, Annex II: Provincial and Territorial Key Actions and Collaboration Opportunities with the Government of Canada, accessed March 15, 2018, <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/annex-key-actions-collaboration.html>.

## China

On December 19, 2017, China's National Development and Reform Commission (NDRC) officially launched the national ETS. Accompanying the announcement was the release of a work plan outlining targets and the roadmap to develop the national ETS.<sup>145</sup>

The ETS roadmap consists of two phases: infrastructure development and simulated trading. The infrastructure development phase, which started with the release of the work plan and will be carried out over approximately one year, is focused on completing the legal foundation and market support systems for the China national ETS, including the trading platform, registry, and data reporting systems. The next phase, which is also expected to take place over a year, will see the power sector participate in simulated trading. The power sector will be the first sector to have compliance obligations under the ETS, which can be met by trading allowances on the spot market. Depending on results of the simulation phase, the national ETS will also gradually be expanded to include another seven sectors: aviation, building materials, chemicals, iron and steel, non-ferrous metals, pulp and paper, and petrochemicals.

To support the development of the national ETS, power sector entities and entities in the other seven sectors to be covered were requested by the NDRC on December 15, 2017 to formulate and submit their monitoring plans and GHG emissions for 2016 and 2017.<sup>146</sup> Only entities emitting more than 26 ktCO<sub>2</sub>e

per year in any year between 2013 and 2017 were required to submit monitoring plans. The allocation plan for the power sector will be revised based on this emissions data, which is expected to be reported and verified before May 31, 2018. Benchmarking will be the main approach for allocation.

Under the national ETS work plan, the pilot ETSs operating in China will gradually be integrated into the national ETS; the modalities for this integration are still under development.<sup>147</sup> In the meantime, the allocation approaches of the pilot ETSs continue to be adjusted. Some pilot ETSs are already improving their alignment with the national ETS. This includes the transition of the free allocation approach in the Beijing pilot ETS for existing facilities in the power sector from a historical emission intensity approach to benchmarking.<sup>148</sup> Also, benchmark values for the power sector in the Guangdong<sup>149</sup> and Shanghai<sup>150</sup> pilot ETSs were adjusted in 2017 to levels that are closer to the values published in the draft allocation plan for the national ETS. Another change includes a decrease in free allocation in the Beijing pilot ETS of up to ten percentage points for existing facilities in various sectors including cement and petrochemicals.<sup>151</sup> Benchmark levels also declined for the cement, and iron and steel sectors in the Guangdong pilot ETS.<sup>152</sup>

The scope of the Hubei pilot ETS increased in 2017 to cover all entities in the power and industry sectors with an energy consumption over 10,000 tons of standard coal equivalent (tce) in any year from 2014 to 2016.<sup>153</sup> Prior to this change, the ETS covered

145 Source: National Development and Reform Commission, *National Development and Reform Commission Issues National Carbon Emissions Trading Market Construction Plan*, December 18, 2017, [http://www.ndrc.gov.cn/gzdt/201712/t20171220\\_871134.html](http://www.ndrc.gov.cn/gzdt/201712/t20171220_871134.html).

146 Source: National Development and Reform Commission, *Notification of Development of Emission Monitoring Plan*, accessed March 13, 2018, [http://qhs.ndrc.gov.cn/qjfzjz/201712/t20171215\\_870557.html](http://qhs.ndrc.gov.cn/qjfzjz/201712/t20171215_870557.html).

147 Source: National Development and Reform Commission, *Notice on Printing and Distributing the National Carbon Emission Trading Market Construction Program*, accessed March 13, 2018, [http://qhs.ndrc.gov.cn/qjfzjz/201712/t20171220\\_871258.html](http://qhs.ndrc.gov.cn/qjfzjz/201712/t20171220_871258.html).

148 Source: Beijing Municipal Commission of Development and Reform, *Notice on Quota-Approved Issues for Key Emissions Units in 2017*, February 12, 2018, <http://www.bjpc.gov.cn/zwxxtzgt/201802/t12508458.htm>.

149 Source: Guangzhou Carbon Emission Trading Center, *Announcements*, accessed March 6, 2018, <http://www.cnemission.com/article/news/jysgg/?2>.

150 Source: Shanghai Municipal Development and Reform Commission, *Notice of Shanghai Municipal Development and Reform Commission on Printing and Distributing the 2017 Shanghai Allocation Plan of Carbon Emission Allowances*, December 27, 2017, <http://www.shdrc.gov.cn/xxgk/cxxxgk/32927.htm>.

151 Source: Beijing Municipal Commission of Development and Reform, *Notice on Quota-Approved Issues for Key Emissions Units in 2017*, February 12, 2018, <http://www.bjpc.gov.cn/zwxxtzgt/201802/t12508458.htm>.

152 The Guangdong pilot ETS has held allowance auctions since 2013. Source: Guangzhou Carbon Emission Trading Center, *Announcements*, accessed March 6, 2018, <http://www.cnemission.com/article/news/jysgg/?2>.

153 Source: Hubei Provincial Development and Reform Commission, *Notice of the Provincial Development and Reform Commission on Printing and Distributing Hubei Province's 2017 Carbon Emission Quota*, January 10, 2018, [http://fgw.hubei.gov.cn/xw/tzgg\\_3465/gg/wbwj/201801/t20180115\\_134615.shtml](http://fgw.hubei.gov.cn/xw/tzgg_3465/gg/wbwj/201801/t20180115_134615.shtml).

entities with an energy consumption over 10,000 tce in any year from 2013 to 2015 from seven sectors (petrochemical, chemical, building materials, iron and steel, non-ferrous metal, pulp and paper, and power), as well as industrial entities from other sectors with an energy consumption over 60,000 tce in any year during this period. As a result of this change, the number of entities covered under the ETS grew to 344 in 2017, compared to 236 in 2016. The cap also increased in 257 MtCO<sub>2</sub>e, compared to 253 MtCO<sub>2</sub>e the year before.

China continues to cooperate with international counterparts on carbon pricing. For example, China and the EU announced in October 2017 that they would continue their cooperation on emissions trading through the Platform for Policy Dialogue and Cooperation. Through this initiative, the EU will provide support to China in the development of its national ETS over a three-year period.<sup>154</sup> In addition, on December 4, 2017, Chinese Premier Li Keqiang and Canadian Prime Minister Justin Trudeau issued a joint statement on climate change, pledging to intensify their cooperation on climate change and clean energy issues, including carbon markets.<sup>155</sup>

### Côte d'Ivoire

Côte d'Ivoire is exploring carbon pricing as part of the policy options to reach the objectives of its NDC. Since 2015, the government has been organizing consultations with stakeholders in the public and private sectors and undertaking a preliminary study to assess initial design options for a carbon pricing policy applicable to its national economy. By 2020, the government will conduct additional analyses to explore in details the main elements to design a potential carbon tax.

### European Union

In February 2018, European lawmakers formally approved the EU ETS phase 4 (2021–2030) reforms.<sup>156</sup> Key post-2020 reforms include changing the linear annual cap reduction from 1.74 per cent to 2.2 percent, and a temporary doubling of the yearly withholding rate of surplus allowances into the MSR to 24 percent until 2023. In addition, as of 2023 the number of allowances held in the MSR will be limited to the previous year's auction volume and any allowances beyond that number will be invalidated. Furthermore, the share of allowances to be auctioned is set at 57 percent, but can be lowered by up to 3 percent to avoid the triggering of the cross-sectoral correction factor. This factor decreases free allocation by a fixed percentage across all sectors if the maximum amount of free allowances is exceeded. Another change will affect industrial sectors that are not included on the list of sectors deemed to be at risk of carbon leakage. They will receive up to 30 percent free allocation until 2026. After 2026, this will decrease linearly to 0 percent in 2030. Sectors on the carbon leakage list will continue to receive 100 percent of their allowances freely, up to benchmark levels. The benchmark levels will be updated every 5 years to take technological progress into account.

The reforms also introduced two low-carbon funding mechanisms for phase 4: the Modernization Fund and the Innovation Fund. The Modernization Fund will be used to support investments in energy efficiency and the modernization of the energy sector in lower-income Member States, and will be financed by 2 percent of the total auctioned allowance proceeds. The Innovation Fund will provide financial support for demonstration projects in

154 Source: European Commission, *EU and China: Strengthening Ties between the World's Largest Emission Trading Systems in 2017*, October 20, 2016, [https://ec.europa.eu/clima/news/articles/news\\_2016102001\\_en](https://ec.europa.eu/clima/news/articles/news_2016102001_en).

155 Source: Government of China, *China-Canada Joint Statement on Climate Change and Clean Growth*, December 4, 2017, [http://en.ndrc.gov.cn/newsrelease/201712/t20171204\\_869543.html](http://en.ndrc.gov.cn/newsrelease/201712/t20171204_869543.html).

156 Source: European Parliament, *Cost-Effective Emission Reductions and Low-Carbon Investments*, accessed March 6, 2018, <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P8-TA-2018-0024>; Council of the European Union, *EU Emissions Trading System Reform: Council Approves New Rules for the Period 2021 to 2030*, February 27, 2018, <http://www.consilium.europa.eu/en/press/press-releases/2018/02/27/eu-emissions-trading-system-reform-council-approves-new-rules-for-the-period-2021-to-2030/>.

energy-intensive industry, renewable energy and carbon capture and storage/utilization. This fund will be financed by the sale of 400 million EUAs; additionally, 50 million unallocated EUAs from Phase 3 (2013–2020) will be set aside for this fund. After 2025, more allowances may be added to both funds, in case these allowances are not needed to prevent a cross-sectoral correction factor.

Over the period during which lawmakers voted on and approved the reforms to the EU ETS, the price of EUAs increased from €5/tCO<sub>2</sub>e (US\$7/tCO<sub>2</sub>) on August 1, 2017 to €13/tCO<sub>2</sub>e (US\$16/tCO<sub>2</sub>) on April 1, 2018.<sup>157</sup>

In the aviation sector, the EU extended the “Stop the Clock” provision in December 2017. Under this extension, intercontinental flights are not included in the scope of the EU ETS until December 31, 2023 to align with the start of the first phase of CORSIA in 2024.<sup>158</sup>

Following the UK’s decision to leave the EU in March 2019, the UK brought forward the EU ETS compliance date for 2018 emissions from UK installations to before the Brexit date to minimize disruptions to the EU ETS.<sup>159</sup> The UK’s participation in the EU ETS from 2019 onward will be subject to the Brexit negotiations that will take place throughout 2018.

In November 2017, the EU and Switzerland signed an agreement to link their ETs. This paves the way for both parties to prepare for implementation. The

agreement will enter into force a year after both parties are technically ready and have deposited their instruments of ratification.<sup>160</sup> Depending on the timing of the ratification, the linkage could enter into force on January 1, 2019 or January 1, 2020.<sup>161</sup> Additionally, the EU and California plan to hold regular political and technical dialogues on the design and implementation of their carbon markets, including cooperation with other carbon markets such as China.<sup>162</sup>

### Finland

From January 1, 2018, the carbon tax rate for coal, heavy fuel oil and light fuel oil was increased from €58/tCO<sub>2</sub>e to €62/tCO<sub>2</sub>e (US\$72/tCO<sub>2</sub>e to US\$77/tCO<sub>2</sub>e). With this increase, the carbon tax rates for heating fuels and liquid transport fuels are now aligned.<sup>163</sup>

### France

To further reduce carbon emissions in the context of the Paris Agreement, the France carbon tax is set to increase at an accelerated rate compared to its initial trajectory in the Act on Energy Transition for Green Growth of €39/tCO<sub>2</sub>e (US\$48/tCO<sub>2</sub>e) in 2018, €56/tCO<sub>2</sub>e (US\$69/tCO<sub>2</sub>e) in 2020 and €100/tCO<sub>2</sub>e (US\$124/tCO<sub>2</sub>e) in 2030.<sup>164</sup> The new trajectory for the next four years involves an annual increase of €10.4 (US\$13) from €44.6/tCO<sub>2</sub>e (US\$55/tCO<sub>2</sub>e) in 2018 to €86.2/tCO<sub>2</sub>e (US\$107/tCO<sub>2</sub>e) in 2022.<sup>165</sup>

157 Source: European Energy Exchange, *Homepage*, accessed March 13, 2018, <https://www.eex.com>. Source: Intercontinental Exchange, *Homepage*, accessed March 13, 2018, <https://www.theice.com>.

158 Source: European Commission, *Amending Directive 2003/87/EC to Continue Current Limitations of Scope for Aviation Activities and to Prepare to Implement a Global Market-Based Measure from 2021*, December 13, 2017.

159 Source: European Commission, *Update on Safeguard Measures for EU Emissions Trading System in 2018 Following Adoption of UK Law*, January 8, 2018, [https://ec.europa.eu/clima/news/update-safeguard-measures-eu-emissions-trading-system-2018-following-adoption-uk-law\\_en](https://ec.europa.eu/clima/news/update-safeguard-measures-eu-emissions-trading-system-2018-following-adoption-uk-law_en).

160 Source: European Commission, *EU and Switzerland Sign Agreement to Link Emissions Trading Systems*, November 23, 2017, [https://ec.europa.eu/clima/news/eu-and-switzerland-sign-agreement-link-emissions-trading-systems\\_en](https://ec.europa.eu/clima/news/eu-and-switzerland-sign-agreement-link-emissions-trading-systems_en).

161 Source: European Union, *Agreement between the European Union and the Swiss Confederation on the Linking of Their Greenhouse Gas Emissions Trading Systems*, December 7, 2017.

162 Source: European Commission, *EU and California in Joint Climate Push, Boost Cooperation*, November 7, 2017, [https://ec.europa.eu/clima/news/eu-and-california-joint-climate-push-boost-cooperation\\_en](https://ec.europa.eu/clima/news/eu-and-california-joint-climate-push-boost-cooperation_en).

163 Source: Government of Finland, *Proposal to Amend the Act on Excise Duty of Liquid Fuels, and the Act on Excise Duty on Electricity and Some Fuels*, October 2017.

164 Source: Government of France, *Law Number 2015-992 of 17 August 2015 Relating to the Energy Transition for Green Growth*, accessed March 9, 2018, <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385>.

165 Source: Government of France, *Law Number 2017-1837 from December 30 2017 of Finances for 2018*, accessed March 26, 2018, <https://www.legifrance.gouv.fr/eli/loi/2017/12/30/CPAX1723900L/jo/texte/>; Source: Government of France, *Draft Finance Act for 2018*, 2017, [https://www.legifrance.gouv.fr/content/download/12831/138180/version/1/file/plf\\_2018\\_cm\\_27.09.2017.pdf](https://www.legifrance.gouv.fr/content/download/12831/138180/version/1/file/plf_2018_cm_27.09.2017.pdf).



## Iceland

The Iceland carbon tax rate increased to approximately ISK3500/tCO<sub>2</sub> (US\$36/tCO<sub>2</sub>) on January 1, 2018.<sup>166</sup> The higher tax rate will generate ISK1.6 billion (US\$16 million) excluding VAT in additional carbon tax revenue.<sup>167</sup> The government expects to increase the rate further in coming years, in line with the climate action plan to combat climate change and fulfill Iceland's commitments under the Paris Agreement.<sup>168</sup>

## Kazakhstan

Kazakhstan relaunched its ETS on January 1, 2018 after it suspended its ETS on April 8, 2016.<sup>169</sup> During the suspension period, Kazakhstan made several amendments to the ETS reflecting changes to the economy that occurred since the Kazakhstan ETS rules were first designed. In December 2017, the government adopted the National Allocation Plan for the third phase of the system (2018–2020) which reflects these amendments. This includes revision of the sectoral scope; the ETS will apply to the following sectors: electricity, oil and gas, mining, metallurgy, chemicals, cement, lime, gypsum, and bricks.<sup>170</sup>

## Korea, Republic of

As of January 1, 2018, the Korea ETS entered its second phase, which will be in effect until 2020. An emissions cap of 538.5 MtCO<sub>2</sub>e will apply in 2018, which is 0.4 MtCO<sub>2</sub>e less than the previous year.<sup>171</sup> Starting in 2019, auctioning will apply to sub-sectors

that do not meet the criteria for trade intensity and/or additional production costs due to the ETS, with 3 percent of the total volume of allowances from these sub-sectors to be auctioned. Sub-sectors that meet the criteria continue to receive 100 percent free allocation. The Korean government will finalize the list of sub-sectors for auctioning in the National Allocation Plan for the second phase (2018–2020) by June 2018.<sup>172</sup> During the second phase, benchmark-based free allocation will be expanded from three sub-sectors (cement, refinery and aviation) to at most eight sub-sectors. Policymakers have also developed guidelines to allow the use of CERs generated outside Korea for compliance.<sup>173</sup>

## Mexico

On December 12, 2017, the Mexican Lower Chamber of Congress approved amendments to the General Law on Climate Change, establishing the mandate to design and launch an ETS in Mexico.<sup>174</sup> The ETS would operate in a pilot phase for 36 months, followed by a formal start phase planned from 2022 onward.<sup>175</sup> A government-private sector working group launched in 2017 will provide the forum for the design and regulation of Mexico's ETS.

In December 2017, a regulation came into force that sets the rules for the use of emission reduction credits for compliance under the Mexico carbon tax.<sup>176</sup> The regulation allows the use of CERs originating from CDM projects in Mexico as well as CERs that are also eligible for compliance in the EU ETS as means to pay liabilities under the carbon tax.<sup>177</sup>

166 Due to the dynamic approach used to continuously improve data quality using official government sources, the price rate of the Iceland carbon tax was corrected in this year's report. Source: Government of Iceland, *Act Amending Various Laws for the Budget for the Year 2018*, accessed March 9, 2018, <http://www.althingi.is/altext/stjt/2017.096.html>.

167 Source: Government of Iceland, *Bill to the Budget 2018*, December 2017.

168 Source: Ibid.

169 Source: Ministry of Energy of the Republic of Kazakhstan, *Press Release on the Improvement of the Ecological Legislation of the Republic of Kazakhstan*, March 10, 2016, <http://energo.gov.kz/index.php?id=5181>.

170 Source: Republic of Kazakhstan, *Ecological Code of The Republic of Kazakhstan*, accessed March 8, 2018, [https://online.zakon.kz/document/?doc\\_id=30085593#pos=484;-99](https://online.zakon.kz/document/?doc_id=30085593#pos=484;-99).

171 This is a preliminary estimate of the emissions cap in 2018 from the National Allocation Plan published in December 2017; it may change after the National Allocation Plan for the second phase (2018–2020) is finalized in June 2018. Source: Joint Ministries of the Republic of Korea, *The National Allocation Plan for the Second Phase (2018–2020)*, December 2017.

172 Source: The Ministry of Environment of the Republic of Korea, *Establishment of the Auctioning Regulation and Amendment of the Guidelines for External Projects*, March 7, 2018, <http://www.gov.kr/portal/ntnadmNews/1376015?hideurl=N>.

173 Source: Ibid.

174 Source: Mexican Bureau of Federal Legislation, *Reformed, Added, and Repealed Provisions of Climate Change Law*, December 12, 2017.

175 Source: Ministry of Environment and Natural Resources of Mexico, *Mexico's Actions to Establish a Carbon Market*, accessed March 6, 2018, <https://www.gob.mx/semarnat/articulos/acciones-de-mexico-para-establecer-un-mercado-de-carbono?idiom=es>.

176 Source: Official Journal of the Mexican Federation, *General Rules for the Optional Payment of the Special Tax on Production and Services to Fossil Fuels through the Delivery of Carbon Credits*, accessed March 14, 2018, [http://dof.gob.mx/nota\\_detalle.php?codigo=5508098&fecha=18/12/2017](http://dof.gob.mx/nota_detalle.php?codigo=5508098&fecha=18/12/2017).

177 The monetary value of the credit used for payment will be equivalent to the price published at the EEX in Leipzig for the day of the transaction.

## Netherlands

On October 10, 2017, the Dutch government announced its intention to introduce a carbon floor price for electricity generators covered under the EU ETS, including facilities in the power sector and other autogeneration facilities.<sup>178</sup> Under this initiative, if EUA prices are below the carbon floor price, covered facilities will be required to pay for the difference between the two in the form of a tax, in addition to meeting their compliance obligations under the EU ETS.<sup>179</sup> The carbon floor price is envisaged to be €18/tCO<sub>2</sub> (US\$22/tCO<sub>2</sub>) in 2020, rising to €43/tCO<sub>2</sub> (US\$53/tCO<sub>2</sub>) in 2030.<sup>180</sup>

» As of 2018, 51 carbon pricing initiatives have been implemented or are scheduled for implementation. This consists of 25 ETSs, mostly located in subnational jurisdictions, and 26 carbon taxes primarily implemented on a national level. «

## Norway

On January 1, 2018, the full carbon tax rate in Norway increased to NOK500/tCO<sub>2</sub>e (US\$64/tCO<sub>2</sub>e),<sup>181</sup> and most exemptions and reduced carbon tax rates were abolished.<sup>182</sup> Exemptions from the carbon tax are still applicable to some sectors, including agriculture and waste incineration, while a reduced carbon tax rate still applies for fisheries.<sup>183</sup> Government appointed committees are investigating the possibility of introducing a carbon tax on agricultural emissions, increasing the carbon tax rate on fisheries, or alternative measures to reduce GHG emissions in these two sectors.<sup>184</sup> The Government is also considering whether waste incineration should be subject to the EU ETS or a carbon tax.<sup>185</sup>

## Portugal

To decarbonize the Portuguese economy, energy tax exemptions for coal-fired electricity generation and co-generation facilities are gradually being abolished. The intention is to level the playing field between different fuel sources for power generation, as oil and other fuels are already taxed at the full rate. In 2018, these generators face a 10 percent of the full carbon tax rate of €6.9/tCO<sub>2</sub>e (US\$8/tCO<sub>2</sub>e).<sup>186</sup> In 2019, they will face 25 percent of the full rate, and the percentage exemption will continue to be lowered annually by 25 percentage points until these generators face the full tax rate in 2022.<sup>187</sup> Added costs from the increased carbon tax are not to be passed through to consumers. The additional revenue generated will be used to reduce the tariff deficit in the energy sector and for funds relating to sustainability and the environment.

178 Source: Dutch Cabinet Formation, *Coalition Agreement "Confidence in the Future,"* October 10, 2017, <https://www.kabinetsformatie2017.nl/documenten/publicaties/2017/10/10/regeerakkoord-vertrouwen-in-de-toekomst>; Dutch First Chamber of the States General, *Changes to the 2018 Tax Plan*, February 23, 2018.

179 Source: *Ibid.*

180 Source: Central Planning Office of the Netherlands, *Analysis of the Economic and Budgetary Effects of the Financial Attachment of the Coalition Agreement*, October 4, 2017.

181 Source: Ministry of Finance of Norway, *Proposition to the Parliament for the Budget Year 2018*, September 29, 2017.

182 Oforskrift/2017-12-20-2378.

183 Source: Government of Norway, *National Budget 2018*, accessed March 6, 2018, <https://www.regjeringen.no/no/dokumenter/meld.-st.-1-20172018/id2574394/sec3#KAP3-7>.

184 Source: Ministry of Finance of Norway, *Proposition to the Parliament for the Budget Year 2018*, September 29, 2017.

185 Source: Government of Norway, *National Budget 2018*, accessed March 6, 2018, <https://www.regjeringen.no/no/dokumenter/meld.-st.-1-20172018/id2574394/sec3#KAP3-7>.

186 Source: Portuguese Ministry of Environment, *Budget of the State 2018*, November 2017.

187 Source: Government of Portugal, "State Budget for 2018," accessed March 13, 2018, <https://dre.pt/home/-/dre/114425586/details/maximized>.

## Singapore

In 2019, Singapore will implement a carbon tax. For the first five years, the carbon tax rate will be set at S\$5/tCO<sub>2</sub>e (US\$4/tCO<sub>2</sub>e);<sup>188</sup> the government will review the tax rate by 2023, and intends to increase it to S\$10-\$15/tCO<sub>2</sub>e (US\$8/tCO<sub>2</sub>e to US\$11/tCO<sub>2</sub>e) by 2030.<sup>189</sup> The carbon tax will apply to all facilities with annual GHG emissions of 25 ktCO<sub>2</sub>e or more, with no exemptions. With this threshold, between 30 and 40 energy-intensive companies, accounting for around 80 percent of Singapore's emissions, will be directly covered by the carbon tax. The carbon tax revenue will help support initiatives to address climate change. Furthermore, to provide a strong push for energy efficiency and low-carbon projects, the government has indicated it is prepared to spend more than what it will collect in carbon tax revenues in the first five years on incentives to support these measures.<sup>190</sup> In the initial implementation of the carbon tax, companies will not be allowed to use international credits against their carbon tax liability, but Singapore remains open to linking its carbon tax framework to other carbon pricing jurisdictions with high environmental integrity.<sup>191</sup>

## South Africa

The South Africa carbon tax is scheduled to be implemented from January 1, 2019.<sup>192</sup> The government published a second Draft Carbon Tax Bill on December 14, 2017 for public comment and Parliament convened public hearings on the carbon tax in March 2018.<sup>193</sup> The second bill addresses comments from the stakeholder consultation on

the first Draft Carbon Tax Bill held in 2015,<sup>194</sup> but this did not lead to major structural changes. The starting carbon tax rate remains at R120/tCO<sub>2</sub>e (US\$10/tCO<sub>2</sub>e). The increase of the carbon tax rate until 2022 is now stated as the amount of consumer price inflation plus two percent annually. After 2022, only inflationary adjustments are envisioned. A revised bill is expected to be formally tabled in Parliament by mid-2018.<sup>195</sup>

## Spain

From 2017 onward, the full rate of the Spain carbon tax, which only covers fluorinated GHGs (F-gases), applies to all F-gases following the end of temporary rate reductions that were in force after the introduction of the tax in 2014.<sup>196</sup> The full rate is €20/tCO<sub>2</sub>e (US\$25/tCO<sub>2</sub>e).

On a subnational level, the Catalan Law on Climate Change was adopted in August 2017. It aims to implement a carbon tax in 2019,<sup>197</sup> which will apply to GHG emissions from large installations in the power, industry, agriculture and waste sectors, including EU ETS installations. The intended tax rate is €10/tCO<sub>2</sub>e (US\$12/tCO<sub>2</sub>e) in 2019, increasing to €30/tCO<sub>2</sub>e (US\$37/tCO<sub>2</sub>e) in 2025. Income from the tax will go to a Climate Fund to be used for climate change mitigation and adaptation policies. However, the future of this tax is unclear, as parts of the Catalan Law on Climate Change were suspended by the Spanish Constitutional Court and the tax will need further legal framework to be operationalized.<sup>198</sup>

188 Source: Government of Singapore, *Carbon Pricing Act 2018*, March 2, 2018.

189 Source: Government of Singapore, *Budget Speech*, accessed March 6, 2018, [http://www.singaporebudget.gov.sg/budget\\_2018/budgetspeech/pc.aspx#s3](http://www.singaporebudget.gov.sg/budget_2018/budgetspeech/pc.aspx#s3).

190 Source: Ministry of the Environment and Water Resources of Singapore, *Public Consultation Paper for Draft Carbon Pricing Bill*, February 18, 2018, <https://www.reach.gov.sg/participate/public-consultation/ministry-of-the-environment-and-water-resources/energy-and-climate-division/public-consultation-paper-for-draft-carbon-pricing-bill>.

191 Source: *Ibid.*

192 Source: Ministry of Finance of South Africa, *Budget Speech 2018*, February 21, 2018.

193 Source: Ministry of Finance of South Africa, *Draft Carbon Tax Bill*, December 14, 2017.

194 Source: *Ibid.*

195 Source: National Treasury of South Africa, *Release of Carbon Tax Bill for Introduction in Parliament and Public Comment*, December 14, 2017.

196 Source: Tax Agency of Spain, *Annual Report of Tax Collection*, 2016.

197 Source: Government of Catalonia, *Law 16/2017, of August 1, on Climate Change*, August 3, 2017, [http://portaljuridic.gencat.cat/ca/pjur\\_ocults/pjur\\_resultats\\_fitxa/?action=fitxa&documentId=794493&language=ca\\_ES&textWords=llei%2520canvi%2520clim%25C3%25A0tic&mode=single](http://portaljuridic.gencat.cat/ca/pjur_ocults/pjur_resultats_fitxa/?action=fitxa&documentId=794493&language=ca_ES&textWords=llei%2520canvi%2520clim%25C3%25A0tic&mode=single).

198 Source: Government of Catalonia, *General Provisions*, December 4, 2017.

## Sweden

Starting from July 1, 2018, Sweden is introducing an emission reduction obligation scheme for petrol and diesel to promote low blending of biofuels.<sup>199</sup> At the same time, the carbon tax for petrol and diesel with low blending of biofuels will be reduced. The reason for the reduction is that the carbon tax rate will be calculated on the basis of the fossil-based carbon content of the fuel. Fuel distributors and large consumers must lower GHG emissions by blending biofuels into petrol and diesel to reach an emission reduction equivalent to 2.6 percent for petrol and 19.3 percent for diesel in 2018, compared to the full carbon content of petrol and diesel. The government plans to increase this obligation, with the goal of having a 40 percent reduction of emissions from petrol and diesel through biofuel blending by 2030. Fuels with a high biofuel share are outside the scope of the obligation scheme and will remain exempted from the carbon tax.

Since January 1, 2018, previously exempted emissions from combined heat and power plants that are also covered by the EU ETS are being taxed at 11 percent of the full tax rate.<sup>200</sup> The tax level for other heat production covered by the EU ETS also increased from 80 percent to 91 percent of the full rate, while industrial facilities covered by the EU ETS are still entirely exempt from the carbon tax. Furthermore, since January 1, 2018 the carbon tax rate on industrial facilities not covered by the EU ETS became aligned with the general tax rate. Prior to this date, a lower tax rate was applied to these facilities.

## Switzerland

The Switzerland carbon tax increased on January 1, 2018 from CHF84/tCO<sub>2</sub>e (US\$88/tCO<sub>2</sub>e) to CHF96/tCO<sub>2</sub>e (US\$101/tCO<sub>2</sub>e), after a government review found that Switzerland's GHG emissions were higher than the targeted levels for 2016.<sup>201</sup> The Swiss government has put forward a proposal that would further increase the maximum possible carbon tax rate from CHF120/tCO<sub>2</sub>e (US\$126/tCO<sub>2</sub>e) to CHF210/tCO<sub>2</sub>e (US\$221/tCO<sub>2</sub>e) if emission reductions targets are not met.<sup>202</sup> Similar to the current regulation, the proposal also defines intermediate emission reduction targets. This would lead to biannual increases of the tax rate if targets are not met, meaning the new maximum tax rate could be reached at the earliest in 2028.

## Ukraine

Ukraine plans to establish a national ETS in line with its obligations under the Ukraine-EU Association Agreement, which entered into force on September 1, 2017.<sup>203</sup> The Ukrainian government published a climate change action plan in December 2017, which includes plans to develop MRV legislation, and in January 2018 it published a draft MRV legislation to pave the way for a future ETS.<sup>204</sup>

## United States

On August 4, 2017, the US formally communicated to the UNFCCC its intent to withdraw from the Paris Agreement.<sup>205</sup> In October 2017, the US Environmental Protection Agency (EPA) released

199 Source: Government of Sweden, *Proposals to the State Budget for 2018, Financial Plan and Tax Issues*, September 14, 2017.

200 Source: Ibid.

201 The carbon tax revenue is redistributed to the public or funneled into low-carbon funds; it does not feed into the federal budget. Source: Swiss Federal Office for the Environment, *Imposition of the CO<sub>2</sub> Levy on Heating and Process Fuels*, accessed March 7, 2018, <https://www.bafu.admin.ch/bafu/en/home/topics/climate/info-specialists/climate-policy/co2-levy/imposition-of-the-co2-levy-on-thermal-fuels.html>.

202 Source: Swiss Federal Office for the Environment, *Total Revision of the CO<sub>2</sub> Act*, accessed March 8, 2018, <https://www.bafu.admin.ch/bafu/de/home/themen/klima/recht/totalrevision-co2-gesetz.html>.

203 Source: International Carbon Action Partnership, *Emission Trading Worldwide*, 2018.

204 Source: Cabinet of Ministers of Ukraine, *Approval of the Action Plan for Implementation of the Concept for Implementation of the State Policy in the Field of Climate Change for the Period up to 2030*, December 6, 2017, <http://old.kmu.gov.ua/control/uk/cardnpd?docid=250489090>; Source: Cabinet of Ministers of Ukraine, *The Basics of Monitoring, Reporting and Verifying Greenhouse Gas Emissions*, January 9, 2018.

205 Source: US Department of State, *Communication Regarding Intent to Withdraw From Paris Agreement*, August 4, 2017, <https://www.state.gov/r/pa/prs/ps/2017/08/273050.htm>.

a proposed rule to repeal the Clean Power Plan<sup>206</sup> and from December 2017, the EPA began consulting with the public on a potential new rule to limit GHG emissions from existing power plants.<sup>207</sup>

On a subnational level, states, cities, companies, and universities are continuing to develop initiatives to reduce GHG emissions. This includes the expansion of the United States Climate Alliance, which intends to uphold the US NDC pledge under the Paris Agreement. As of April 1, 2018, 16 US states<sup>208</sup> and Puerto Rico have joined the Alliance.<sup>209</sup> Furthermore, on January 31, 2018, nine states announced the formation of the Carbon Costs Coalition, which brings together lawmakers from states to share best practices for strengthening regional momentum and advancing progress on carbon pricing.<sup>210</sup>

In California, the legislature passed Assembly Bill 398 in July 2017, clarifying the role of the state's ETS post-2020. In February 2018, the California Air Resources Board (CARB) released two documents outlining preliminary modifications to reflect the requirements of Assembly Bill 398. Proposed modifications to the ETS include the establishment of a price ceiling, the allowance price containment reserve, free allocation, and the use of offsets.<sup>211</sup> CARB is now seeking feedback from stakeholders through public workshops in 2018–19. A tentative final board hearing, where lawmakers will vote on the modifications, is scheduled for late 2018.<sup>212</sup>

In December 2017, RGGI released the updated 2017 Model Rule,<sup>213</sup> thereby concluding the program review. Amendments to the Model Rule include an updated emissions cap and the establishment of an Emissions Containment Reserve (ECR). In 2021, the emissions cap will be 75 million short tons of CO<sub>2</sub> per year. The cap will decrease annually by approximately 3 percent, resulting in a 30 percent reduction in the cap in 2030 compared to 2020 levels.<sup>214</sup> The ECR will curb any oversupply of allowances from 2021 onward.<sup>215</sup> States participating in RGGI will now start their state-specific processes to bring these changes into effect. New Jersey is set to rejoin RGGI following approval of bills in the Assembly and Senate in February 2018.<sup>216</sup> Additionally, Virginia's Department of Environmental Quality issued a draft regulation<sup>217</sup> to implement an ETS for the power sector and link it to the RGGI. This could increase the number of states participating in the RGGI allowance market to eleven by 2020.

On January 1, 2018, Massachusetts launched its ETS, which directly covers power plants. The ETS is a cap-and-trade system,<sup>218</sup> with a cap that will decline annually by 2.5 percent until emissions reach 1.8 MtCO<sub>2</sub> in 2050. Allowances are freely allocated in 2018, but will be auctioned from 2019 onward. The system acts in parallel to RGGI, meaning power plants in Massachusetts must meet compliance obligations in both systems.<sup>219</sup>

206 Source: US Environmental Protection Agency, *Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, October 16, 2017.

207 Source: US Environmental Protection Agency, *State Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units*, December 28, 2017.

208 California, Colorado, Connecticut, Delaware, Hawaii, Maryland, Massachusetts, Minnesota, New Jersey, New York, North Carolina, Oregon, Rhode Island, Vermont, Virginia, and Washington.

209 Source: US Climate Alliance, *About Us*, accessed March 8, 2018, <https://www.usclimatealliance.org/about-us/>.

210 These states include Connecticut, Maryland, Massachusetts, New Hampshire, New York, Oregon, Rhode Island, Vermont, and Washington. Source: National Caucus of Environmental Legislators, Carbon Costs Coalition, accessed March 8, 2018, <https://www.ncel.net/carbon-costs-coalition/>.

211 Source: California Air Resources Board, *Preliminary Concepts: Price Containment Points, Price Ceiling, and Allowance Pools*, February 2018. California Air Resources Board, *Preliminary Discussion Draft of Potential Changes to the Regulation for the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms*, February 2018.

212 Source: California Air Resources Board, *Cap-and-Trade Regulation Workshop*, October 12, 2017, <http://apps2.leg.wa.gov/bills/bills/BillNumber=6203&Year=2017&BillNumber=6203&Year=2017>.

213 Source: RGGI, *CO<sub>2</sub> Budget Trading Program General Provisions*, December 19, 2017.

214 Source: RGGI, *Maryland, RGGI States to Strengthen Emissions Cap*, August 23, 2017.

215 Source: RGGI, *CO<sub>2</sub> Budget Trading Program General Provisions*, December 19, 2017.

216 Source: New Jersey State Legislature, *An Act Concerning the Reduction of Greenhouse Gas Emissions*, January 30, 2018. New Jersey State Legislature, *Clarifies Intent of P.L.2007, c.340 Regarding NJ's Required Participation in Regional Greenhouse Gas Initiative*, accessed March 8, 2018, <http://www.njleg.state.nj.us/bills/BillView.asp?BillNumber=A1212>.

217 Source: Virginia Regulatory Town Hall, *Reduce and Cap Carbon Dioxide from Fossil Fuel Fired Electric Power Generating Facilities*, accessed March 26, 2018, <http://www.townhall.virginia.gov/L/ViewXML.cfm?textid=12246>.

218 The ETS is intended to ensure that emissions reductions associated with other clean energy programs occur in Massachusetts; it is not intended to provide a significant independent incentive to reduce emissions.

219 Source: Massachusetts State Government, *Electricity Generator Emissions Limits*, accessed March 8, 2018, <https://www.mass.gov/guides/electricity-generator-emissions-limits-310-cmr-774>.

Washington state launched the Clean Air Rule (CAR) in 2017, which establishes a baseline-and-credit ETS initially covering fuel distributors and industrial companies that are not considered to be energy-intensive nor trade-exposed. However, the state suspended compliance requirements under the CAR after a court ruling on December 15, 2017 found that the Department of Ecology did not have the authority to cover suppliers of natural gas and petroleum products under its ETS because they are not direct emitters of GHGs. In 2018, Washington's governor

also tried to introduce a carbon tax in the state<sup>220</sup> following similar initiatives by other lawmakers in the past, but the attempt was unsuccessful.<sup>221</sup>

Elsewhere in the US, carbon pricing bills were introduced for consideration by the Oregon House of Representatives and Senate in January 2018.<sup>222</sup>

Selected changes in regional, national and subnational carbon pricing initiatives are summarized in Box 4.

#### Box 4 / Summary of selected changes in regional, national and subnational carbon pricing initiatives

**Initiatives implemented in 2017:** Alberta (carbon tax), Chile (carbon tax), Colombia (carbon tax), Ontario (ETS) and Washington (CAR).

**Initiatives implemented in 2018:** Massachusetts (ETS).

**New initiatives scheduled for implementation in 2019/20:** Argentina (carbon tax), China (ETS), Singapore (carbon tax), South Africa (carbon tax).

**New initiatives under consideration:** Catalonia (Spain), Côte d'Ivoire, Manitoba (Canada), the Netherlands, Saskatchewan (Canada).

**Initiatives under consideration with new developments:** New Brunswick (Canada), Nova Scotia (Canada), Ukraine.

#### **Scope expansion:**

**2017/2018:** Hubei pilot ETS scope increased to cover all entities in the power and industry sectors with an energy consumption over 10,000 tce in any year from 2014 to 2016. Prior to this change, the ETS covered entities with an energy consumption over 10,000 tce in any year from 2013 to 2015 from seven sectors (petrochemical, chemical, building materials, iron and steel, non-ferrous metal, pulp and paper, and power), as well as industrial entities from other sectors with an energy consumption over 60,000 tce in any year during this period.

220 Bill SB6203 was not passed by the Senate. Source: State of Washington Legislature, *An Act Relating to Reducing Carbon Pollution by Moving to a Clean Energy Economy*, January 10, 2018.

221 Source: New Jersey State Legislature, *Statement to Assembly Number 12*, February 26, 2018; Washington State Legislature, *Reducing Carbon Pollution by Moving to a Clean Energy Economy*, accessed March 8, 2018, <http://apps2.leg.wa.gov/bills/summary?BillNumber=6203&Year=2017&BillNumber=6203&Year=2017>.

222 HB4001 and SB1507. Source: Oregon State Legislature, *Relating to Greenhouse Gas Emissions; Declaring an Emergency*, accessed March 8, 2018, <https://olis.leg.state.or.us/liz/2018R1/Measures/Overview/HB4001>; Oregon State Legislature, *Relating to Greenhouse Gas Emissions; Prescribing an Effective Date*, accessed March 8, 2018, <https://olis.leg.state.or.us/liz/2018R1/Measures/Overview/SB1507>.

**Price rate changes (carbon tax only):**

*2017/2018:* Alberta carbon tax increased from CAN\$20/tCO<sub>2</sub>e (US\$16/tCO<sub>2</sub>e) in 2017 to CAN\$30/tCO<sub>2</sub>e (US\$23/tCO<sub>2</sub>e) in 2018; British Columbia carbon tax increased from CAN\$30/tCO<sub>2</sub>e (US\$23/tCO<sub>2</sub>e) to CAN\$35/tCO<sub>2</sub>e (US\$27/tCO<sub>2</sub>e) on April 1, 2018; Finland carbon tax rate for fossil fuels other than liquid transport fuels rose from €58/tCO<sub>2</sub>e (US\$72/tCO<sub>2</sub>e) to €62/tCO<sub>2</sub>e (US\$77/tCO<sub>2</sub>e) in 2018; France carbon tax increased from €30.5/tCO<sub>2</sub>e (US\$48/tCO<sub>2</sub>e) to €44.6/tCO<sub>2</sub>e (US\$55.3/tCO<sub>2</sub>e) in 2018, Iceland carbon tax increased to approximately ISK3500/tCO<sub>2</sub>e (US\$36/tCO<sub>2</sub>e) in 2018; Switzerland carbon tax increased from CHF84/tCO<sub>2</sub>e (US\$88/tCO<sub>2</sub>e) to CHF96/tCO<sub>2</sub>e (US\$101/tCO<sub>2</sub>e).

*Future developments:* Argentina will tax fuel oil and solid fossil fuels in 2019 at 10 percent of the full tax rate (i.e. the local currency equivalent of US\$10/tCO<sub>2</sub>e), increasing annually by 10 percent to reach 100 percent in 2028; British Columbia carbon tax will continue to increase annually by CAN\$5/tCO<sub>2</sub>e (US\$4/tCO<sub>2</sub>e) until rate is CAN\$50/tCO<sub>2</sub>e (US\$39/tCO<sub>2</sub>e) in 2021; France will increase its carbon tax rate annually by €10.4 (US\$13) to €86.2/tCO<sub>2</sub>e (US\$107/tCO<sub>2</sub>e) in 2022.

**Price/market stabilization mechanisms (ETS only):**

*Future developments:* : The EU is temporarily doubling the yearly withholding rate of surplus allowances into the MSR to 24 percent from 2021 until 2023; RGGI's newly released rules are establishing an ECR which is set to curb oversupply of allowances from 2021 onward; California is proposing the establishment of a price ceiling for the post-2020 phases.

**Offsets:**

*2017/2018:* The Korean government developed rules to allow the use of CERs generated outside Korea for compliance.

*Future developments:* Saskatchewan is considering a baseline-and-credit ETS that allows industrial facilities exceeding the baseline to comply by purchasing approved offsets or engaging in market mechanism under the Paris Agreement.

**Linking and/or cooperation:**

*2017/2018:* California, Ontario and Québec linked their ETSs; China and the EU announced the continuation of their cooperation on emissions trading in October 2017 through the Platform for Policy Dialogue and Cooperation.

*Future developments:* The EU and Switzerland signed an agreement to link their ETSs, paving the way for both parties to prepare for implementation; Canada and China issued a joint statement pledging to intensify their cooperation on climate change and clean energy issues, including carbon markets; New Jersey is set to rejoin RGGI after approval by its Assembly and Senate.

**Initiatives under review**

*2017/2018:* The Australian government is currently consulting the industry sector on potential changes to the ERF Safeguard Mechanism; California proposed modifications to its ETS and is seeking feedback from stakeholders through public workshops.



# 5

## Internal carbon pricing initiatives





## 5

## Internal carbon pricing initiatives

An increasing number of organizations are using internal carbon pricing as a tool to mitigate climate-related financial risks, discover new business opportunities and prepare for the transition to a low-carbon economy. In 2017, over 1,300 companies—including more than 100 Fortune Global 500 companies with collective annual revenues of about US\$7 trillion—disclosed to CDP that they are using an internal price on carbon to inform their decision making, or plan to do so in the next two years, which is an increase of 11 percent compared to 2016.<sup>223</sup> While most companies use internal carbon pricing as a tool to manage potential climate-related risks, some companies also see additional benefits internal carbon pricing provides for improving cooperation within the company, particularly between finance and sustainability departments and senior management.

There is increasing pressure from stakeholders to better understand how companies are using internal carbon pricing. This is primarily driven by the FSB TCFD recommendations, which include the use of scenario analysis for climate-related risks and opportunities.<sup>224</sup> Investors and businesses are encouraged to disclose the parameters

they use in their scenario analysis, including the carbon prices assumed.<sup>225</sup> The Carbon Pricing Corridors initiative<sup>226</sup> aims to support investors and businesses in their scenario analysis by identifying the carbon prices needed to achieve the ambitions of the Paris Agreement from the private-sector perspective. The Corridors Panel expressed that for decarbonization of the power sector by 2050, carbon prices in the range of US\$24–36/tCO<sub>2</sub>e in 2020 and US\$38–100/tCO<sub>2</sub>e by 2035 are needed. In addition, carbon prices of US\$30–50/tCO<sub>2</sub>e in 2020 and US\$50–100/tCO<sub>2</sub>e in 2035 are needed to put the chemical sector on a pathway in line with the Paris Agreement.<sup>227</sup>

To align with the recommendations of the TCFD, for the first time in its annual Climate Change Questionnaire, CDP requests companies to disclose their exposure to regulations that put a price on carbon, and the company's strategy to manage the risks from such regulations, including the use of an internal carbon price.<sup>228</sup> The expanded set of questions related to internal carbon pricing correspond to a new four-dimensional framework for internal carbon pricing best practices developed by Ecofys, The Generation Foundation and CDP.<sup>229</sup>

223 Source: CDP, *Putting a Price on Carbon*, October 2017.

224 Source: FSB TCFD, *Recommendations of the Task Force on Climate-Related Financial Disclosures*, June 2017.

225 Source: FSB TCFD, *The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities*, June 15, 2017.

226 The Carbon Pricing Corridors Initiative is facilitated by CDP on behalf of The We Mean Business Coalition and consists of a panel of utilities and investment leaders from across the G20. In 2018, the panel was expanded to companies in the chemical sector.

227 Source: CDP, *Carbon Pricing Corridors: The Market View 2018*, April 2018, <https://www.cdp.net/en/reports/downloads/3326>.

228 Source: CDP, *CDP Climate Change Questionnaire 2018*, accessed March 10, 2018, <https://guidance.cdp.net/en/guidance?cid=2&ctype=theme&idtype=ThemeID&incchild=1&microsite=0&otype=Questionnaire&tags=TAG-585%2CTAG-594%2CTAG-646%2CTAG-605%2CTAG-599>.

229 Source: Ecofys, The Generation Foundation and CDP, *How-to Guide to Corporate Internal Carbon Pricing*, December 2017.

The framework helps companies shift their thinking beyond the carbon price level dimension to actively consider the GHG emissions covered, the level of influence in decisions and the future development of their internal carbon pricing approach. The framework also helps investors better understand if internal carbon pricing is providing incentives for a company to manage its climate-related financial risks and opportunities. A CDP and CDSB report shows that in 2017, while eight out of ten surveyed companies oversee climate-related risks and opportunities at a board level, only one out of ten have incentives to the board to manage these risks and opportunities.<sup>230</sup> This shows there is still a potential for the use and impact of internal carbon pricing.

Finally, financial institutions are not only paying more attention to the internal carbon pricing approach of companies that they invest in, but they are also increasingly using internal carbon pricing in their own decision-making. Only 25 financial institutions reported using an internal carbon price in 2014; this number has grown to 69 in 2017, with an additional 78 planning to implement it by 2019. While most financial institutions only use internal carbon pricing on the GHG emissions from their energy consumption or business travel, some financial institutions are using internal carbon pricing to assess their investment portfolio, such as the World Bank and the International Finance

Corporation as detailed in Box 5, though this is often limited to specific projects.<sup>231</sup> Particularly, some MDBs are actively sharing lessons on their use of internal carbon pricing via the CPLC's Banking task team.<sup>232</sup>

» Financial institutions are not only paying more attention to the internal carbon pricing approach of companies that they invest in, but they are also increasingly using internal carbon pricing in their own decision-making. «

These MDBs are complemented in their efforts by other initiatives that focus on the reporting of GHG emissions in financial portfolios such as the Portfolio Carbon Initiative<sup>233</sup> and Platform Carbon Accounting Financials.<sup>234</sup>

### Box 5 / Growth of internal carbon pricing usage by Multilateral Development Banks<sup>235</sup>

MDBs have taken a leading role in addressing climate change in their own operations and helping their clients to do the same. A growing number are beginning to use internal carbon pricing to influence their investment decision-making and address climate risks. The following summarizes the current state of play of internal carbon pricing for the MDBs that are actively using a carbon price today:

230 The survey was made around the time of the launch of the final TCFD recommendations in June 2017 and covers disclosure of 1,681 companies.

Source: CDP, *Ready or Not: Are Companies Prepared for the TCFD Recommendations?*, March 2018.

231 Carbon Pricing Leadership Coalition, *Executive Brief: TCFD and Carbon Pricing*, May 2018.

232 Source: Climate Pricing Leadership Coalition, *Managing Climate Risk with Carbon Pricing and Science-Based Targets*, February 19, 2018, <https://www.carbonpricingleadership.org/blogs/2018/2/19/managing-climate-risk-with-carbon-pricing-and-science-based-targets>.

233 Source: GHG Protocol, *Portfolio Carbon Initiative*, accessed March 12, 2018, <http://www.ghgprotocol.org/portfolio-carbon-initiative>.

234 Source: Platform Carbon Accounting Financials, *Developing a Carbon Accounting Methodology for Financed Emissions*, accessed March 12, 2018, <http://carbonaccountingfinancials.com/>.

235 Extracted from: Carbon Pricing Leadership Coalition, *Carbon Pricing Leadership Coalition Leadership Report 2017-2018*, April 19, 2018, Washington, DC.

**Asian Development Bank** incorporates a social cost of carbon as part of the economic analysis of projects in the energy and transport sectors and projects with a GHG emission mitigation focus. In 2016, a carbon price of US\$36.3/tCO<sub>2</sub>e was used, which increases annually by 2 percent in real terms to take the increasing marginal damage of climate change over time into account. The approach identifies and values the net change in emissions resulting from a given project through a 'with and without project' comparison.

**European Bank for Reconstruction and Development (EBRD)** has publicly disclosed its carbon pricing methodology for coal-fired power generation projects. The cost of emissions is factored in as part of the lifetime costs of the coal-fired power generation projects considered, along with other relevant externalities, and used to compare with different feasible alternative projects. The carbon price being applied starts at €35/tCO<sub>2</sub>e (US\$43/tCO<sub>2</sub>e) for 2014 GHG emissions, rising by 2 percent per year in real terms. Since the introduction of the methodology, the EBRD has not financed any coal-fired power projects.

**European Investment Bank (EIB)** began to incorporate environmental externalities, including carbon and local air pollutants, into its economic appraisal of projects in the mid-1990s. The EIB, as part of its wider climate action strategy, has established internal carbon prices to 2050. The central EIB price for carbon emissions in 2018 is €38/tCO<sub>2</sub>e (US\$47/tCO<sub>2</sub>e), increasing annually in real 2016 terms to €121/tCO<sub>2</sub>e (US\$150/tCO<sub>2</sub>e) by 2050. The EIB also uses a low and high carbon price scenario in its sensitivity testing.

**The World Bank** updated its approach in September 2017 to align the carbon prices used with the Paris-compatible prices from the High Level Commission on Carbon Prices. The use of a shadow price of carbon in economic analysis is a corporate commitment for all International Development Association/ International Bank for Reconstruction and Development investment project financing in sectors that are subject to GHG accounting and that have concept notes approved on or after July 1, 2017. When conducting an economic analysis of projects, a low and high price is required, starting at US\$40/tCO<sub>2</sub>e and US\$80/tCO<sub>2</sub>e, respectively, in 2020 and increasing to US\$50/tCO<sub>2</sub>e and \$100/tCO<sub>2</sub>e by 2030. Beyond 2030, the price rises at a rate of 2.25 per cent per year to 2050.

**The International Finance Corporation (IFC)** has operated a carbon pricing pilot since November 2016 using price levels of US\$30/tCO<sub>2</sub>e in 2016, increasing to US\$80/tCO<sub>2</sub>e by 2050. The price is applied to the economic rate of return analysis of project finance investments in the cement, thermal power and chemicals sectors, and is considered as one of several inputs into the investment decision. The price is applied to gross Scope 1 and 2 emissions. The IFC is moving to full implementation in project finance deals in the three sectors listed above, and plans to pilot the application of a carbon price to project finance investments in other sectors with annual emissions above 25 ktCO<sub>2</sub>e.

# Annex I

## Conversion rates

**Table 2 / Currency conversion rates, as of April 1, 2018**

Currency	Symbol	US\$ equivalent
Argentinian Peso	ARS	0.0497
Australian Dollar	A\$	0.7694
British Pound	£	1.4143
Canadian Dollar	CAN\$	0.7751
Chilean Peso	CLP	0.0017
Chinese Yuan	CNY	0.1592
Danish Krona	DKR	0.1664
Euro	€	1.2398
Icelandic Krona	ISK	0.0102
Japanese Yen	JPY	0.0095
Kazakhstan Tenge	KZT	0.0031
Korean Won	KRW	0.0009
Mexican Peso	MXN	0.0547
New Zealand Dollar	NZD	0.7267
Norwegian Krone	NOK	0.1286
Polish Zloty	PLZ	0.2945
Singapore Dollar	S\$	0.7648
South African Rand	R	0.0855
Swedish Krona	SEK	0.1210
Swiss Franc	CHF	1.0511
Ukrainian Hryvnia	UAH	0.0377





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