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# **CARBON PRICING** ASSESSMENT AND DECISION-MAKING: **A GUIDE TO ADOPTING A CARBON PRICE**

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# ACRONYMS

<b>BAU</b>	Business as usual
<b>BB</b>	Building blocks
<b>CDM</b>	Clean Development Mechanism
<b>CER</b>	Certified emissions reduction
<b>CGE</b>	Computable General Equilibrium
<b>CPI</b>	Carbon pricing instrument
<b>CPLC</b>	Carbon Pricing Leadership Coalition
<b>DNP</b>	National Planning Department (Colombia)
<b>EITE</b>	Emissions-intensive, trade-exposed
<b>ETS</b>	Emissions trading system
<b>EU</b>	European Union
<b>FTE</b>	Full-time equivalent
<b>GHG</b>	Greenhouse gas
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit (Germany)
<b>GVA</b>	Gross value added
<b>IAM</b>	Integrated assessment model
<b>ICAP</b>	International Carbon Action Partnership
<b>IEA</b>	International Energy Agency
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MADS</b>	Ministry of Environment and Sustainable Development (Colombia)
<b>MEG4C</b>	Modelo de Equilibrio General Computable de Cambio Climático para Colombia (Colombia)
<b>MINEA</b>	Ministry of Environment and Energy (Costa Rica)
<b>MRV</b>	Monitoring, reporting, and verification
<b>NCCS</b>	National Climate Change Secretariat
<b>NDC</b>	Nationally Determined Contribution
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PMR</b>	Partnership for Market Readiness
<b>PSAM</b>	Price or supply adjustment measure
<b>RGGI</b>	Regional Greenhouse Gas Initiative
<b>tCO<sub>2</sub>e</b>	Metric tons of carbon dioxide equivalent
<b>TOR</b>	Terms of reference
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VCS</b>	Verified Carbon Standard

# INTRODUCTION TO THE GUIDE

**Many countries and subnational jurisdictions are considering putting a price on carbon to help reduce greenhouse gas (GHG) emissions and achieve their climate commitments.** A carbon price applies a direct and explicit cost to GHG emissions, thereby incentivizing behavior change and investment in abatement solutions to reduce emissions.

**There are currently 64 carbon pricing instruments (CPIs) in place or in the process of implementation, with 10 launched in 2019 alone.** These initiatives are spread globally: South Africa became the first African country to price carbon, Singapore was the latest jurisdiction to introduce a carbon tax in Asia, and Mexico's cap and trade pilot system paves the way for emissions trading in Latin America. Carbon pricing is also not limited to national systems. The European Union (EU) has established an emissions trading system (ETS), which is a multinational CPI. Canada's provinces and territories are establishing systems to price carbon pollution, California has been operating an economy-wide cap and trade program since 2012, and New York City is considering emissions trading for the building sector.<sup>1</sup>

**Before a jurisdiction implements a CPI, it will often examine the role a CPI would play and the rationale for adopting it.** Only then can policymakers convince decision-makers and, to the extent possible, obtain the buy-in of stakeholders. Putting forward a convincing case for carbon pricing involves analyzing the existing

policy landscape to determine what role a carbon price can play, identifying the most appropriate carbon pricing options, and understanding their environmental, social, and economic impacts. Typically, this case is then presented to legislators or senior policymakers in a recommendation paper.

**The objective of this guide is to help policymakers build the case for carbon pricing and choose an appropriate CPI.** It begins with a brief introduction to carbon pricing and discusses how a CPI could fit into the broader climate policy mix. It then provides guidance on assessing jurisdictional circumstances and selecting a CPI most suited to meeting jurisdiction-specific objectives. Potential impacts and ways of measuring these impacts are also discussed. Finally, the guide describes how to reach a recommendation on carbon pricing in light of the evidence collected and translate this into a compelling recommendation paper. Developing a communication plan is another key element in the initial preparation stage. However, this component is discussed in more detail in the Partnership for Market Readiness' (PMR) [\*Guide to Communicating Carbon Pricing\*](#).

**This guide does not advise on the detailed technical design of specific CPIs. Instead, it refers readers to other World Bank technical guidance as set out in [Figure 1](#).**<sup>2</sup>

<sup>1</sup> World Bank 2020a.

<sup>2</sup> The technical guidance published by the PMR includes the *Carbon Tax Guide: A Handbook for Policy Makers*, *Emissions Trading in Practice: A Handbook on Design and Implementation*, and the forthcoming *A Guide to Carbon Crediting: Designing and Implementing Domestic Carbon Crediting Mechanisms and Designing Accreditation and Verification Systems: A Guide to Ensuring Credibility for Carbon Pricing Instruments*.

**Figure 1** This guide complements the PMR's other knowledge products



\* As part of the World Bank's Mitigation Action Assessment Protocol (MAAP), the Carbon Pricing Assessment Module (MAAP-CPI) supports the assessment of a government's capacity to implement a CPI by providing a structured checklist of key building blocks based on international best practices. MAAP-CPI provides a framework for scoring each building block, which allows jurisdictions to track progress and adjust areas of focus over time. More information available at <https://maap.worldbank.org/#/homepage>.

### This guide outlines key elements for preparing for carbon pricing, including

- ▶ **Introduction to carbon pricing.** Chapter 1 sets out the rationale for putting an explicit price on carbon and examines the two main options for implementation: ETSs and carbon taxes. It then lays out the various roles carbon pricing can play within a policy mix, and how it can help meet a jurisdiction's broader objectives.
- ▶ **The jurisdictional context.** Chapter 2 outlines the local conditions that policymakers need to consider. This includes a jurisdiction's economic and emission profiles, legal and institutional governance, and the political landscape. The capacity of both regulators and businesses will also need to be factored in, particularly in the early years of carbon pricing.
- ▶ **Impact assessment.** Chapter 3 outlines how to assess the potential impacts of carbon pricing on key stakeholders. It first discusses how to identify the questions to be answered through impact analysis. It then outlines the potential impacts of carbon pricing on businesses, households, and other stakeholders. Economic models can help policymakers understand the nature and scale of these impacts, though modeling also has many limitations.
- ▶ **Reaching a recommendation.** Chapter 4 describes how the work done in the previous sections can be used to make an informed recommendation for carbon pricing implementation, and how this recommendation can then be communicated effectively.

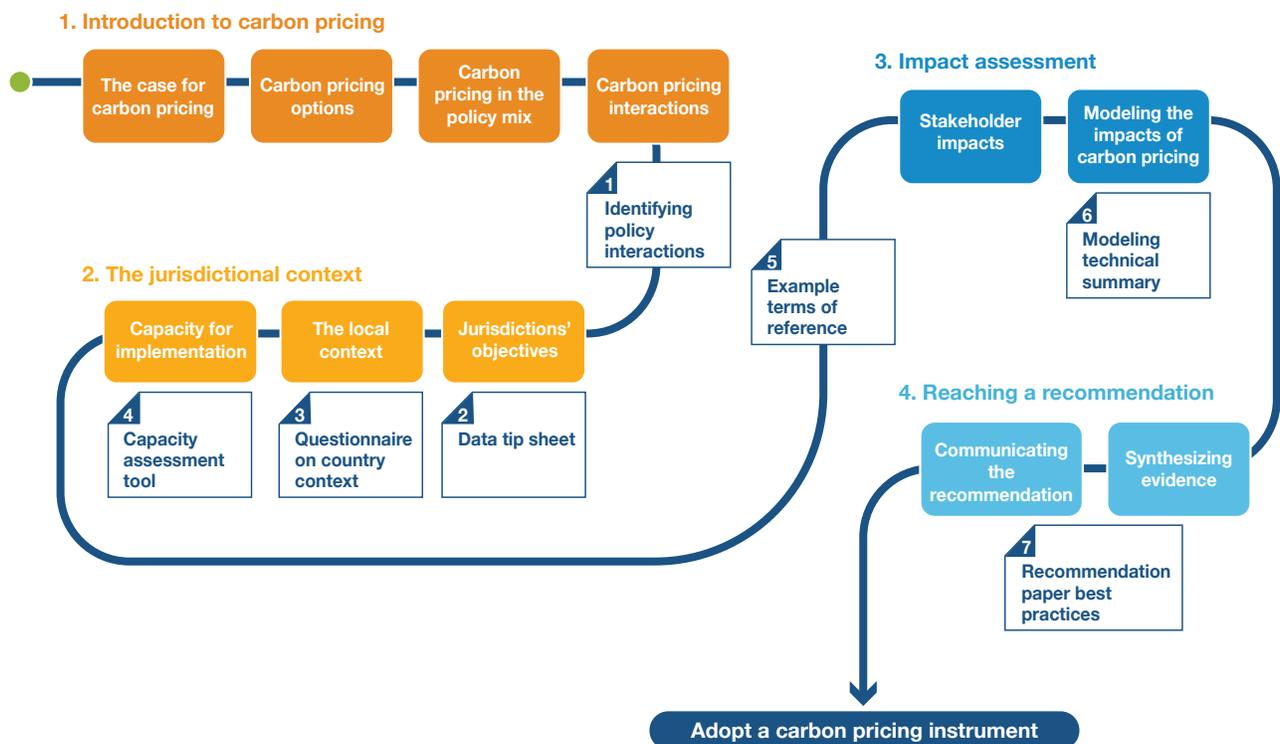
This guide also provides tools to assist policymakers in performing the analyses presented (see Box 1).

### Box 1 Attachments to the guide

- 1. Identifying policy interactions.** Carbon prices interact with the broader policy landscape and are best deployed in a coherent policy package. This attachment provides a rubric for mapping existing or planned policies and their interactions with a carbon price.
- 2. Questionnaire on jurisdiction context.** This provides a list of key questions policymakers should answer to map out the country context. It includes questions on economic and emissions attributes, policy coherence, public acceptance, and implementing institutions.
- 3. Data tip sheet.** The tip sheet identifies the key data required to answer the questionnaire on jurisdiction context and suggests potential sources for collecting these data. This document is to be used alongside the questionnaire on jurisdiction context.
- 4. Capacity assessment tool.** This tool maps broad carbon pricing requirements against key attributes of capacity for both regulators and businesses to assist in identifying an appropriate CPI.
- 5. Modeling technical summary.** This document is an introduction to the modeling process and major types of economic models used in climate policy analysis, covering their main areas of focus, strengths, and limitations.
- 6. Example terms of reference.** This outlines recommended content (along with examples) for a terms of reference for economic modeling services. This should assist jurisdictions in formulating a modeling request that covers the key aspects required to assess the impact of carbon pricing options.
- 7. Recommendation paper best practice.** This attachment provides a structure for developing a brief policy paper summarizing the process of evaluation, the CPI recommended, and how it matches jurisdiction objectives and priorities. It also includes best practices on drafting policy papers.

The links between the sections in the guide and the annex attachments are summarized in [Figure 2](#).

**Figure 2** An overview of the topics and support tools included in this guide



# 1. INTRODUCTION TO CARBON PRICING

## Key takeaways:

- ✓ There are a number of advantages of carbon pricing, from the revenue generation to development benefits and reduced greenhouse gas (GHG) emissions. Carefully considering and communicating these benefits can help policymakers appeal to a wider array of stakeholders.
- ✓ Both carbon taxes and emissions trading systems (ETs) have their advantages and disadvantages; the best instrument is one that meets a jurisdiction's objectives and circumstances.
- ✓ Coverage and the scale of emissions reduced by the carbon pricing instrument (CPI) should be considered at an early stage.
- ✓ Carbon pricing will interact with other climate and energy policies, particularly where there are overlapping or countervailing policies in place.

**Understanding the role of carbon pricing in the policy mix, and the specific ways in which carbon taxes and ETs function, is the first step in providing a suitable recommendation on carbon pricing.** To this end, this chapter is structured as follows:

- ▶ [Section 1.1](#) outlines the case for carbon pricing;
- ▶ [Section 1.2](#) sets out the key instruments used to implement carbon pricing;
- ▶ [Section 1.3](#) examines the roles carbon pricing can play;
- ▶ [Section 1.4](#) introduces the types of policy interactions that can occur when introducing a CPI; and
- ▶ [Section 1.5](#) discusses how to apply lessons from other jurisdictions in your analysis.

## 1.1 THE CASE FOR CARBON PRICING

**Underlying the case for carbon pricing is the need to reduce GHG emissions to mitigate the risks of dangerous climate change.** Climate change is one of the greatest global challenges of our time. It threatens to roll back decades of development progress and puts lives, livelihoods, and economic growth at risk. To stay well below 2°C of global atmospheric warming, the Intergovernmental Panel on Climate Change (IPCC) says the world will need to get to net zero emissions by 2050.<sup>3</sup> Carbon pricing can be an important part of the solution.

**Carbon pricing is any policy that places an explicit price on GHG emissions, such as those emitted from the use of fossil fuels.** When GHG emissions are more expensive, economic actors are incentivized to account for the costs of their emissions when making commercial decisions. Businesses will treat these costs like other costs and aim to reduce them to increase profit margins and/or

gain market share. Over time, these costs are likely to mean that lower-emissions producers gain market share over their higher-emissions competitors. At the same time, consumers are likely to shift toward lower-emissions products due to their relative cost advantage, while consumption of higher-emissions products is likely to be reduced or avoided.

**Putting a price on GHG emissions provides emitters with flexibility in choosing whether to pay for emissions or reduce them, which allows them to minimize their compliance costs.** This contrasts with traditional “command and control” environmental regulation, which stipulates how environmental outcomes are achieved. This means that carbon pricing can incentivize the changes in investment, business planning, production, and consumption patterns needed to transition to a low-carbon economy in a more cost-effective way than command and control regulation. Carbon pricing also brings a range of other potential benefits that may be important to jurisdictions deciding whether to introduce carbon pricing (summarized in [Figure 3](#))—for example, raising revenue or facilitating regional cooperation. A compelling case for carbon pricing emphasizes the multiple environmental, economic, social, and political benefits that carbon pricing can provide, including

- ▶ **Delivers cost-effective mitigation:** Carbon pricing provides an efficient way for jurisdictions to reach their emissions reduction targets. Economic theory shows that carbon pricing, regardless of instrument choice, allows businesses and consumers to reduce their emissions in the most cost-effective way possible.
- ▶ **Incentivizes low carbon growth:** By internalizing the cost of GHG emissions, carbon pricing increases the cost of carbon-intensive technologies, thus providing a financial incentive to invest in climate-friendly technologies. It also provides an incentive for

3 <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>

continuous improvement, helping to drive low-carbon innovation and avoiding stranded assets.

- ▶ **Raises revenue:** Carbon pricing can raise revenues that can be used by governments for a variety of purposes. For example, revenues can be used for environmental projects or low-carbon research and development, directed toward protecting low-income households from increasing energy costs, or shielding energy-intensive and trade-exposed industries from unfair competition from jurisdictions with less ambitious carbon prices. Revenues may also be used to substitute for the reduction of other taxes that reduce economic activity, such as taxes on labor or production. They can also be recycled through the general budget. Policymakers can use carbon pricing revenues to ensure that the low-carbon transition is just and that no one is left behind.<sup>4</sup> Communicating and visibly demonstrating to the public and other stakeholders how the revenue is used can increase the political acceptability of a carbon price.
- ▶ **Generates development benefits:** GHG emissions reduction policies can provide development benefits, such as improved air quality, an increase in employment in low-carbon industries, and technological innovation, as well as improved energy security.<sup>5</sup> These broader carbon pricing benefits can help developing countries meet other policy priorities while addressing climate change.
- ▶ **Regional or international cooperation:** Jurisdictions may use carbon pricing as a means of enhancing political and economic cooperation with regional or international partners. For example, Article 6 of the Paris Agreement establishes a framework for countries (Parties) to voluntarily cooperate to support meeting their Nationally Determined Contribution (NDC) goals. Such cooperation can increase the efficiency of carbon pricing policies by allowing for international trading of mitigation outcomes.<sup>6</sup>

**A carbon price should be one element in a comprehensive policy package to address climate change.** Carbon pricing may not be appropriate in all sectors. In addition, other economic, financial, or behavioral barriers may hinder emissions reductions and low-carbon technology development. For example, consumers may need additional information about the energy cost savings associated with efficiency measures like insulation and lighting changes. While a carbon price can unlock emissions reduction options by providing financial incentives, it needs to operate as part of a broader policy mix that addresses the barriers and hurdles to a low-carbon transition. In particular, other policies in the climate change portfolio and in other relevant sectors

**Figure 3** Key benefits of carbon pricing



(called “companion policies”) are required to overcome nonprice barriers, including lack of information and high initial technology costs, or to reduce emissions in sectors not covered by the carbon price (for more see [Section 1.3](#)).

## 1.2 CARBON PRICING OPTIONS

**CPIs generally take the form of a carbon tax or an ETS.** In some cases, a carbon tax or ETS also allows regulated entities to use “carbon credits” to meet a share of (or “offset”) their compliance requirements, for instance, instead of surrendering allowances under an ETS. The three main instruments (carbon tax, ETS, and crediting mechanism) are defined and summarized in the following subsections. However, it is noted that in practice jurisdictions sometimes adopt design aspects (e.g., price floors or ceilings in an ETS) that reduce the differences between these instruments. Further, in some cases a jurisdiction may have more than one CPI operating at the same time, although this is not common ([Section 1.2.4](#)).

### 1.2.1 Carbon taxes

**Carbon taxes are those that explicitly put a price on GHG emissions—they establish a direct link between the GHG emissions of a product or process and the tax that must be paid on it** (that is, a uniform price per metric ton of carbon dioxide equivalent [tCO<sub>2</sub>e] or per unit of fuel based on its carbon content).<sup>7</sup> This provides a financial

<sup>4</sup> See the Partnership for Market Readiness’ (PMR) *Using Carbon Revenues Report* for a more detailed discussion.

<sup>5</sup> See the PMR’s forthcoming *Development Benefits of Carbon Pricing Guide*.

<sup>6</sup> Article 6 of the Paris Agreement relates to international cooperation on achieving emissions reductions, which might include trading of mitigation outcomes across countries through market-based approaches. At the time of writing, the rules around functioning of this mechanism are yet to be finalized.

<sup>7</sup> World Bank, Ecofys, and Vivid Economics 2016.

incentive for taxpayers to lower their emissions in order to reduce their tax obligations, whether through switching to more efficient practices, choosing cleaner fuels, or, in the case of consumers, changing their lifestyle habits.

**Carbon taxes provide certainty over the price of emissions, but not on the level of emissions and emission reduction delivered.** The government sets the tax rate charged per metric ton of emissions or per unit of carbon in fossil fuel. But the regulator does not have full knowledge about how an emitter will respond to the tax (e.g., the extent an emitter will reduce its emissions to lower its tax liability) and thus it is challenging to know the resulting level of emissions reductions.

**Nevertheless, the price predictability of a tax has advantages and can help with forward planning for both compliance and long-term investment.** It is relatively straightforward for regulated entities to assess their carbon tax costs (and for policymakers to estimate revenue raised by the tax) based on the tax rate and their expected emissions profile. This price certainty is important to regulated entities as it allows them to assess their long-term cost exposure and the value of long-term low-carbon investments. Because policymakers set the tax rate, they also have more control over the strength of the price signal transmitted to regulated entities.

**However, it can be difficult to align the carbon tax level needed to an emissions target as the total emissions reductions driven by a certain carbon price are highly uncertain.**<sup>8</sup> This can pose a challenge for jurisdictions if the primary role of the carbon price is to reduce emissions to a level specified by the jurisdiction's climate commitments (discussed further in [Section 1.1](#)).

**The relative simplicity of a carbon tax makes it an attractive option for jurisdictions with limited administrative capacity or resources available for implementation or that want to introduce carbon pricing quickly.** Carbon taxes are easier to implement than an ETS as they do not require a secondary market and can build on existing tax infrastructure (for example, through an existing fuel excise or tariff system). Additionally, a tax may be simpler for jurisdictions that lack emissions data on which to base an ETS emissions cap. Taxes also have an advantage in countries where there are not enough market participants, which could lead to insufficient liquidity in the secondary market. The capacity requirements for each instrument are discussed in [Section 2.3](#).

Further details on the design of carbon taxes can be found in the PMR's [Carbon Tax Guide](#).<sup>9</sup>

## 1.2.2 Emissions trading systems

**ETSs (also called cap and trade systems) work by placing a quantitative limit (a cap) on the amount of GHG emissions in one or more sectors of the economy.**<sup>10</sup> Regulated entities are required to surrender one allowance for each unit of emissions for which they are responsible.<sup>11</sup> Regulated entities either acquire allowances from auctions, are allocated allowances (e.g., for free from the regulator), or purchase allowances from other regulated entities in a secondary market. The carbon price will vary with changes in allowance supply and demand.

**An ETS provides certainty over the quantity of emissions reduced, but not over the carbon price.** Policymakers set the cap on emissions, and the carbon price will fluctuate depending on market forces aligning allowance supply and demand. However, there are design features that allow policymakers to exercise some degree of control over carbon prices and allowance supply. These include auction reserve prices, price floors, or the levying of additional fees and charges that can help avoid overly low prices or too many allowances in the market. Options used to respond to overly high prices or a scarcity of allowances including cost containment reserves or hard price ceilings. Price or supply adjustment measures (PSAMs) are now in operation in some form in all major operating ETSs. For instance, both California and Québec use price floors and a price ceiling via a price containment reserve, which allocates allowances at successive price thresholds.<sup>12</sup> In 2021, California will shift to using two price containment points, as well as a hard price ceiling. The European Union (EU) ETS uses a Market Stability Reserve to adjust the number of allowances that are auctioned based on the total number of allowances in circulation.

**An ETS provides greater flexibility regarding where and when emissions reductions occur, which can lower mitigation costs.** Secondary market trading enables businesses in high abatement cost sectors to buy allowances from businesses in low abatement cost sectors. The gains from trade are particularly advantageous where covered entities have significantly different abatement costs. An ETS will help ensure emissions reductions occur in the most economically efficient way. If the jurisdiction's ETS is linked with another system, trading can also take place across borders, offering regulated entities access

8 Metcalf 2019 suggests a dynamic and self-adjusting tax rate which could, in theory, be designed to meet emissions reduction targets. However, this has not been implemented in practice.

9 PMR 2017.

10 The remainder of this report uses the term ETS to specifically mean a cap and trade system. However, it should be noted that, in theory, any mechanisms by which participants can trade emissions commitments is an ETS. The most notable is a baseline and crediting system, where firms have either credits or liabilities depending on their performance relative to a baseline function like an ETS — credits are traded between firms to meet any liabilities. However, it is distinct from a cap and trade system because it does not have a set limit or cap on emissions.

11 One allowance typically equates to one metric tonne (1000 kg) of carbon dioxide equivalent, or one short ton (907 kg) of carbon dioxide equivalent in some systems in the US. ,

12 CARB 2019.

to a broader array of mitigation options. Furthermore, the ETS price automatically adjusts with economic activity, reducing in recessions and increasing in booms.<sup>13</sup> This countercyclical behavior leads to lower costs overall. Depending on the design of the ETS, entities may also be allowed to bank surplus allowances for later use, and in some cases, to borrow allowances from future compliance periods. This affords businesses flexibility on when emissions reductions occur, letting them choose the timing of investment according to their needs. Banking can also incentivize earlier emissions reductions because of the expectation of higher carbon prices in the future. However, careful design is needed to ensure these flexibility options do not undermine the environmental integrity of the cap. For example, if significant borrowing allowance from future years is allowed, economic conditions could arise where repayment becomes difficult to enforce. As such borrowing is limited heavily in most systems.

**ETSs can make international cooperation on climate easier.** It helps governments meet international emissions reduction targets with more confidence and opens the possibility of linking carbon pricing systems across jurisdictions (which is facilitated by trading emission

allowances). Linking has a range of benefits, including bolstering international cooperation on climate goals, improving the cost-effectiveness of the linked system, reducing price volatility, and increasing market liquidity.<sup>14</sup>

**However, ETSs are more complex to create and administer than carbon taxes.** An ETS involves additional infrastructure and administrative setup when compared to a tax, especially given the need to create and manage a secondary market for emissions allowances.

Further detail on ETS design can be found in the PMR's *ETS Handbook*.<sup>15</sup>

**A simplified comparison of key features of carbon taxes and ETSs is provided in Table 1.** As the table highlights, while there are some differences between carbon taxes and ETSs, both instruments have relatively flexible design features. As this guide outlines, the extent to which one instrument is preferable to the other will likely depend on the jurisdictional context and policy priorities. Equally, it is unlikely to be the choice of instrument that determines effectiveness, but rather the design choices and trade-offs that are made.

**Table 1** Simplified comparison of ETSs and carbon taxes

Element	Carbon Tax	ETS
<b>Certainty of emissions levels</b>	It is difficult to estimate emissions reductions achieved through a tax in advance, making it hard to align to an emissions target. <sup>16</sup>	An ETS cap provides certainty on an upper limit of emissions, enabling its alignment to a certain policy target (for example, a carbon budget). <sup>17</sup>
<b>Cost-effectiveness</b>	A tax does not provide the economic efficiency gains of trading among entities and across sectors and offers less temporal price flexibility for regulated entities.	An ETS allows for economic efficiency between and within sectors (as a result of trading) and over time. However, market power, lack of liquidity, and excessive volatility in allowance prices can reduce cost-effectiveness.
<b>Timeline of implementation</b>	Carbon taxes can be implemented fairly quickly as they can build on existing tax infrastructure.	Developing an ETS requires the creation of a secondary market in which allowances can be traded, therefore making its creation a longer process.
<b>Ease of administration and scope</b>	While a tax requires a robust monitoring, reporting and verification (MRV) system, it does not require any infrastructure for trading allowances, and the ability to rely on a jurisdiction's existing tax infrastructure makes it easier to implement in a broad range of sectors.	An ETS is more complex to implement because, in addition to the infrastructure required for a tax, it also involves a secondary market for trading allowances. The regulator and regulated entities therefore need to have additional capabilities. This might make it more difficult to include certain sectors in the scope.
<b>Price predictability</b>	The carbon price is set by predefined tax rates. This provides a stable price signal to inform investment decisions.	The carbon price is determined by the market. This automatically adjusts for economic conditions but might lead to price volatility. <sup>18,19</sup>

13 A dynamic price set by market forces will vary with the supply and demand of ETS allowances. Assuming the emissions level corresponds to economic activity, an economic contraction would lead to reduced demand for allowances from regulated entities, and therefore lower prices. Conversely, allowance prices would rise with a growing economy and growing emissions. However, rapid change in demand or supply can cause price volatility. For further information see Vivid Economics 2009.

14 Linking is discussed more fully in the PMR's and International Carbon Action Partnership's (ICAP) *Emissions Trading in Practice: A Handbook on Design and Implementation* and *A Guide to Linking Emissions Trading Systems* 2021.

15 See the PMR's and ICAP's *Emissions Trading in Practice: A Handbook on Design and Implementation* 2021.

16 It can also be difficult to set an economically "optimal" tax rate that suitably prices carbon but does not introduce market distortions. See the World Bank's *Carbon Tax Guide: A Handbook for Policy Makers* for further details.

17 However, PSAMs that permanently remove or add allowances to the cap may alter the emissions reductions achieved.

18 A dynamic price set by market forces will vary with the supply and demand of ETS allowances. Assuming the emissions level corresponds to economic activity, an economic contraction would lead to reduced demand for allowances from regulated entities, and therefore lower prices. Conversely, allowance prices would rise with a growing economy and growing emissions. However, rapid change in demand or supply can cause price volatility.

19 PSAMs can be used to increase price predictability in an ETS.

### 1.2.3 Crediting mechanisms

**A crediting mechanism creates a supply of tradable credits for each unit of verified emissions reduction or removal.** Carbon crediting is an instrument that can be used with a tax or an ETS within the framework of a carbon market. Crediting offers positive incentives for entities to reduce emissions. Under a crediting mechanism, tradable credits are issued for actors who voluntarily implement approved emission reduction or removal activities. These credits can be issued through domestically established crediting mechanisms, through international mechanisms like the Clean Development Mechanism (CDM) developed under the Kyoto Protocol, or through independent mechanisms like the Gold Standard or Verified Carbon Standard (VCS).

**Crediting mechanisms are complementary and need a source of demand for credits to have value.** Unlike carbon taxes or ETSs, crediting mechanisms do not in themselves create a carbon price directly or indirectly. Instead, they complement initiatives that create demand for emissions reducing activities, at either the domestic or the international level. For carbon credits to have value, crediting mechanisms require an external source of demand for the credits. For instance, the EU ETS initially allowed credits from mechanisms like the CDM and Joint Implementation to be used for compliance.<sup>20</sup> In Colombia, domestically sourced credits from a variety of recognized carbon crediting mechanisms, including the CDM, VCS, and Gold Standard, can be used by regulated entities to fully or partially reduce liabilities under Colombia's carbon tax.<sup>21</sup> Ultimately the type of crediting mechanism to allow (or whether to use one at all) is a choice for each jurisdiction. At present, most ETSs and several carbon taxes currently allow credits to be used for compliance; however, those credits need to meet certain qualitative criteria and there are quantitative limits imposed on the number of credits a regulated entity may use.

**Crediting can be used to incentivize mitigation in sectors, activities, or regions where there are barriers to direct coverage under a CPI.** By providing a positive incentive for entities in uncovered sectors to abate emissions, entities with the required capacity and access to cost-effective abatement in uncovered sectors can “opt in.” For example, some abatement opportunities in the agricultural sector have traditionally been difficult to cover

because individual emitters (such as farms) are often too small and too numerous to be effectively regulated and emissions monitoring technologies for farm activities are expensive or highly uncertain. In this way crediting can support low-carbon investment, learning, and engagement while effectively sending a carbon pricing signal. Additionally, crediting offers compliance flexibility to entities covered by a traditional CPI by allowing them to exploit mitigation opportunities in uncovered sectors. Finally, the use of crediting in uncovered sectors can help policymakers understand whether it would be feasible to eventually bring uncovered sectors under a carbon tax or an ETS.

**Crediting mechanisms must also be designed and implemented in a manner that promotes environmental integrity.** Promoting environmental integrity in a crediting system means ensuring that aggregate emissions do not increase as a result of the crediting transactions.<sup>22</sup> This requires consideration of multiple elements, including ensuring that the activity is additional, the emissions abatement is independently verified, there is no double counting of emissions reductions, and the emissions reductions are permanent.<sup>23</sup> In some crediting projects, there is a need to manage the risk of reversal, where carbon dioxide sequestered by a certain activity is later released into the atmosphere (e.g., a forest fire causes the release of sequestered carbon dioxide that had previously been credited). Without additional measures, like buffer reserves, a reversal event may undermine the integrity of the issued credits. The use of crediting can also alter distributional outcomes, as financial flows for low-carbon investment and the broader benefits associated with emissions reductions will also shift to the regions where the credit is issued. Further, the use of crediting in a CPI can reduce emissions reductions from compliance sectors that seek lower-cost reductions elsewhere, such as energy and transport, which may in turn mean that important development benefits are not achieved. The drawbacks of crediting can be allayed by quantitative and qualitative restrictions on the credits that can be used for compliance.<sup>24</sup>

See the PMR's forthcoming [\*A Guide to Developing Domestic Carbon Crediting Mechanisms\*](#) for further details on crediting mechanisms.

20 European Commission 2020.

21 Organisation for Economic Co-operation and Development (OECD) 2019.

22 Schneider and La Hoz Theuer 2019.

23 Schneider and La Hoz Theuer 2019; Broekhoff et al. 2019.

24 See the PMR's and ICAP's *Emissions Trading in Practice: A Handbook on Design and Implementation 2021*, Chapter 8 on offsets.

### 1.2.4 Multiple CPIs

**Jurisdictions will usually select one type of CPI to apply across a range of emissions sources, but some jurisdictions have adopted more than one CPI operating at the same time.** In general, this has occurred when one type of CPI (for instance, a carbon tax) has been implemented, and then the jurisdiction has chosen to introduce another type of CPI (for instance, an ETS) to address specific circumstances. Jurisdictions that have followed this approach include Colombia, the UK, and Mexico. In 2016, Colombia imposed a tax based on the

carbon content of fossil fuels, including kerosene and gasoline. The carbon tax was introduced as part of a broader tax reform. In 2018, the country adopted a climate law<sup>25</sup> that established a legal mandate to develop an ETS. The carbon tax has provided an easy way for domestic actors to familiarize themselves with carbon pricing while the ETS is under development, for instance by enabling improved accounting of emissions for use in setting an ETS cap. [Box 2](#) describes the case of Mexico, where both a carbon tax and an ETS have been used to fit its specific local circumstances.

#### Box 2 Case study: Mexico's dual CPI system

Mexico has had a carbon tax since 2013, and in 2020 began implementing its ETS. The adoption of two CPIs reflects the use of different approaches to achieve different outcomes and contrasting methods for different sectors and sources of emissions.

The General Climate Change Law of April 2012 paved the way for the introduction of carbon pricing, including provisions enabling the introduction of an ETS. However, policymakers saw a political window of opportunity and implemented a carbon tax as part of a broader fiscal reform in 2013. Since its implementation, the tax rate has increased annually with inflation, but it remains at a relatively low price, approximately USD 3/tCO<sub>2</sub>.

In December 2017, regulations allowing the use of credits from the CDM, called certified emissions reductions (CERs), were published. These regulations allow regulated entities to use CERs from Mexican projects approved by the United Nations Framework Convention on Climate Change to satisfy up to 20 percent of their tax obligation.

A National Emissions Registry was also developed and came into operation in 2015. This required companies or facilities with annual emissions over 25,000 tCO<sub>2</sub>e to report their emissions, providing the basis of Mexico's ETS MRV systems.

In 2018, the Mexican government mandated the introduction of an ETS through a reform of the General Climate Change Law.

Mexico's pilot ETS started operating in January 2020 and aims to be fully operational by 2022. The pilot covers direct carbon dioxide emissions from the energy and industry sectors, for facilities that generate at least 100,000 tCO<sub>2</sub> per year. Around 300 entities are covered by the pilot, corresponding to just under 40 percent of national emissions.<sup>26</sup>

These two instruments may have different roles to play within the policy landscape and address emissions from different regulation points. Sequencing them may also be considered. The carbon tax on fuels was an early and easy way to implement an instrument, introduced at a low rate, that allowed regulators, businesses, and households to engage with a carbon price while the capacity for a more complex instrument was built. The ETS let Mexico focus its efforts on the largest emitters in the country. It will also ideally be able to ramp up ambition. An ETS may also facilitate international cooperation with regional partners, including the Western Climate Initiative carbon market (which includes California and Québec) and the Pacific Alliance countries (Mexico alongside Chile, Colombia, and Peru), which have agreed to cooperate on carbon pricing.

**If multiple CPIs are used, it is important to minimize and carefully manage potential overlaps.** Using multiple CPIs together may make it more difficult for regulated entities to achieve emissions reductions in an efficient and cost-effective way. The cost-effectiveness of carbon pricing relies on different entities responding to the same

price signal in a way that enables the identification of the most cost-effective mitigation options in an economy. When sources of emissions face different carbon price incentives, this can reduce the cost-effectiveness of the policy mix.

<sup>25</sup> Colombia, 2018. Law 1931.

<sup>26</sup> More details on Mexico's pilot ETS can be found at ICAP 2020b and Secretariat of Environmental and Natural Resources and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) 2019.

### 1.3 THE ROLE OF CARBON PRICING

**The role of carbon pricing and its importance as part of the broader climate policy mix will vary across jurisdictions.** Some jurisdictions, like New Zealand and British Columbia, use it as a central driver of emissions reductions. Other jurisdictions, like Singapore and California, use carbon pricing more as a safety net to provide further incentives to ensure that emissions reduction targets are met. If other measures, such as emissions standards or direct investment, prove less effective than hoped, the carbon price can be increased (in an ETS this occurs automatically if emissions covered by the cap increase) to incentivize additional emissions

reductions. A carbon price can also provide a source of government revenue, raising funds that could be used to compensate for a removal of other taxes that reduce economic activity, like taxes on labor or production. The revenue can also be used to protect vulnerable consumers or industry from cost impacts or pay for additional emissions reductions in sectors covered by the CPI to drive additional emissions reductions. All these approaches can be appropriate; what is important is that policymakers are clear on the role of carbon pricing before attempting to select and design a CPI. [Box 3](#) provides examples of the varying roles of carbon pricing in different jurisdictions based on their specific policy objectives.

#### Box 3 Case study: The role of carbon pricing in different jurisdictions

The role of an ETS:

- ▶ In New Zealand, carbon pricing is a key driver of mitigation. The country set up an ETS that provides broad sectoral coverage and is now being used as a key tool to meet the country's net zero targets by 2050.
- ▶ The EU ETS is the cornerstone of the EU's emissions reduction policy. To ensure that all sectors of the economy share the burden of emissions reductions, the Effort Sharing Decision establishes binding emissions reduction targets for sectors that are not covered by the EU ETS. In this way, the legislation captures emissions from uncovered sectors, ensuring that overall emissions are constrained across both covered and uncovered sectors.
- ▶ California's ETS operates alongside a range of other policies that seek to drive economy-wide decarbonization. For example, in California the Renewable Portfolio Standard requires that electricity providers source a minimum amount of energy from renewable sources, and the Low-Carbon Fuel Standard provides regulation to ensure that the fuel mix sold for transportation in California aligns with its GHG targets. The ETS largely acts as a backstop to ensure climate targets are met and is a source of revenue to fund other low-carbon and climate resilience activities.

The role of a carbon tax:

- ▶ The carbon tax in British Columbia was introduced as part of broader fiscal reforms, reducing corporate and personal income taxes in favor of an environmental carbon tax. A tax provides greater certainty of revenues, which is important given the province has legal obligations to balance fiscal revenue and expenditure. Revenues are directed to promoting green initiatives, maintaining industrial competitiveness, and improving energy affordability for households and businesses (for instance through the Climate Action Tax Credit).
- ▶ Colombia introduced a carbon tax to discourage the use of fossil fuels and incentivize technological improvements so they can be used more efficiently. The carbon tax also raises revenue for conservation measures and ecosystem protection. A crediting mechanism was then added to stimulate mitigation initiatives for emissions reductions or removals. It also builds capacity in the carbon crediting markets and reduces costs to firms. Building these capabilities has also positioned Colombia well for potential future access to international carbon markets.

**Certain design elements can influence the role of the CPI (or whether carbon pricing is implemented at all) and should be considered early in policy deliberations.**

The detailed design of a CPI is a complex process that generally occurs after the initial decision is made to pursue carbon pricing.

**However, two key design features to consider at an early stage are**

- ▶ **The scope of the CPI**, including the sectors and entities to be covered, the gases to be covered, and the point in the supply chain at which these emissions are regulated; and
- ▶ **The ambition of the CPI**, which refers to the scale of emissions reductions sought, either through the ETS cap and cap trajectory or the carbon tax rate and trajectory.

**These features determine which stakeholders benefit and which will bear the costs imposed by the policy and the extent of those costs, including broader economic impacts.** This information is essential to understanding the political feasibility of a CPI, including the likely supporters and sources of opposition. It also determines the appropriate role for carbon pricing in the climate policy mix. For example, if it is clear early on that some sectors that have high emissions cannot be covered by the carbon price, it is unlikely that the CPI will be the key driver of emissions reductions for that jurisdiction.

### 1.3.1 Scope

**The scope of a CPI refers to the emissions sources that will be regulated.** Policymakers need to consider the sectors, types of GHGs or fuels covered, as well as thresholds for the size of facilities that may be liable. Because it determines which sectors and firms would be subject to the carbon price, the scope is a fundamental consideration when determining whether and how to adopt a carbon price. This also means that policymakers need to ensure those firms have the skills and expertise to comply with the CPI.

**Generally, for an ETS to function well it must have sufficiently broad coverage to include a wide pool of entities that can efficiently participate in trading in the secondary market.** This is important both to ensure a sufficient level of trading for the market to function and to reduce the risk that market players with large amounts of market power will corner the market. Additionally, a broad ETS coverage will likely result in higher gains from trade if the entities covered have significantly different abatement costs. The coverage required to meet this need will differ in jurisdictions with different levels and compositions of emissions. In most cases, an ETS should consider covering emissions from the electricity and industrial sectors. This is due to the large contribution of these sectors to jurisdictions' emission levels, the amount known about abatement costs and options, the ease of identifying sources of emissions, and the fact that most firms in these sectors have sufficient capacity to analyze carbon liabilities and participate in carbon markets.

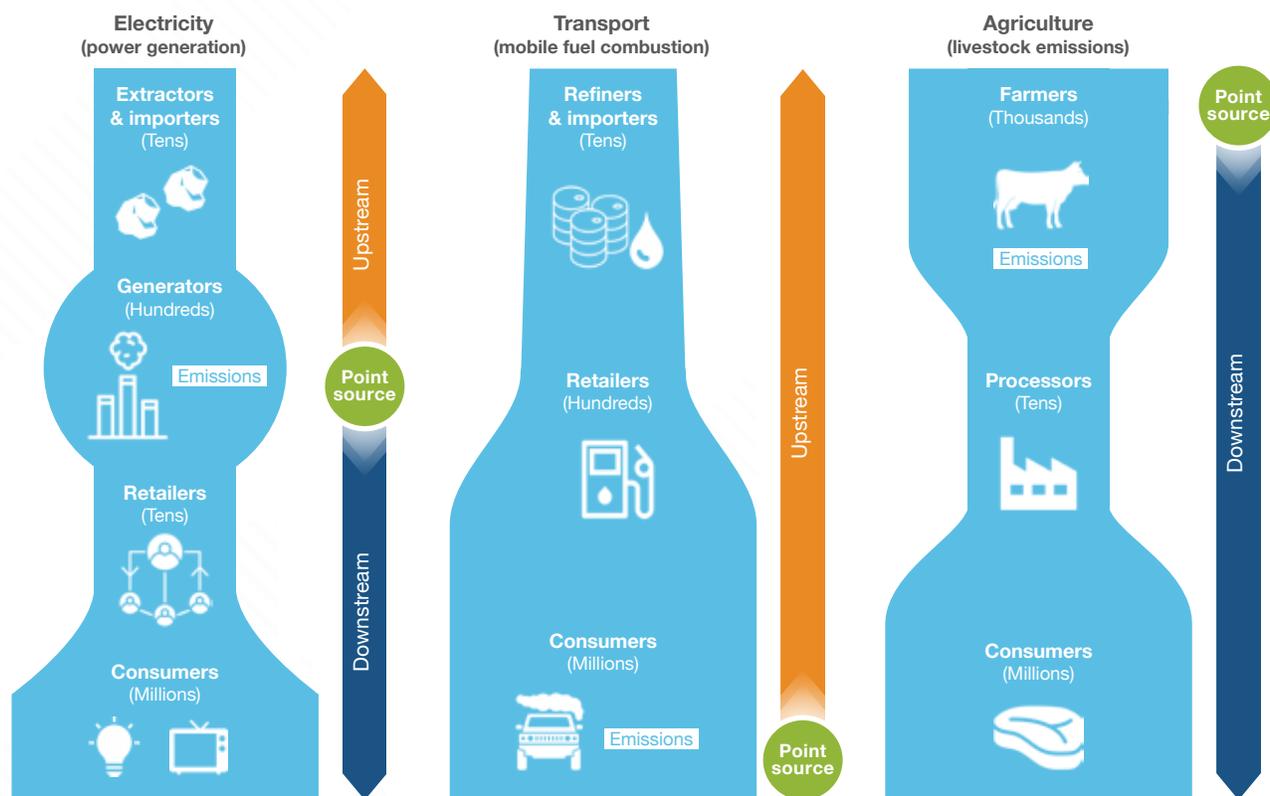
**A carbon tax can operate effectively even with more limited coverage and a smaller pool of covered firms.** As a carbon tax does not require trading, it does not need the infrastructure to oversee a secondary market. Because of this, taxes are often used to cover more concentrated

sources of emissions. For instance, carbon taxes often cover transport fuels by covering the small number of firms that usually distribute fuel and drawing on taxation reporting infrastructure that is used for fuel excise taxation in many jurisdictions.

**The decision on GHG coverage is closely related to sectoral coverage, and in most cases, jurisdictions opt to cover the largest sources of emissions initially, and most tend to increase this coverage over time.** In some cases, it may not be practical to cover all gases, for instance, due to limited MRV capabilities, high uncertainty in quantification, and/or high costs of measurement. All CPIs currently cover carbon dioxide, which is the most prevalent type of GHG in most jurisdictions. However, in some jurisdictions other gases such as methane and nitrous oxide (for example from industrial processes, fossil fuel extraction, landfills, and agriculture) may form a large part of a jurisdiction's emissions profile, especially in developing countries and economies with large agricultural sectors.

**Emissions can be regulated at different points in the supply chain.** This determines which firms have compliance liabilities, and the number of entities covered by the CPI. Liabilities are incurred either at the point source, where emissions are physically released into the atmosphere; before the point source (upstream); or after the point source (downstream), as illustrated in [Figure 4](#). For example, in the California Cap-and-Trade Program, the point of regulation for transport fuels is upstream, at the point they enter commerce. In practice, the point of regulation is at terminal racks and large refineries, where transportation fuels are physically transferred. The owners of these facilities pass the costs reflecting the embedded carbon dioxide through to the consumer in the form of higher fuel product prices. The Tokyo-Saitama ETS covers emissions from electricity used in buildings, which is downstream of the source of emissions. Both ETSs and carbon taxes can be applied at various points in a supply chain, and different sectors under the same CPI may also have differing points of regulation. However, these choices will influence the administrative costs and MRV needed for implementation. As discussed above, the number of entities and variety of sectors covered will also affect liquidity of the secondary market for an ETS.

**Figure 4** Emissions can be regulated at the point source of emissions, upstream or downstream



Source: *Emissions Trading in Practice: A Handbook on Design and Implementation 2021*.

### 1.3.2 Ambition

The ambition of the cap or tax is important for determining the role the CPI will play in achieving a jurisdiction's emissions reduction target and the impact it will have on stakeholders. The ambition of the CPI will determine the strength of the abatement incentive. A tighter ETS cap, and one that increases in stringency over time, will result in higher prices and increased investment in low-carbon technology, and therefore incentivize more abatement. The same applies for a higher, increasing tax rate under a carbon tax.<sup>27</sup>

Importantly, more ambitious climate policies are likely to have greater impacts on stakeholders, as discussed further in Chapter 3. Through its impact on stakeholders, therefore, the level of ambition — how much of the emission reduction target it would achieve, for example — is an important consideration in the decision to adopt a CPI. It will also influence design choices that aim to ameliorate any adverse impacts.

## 1.4 CARBON PRICING INTERACTIONS

Carbon pricing operates within a broader policy landscape; its role and interactions with other policies has implications for choosing a CPI. Developing a clear understanding of these dimensions is a key step in moving through the design process. Changes in the broader policy context also mean that the CPI design should be regularly reviewed and improved to account for changing interactions.

Carbon pricing is just one tool within a wider policy toolbox and should form part of a broader suite of policies. Carbon pricing creates financial incentives to reduce GHG emissions. However, it may not be able to address nonprice barriers to mitigation, or to overcome barriers such as the initial high cost of new mitigation technologies. For instance, some clean technologies, like battery storage for renewable electricity, may initially be expensive because they have not been deployed at a scale that would reduce their cost. Therefore, synergies should be explored with other instruments, such as dedicated technology funds, low-carbon technology mandates, or R&D support, to reduce technology costs. A variety of

<sup>27</sup> PSAMs reduce or increase supply in the ETS when market outcomes fall outside preferred parameters, for instance if prices are too high or too low. An auction reserve price is an example of a PSAM.

enabling policies are required to establish standards, mitigate risks, and create the right market conditions for wide-scale low-carbon technology deployment, regardless of CPI choice.

**CPIs operate within a complex policy landscape, and interactions with other policies may affect how the tax or ETS will function.** Other policies can affect the operation of the CPI, including the level of emissions reductions; the carbon price; and the distributional impacts on businesses, households, and other stakeholders. The types of interactions fall into three categories. Complementary policies can help improve the effectiveness of the CPI, as overlapping policies duplicate incentives provided by the CPI and countervailing policies contradict the incentives provided by the CPI.<sup>28</sup> It is therefore important for policymakers to identify the various policies that may interact with the CPI and assess what effects they might have. Similarly, after a CPI is in place, policymakers should carefully consider the introduction of new policies — assessing the objectives of new policies and how they may impact on the effectiveness of the CPI. A carbon price should operate alongside complementary policies that support decarbonization, while overlapping and countervailing policies should be consolidated, revised, or (where possible and appropriate) removed, noting that these policies may be focused on achieving a range of other policy objectives. Figure 5 summarizes these interactions and provides examples of companion policies in each category.

**The policy interactions attachment (See Attachment 1) identifies key policy interactions and helps guide policymakers through the types of policy interactions and their effect on the CPI.**

#### Box 4 Policy interactions attachment

Attachment 1 is designed to help policymakers assess the interactions between carbon pricing and related climate and energy policies. It presents a table of policies categorized by how these policies may interact with the CPI (complementary, overlapping, or countervailing). This table provides a template for identifying relevant policies and a worked example to guide these considerations regarding policy interactions.

**Figure 5** The impact of policy interactions on carbon price

	Examples	Likely impact on allowance demand and carbon price in an ETS
<b>Complementary</b> improve functioning of carbon markets	<ul style="list-style-type: none"> <li>energy market reform (e.g. facilitating cost pass-through)</li> <li>infrastructure upgrades</li> <li>energy efficiency labeling</li> <li>pollution/emissions measurement</li> </ul>	↓
<b>Overlapping</b> duplicate incentives in carbon markets	<ul style="list-style-type: none"> <li>feed in tariffs</li> <li>green certificate programs, such as renewable energy targets</li> </ul>	↓
<b>Countervailing</b> oppose incentives in carbon markets	<ul style="list-style-type: none"> <li>fossil fuel subsidies</li> <li>industry tax breaks and special treatment</li> </ul>	↑

Source: *Emissions Trading in Practice: A Handbook on Design and Implementation* 2021.

**The impact of companion policies should be considered when selecting and designing a CPI, to enable these policies to provide mutual support and improved outcomes.** Successful carbon pricing policies exist alongside measures that support deeper emissions reductions over time. Complementary policies are typically associated with energy and electricity reform to ensure energy markets are competitive, providing physical and institutional infrastructure for consumers to respond to prices, innovation policies, and behavioral incentives. For instance, electricity market reforms to ensure customers are free to choose their electricity supplier; there is unbundling of supply, generation, and networks ensuring competition in wholesale and retail markets; power plants are dispatched based on their economic merit; and independent regulators are assigned to monitor the market. Similarly, land tenure reforms that provide formal property rights can complement pricing land sector sequestration because it helps landholders access finance more easily. Providing electric vehicle charging infrastructure can accelerate demand-side responses to carbon pricing in the transport sector. Rolling out smart meters can raise awareness of energy use and prompt consumers to change their usage behavior. Other reforms may have a less direct but still important effect; for instance, reforms to support an appropriately regulated financial sector can improve the operation of secondary markets for emissions allowances or credits.

**Overlapping policies should be considered when designing a CPI and consolidated where possible.**

Overlapping policies like green certificate programs, subsidies to low-carbon projects, or fuel taxes can duplicate the effect of a CPI in the short term but might be in place to address other barriers to emissions reductions or to achieve other objectives. For example, policymakers might want to encourage specific mitigation options to lower their long-term costs or achieve other strategic objectives such as improved air quality or security of energy supply. Overlapping policies should be consolidated, revised, or removed where appropriate, and the design of the CPI should consider those that remain in place (for example, through targeting coverage to those sectors not covered by other policies). This approach can improve the effectiveness of the overall policy mix while still attaining other objectives of interest. Further, attempts should be made to adjust existing policies (where possible and appropriate) to better reflect or be more compatible with carbon pricing.<sup>29</sup>

**In general, jurisdictions should try to avoid countervailing policies (such as fossil fuel subsidies) that undermine carbon market incentives.** However, this too requires careful analyses, as these policies may achieve other objectives that may be of value to a jurisdiction. For example, they might support strategic economic sectors, lower-income groups, or disadvantaged geographic regions. Importantly, jurisdictions should consider the existing policy landscape when introducing a CPI. Indeed, it will be easier to coordinate and harmonize a CPI with policies under consideration. At the same time, it can be more challenging to introduce a CPI in a policy environment that consists of several mature policies, some of which may run contrary to the objective of the CPI, as these policies are entrenched and vested interests may resist them. They will also affect the performance of the carbon price. For example, the investment incentives provided by a carbon price could be undermined if it is operating alongside fossil fuel subsidies. Moreover, policymakers might consider formulating CPI design elements (such as providing income support through revenue raised) to benefit these same groups without the negative consequences of the countervailing policy. For example, revenue from a carbon tax could be targeted to support disadvantaged groups that may be negatively affected by the removal or phaseout of fossil fuel subsidies.

## 1.5 LEARNING FROM OTHER JURISDICTIONS

**Existing international experience can provide important information on the options available and common challenges in the selection, design, and implementation of CPIs.** The experience of existing CPIs can also strengthen the case for pursuing carbon pricing or adopting a given CPI. For example, it can provide jurisdictions' experiences on the mitigation and cost impacts of CPIs, government finance and distributional impacts, competitiveness effects, and wider benefits. Real-world examples of the effects of a CPI and the results it has delivered can be complemented by locally focused quantitative and qualitative research.

**A cautious approach must be taken when assessing international experience, given the different contexts in which CPIs are operating.** Jurisdictional context can have a large impact on the likely operation of a CPI (discussed in more detail in [Chapter 2](#)). These local factors need to be considered when comparing against international experience. For instance, the way markets operate in very large jurisdictions like the EU or China may be very different to how they operate in smaller jurisdictions like New Zealand or South Korea. Similarly, the distributional impacts of a carbon tax in a developing country like Colombia may be different to the impacts in a developed country like Sweden. This means that the relevance of the examples for a given jurisdiction could differ substantially given its size, level of development, and an array of other factors.

**By identifying case studies, a practical set of evidence regarding CPI design and operation can be assembled.** Key aspects to look for to ensure comparability and direct applicability of case studies include

- ▶ **CPI type, design, and role:** Does the CPI cover similar or different sectors? What is its level of ambition and what role does it play in the policy mix? Is it an ETS or a carbon tax, and does it have a crediting mechanism?
- ▶ **Jurisdictional context:** Are the jurisdictions comparable in terms of emission, economic, institutional, or other factors? Are these neighboring jurisdictions or close trading partners?
- ▶ **Policy context:** How does the jurisdiction compare in terms of climate, energy, and other policies that may be relevant for how a CPI works?

**Detailed case studies can also be found in World Bank resources and guidebooks.** This includes the *State and Trends of Carbon Pricing* series,<sup>30</sup> *Emissions Trading in Practice: A Handbook on Design and Implementation*, *Carbon Tax Guide*, *A Guide to Developing Domestic Carbon Crediting Mechanisms*, and specific guides on a range of

29 OECD 2019b.

30 World Bank 2020a.

topics including carbon pricing benefits, competitiveness, and carbon leakage.<sup>31</sup> Insights into jurisdictions' experiences can also often be drawn from reports published by regulators and ministries on the performance of CPIs already implemented. Briefs and events put on by the World Bank Carbon Pricing Leadership Coalition (CPLC) can also be rich sources of information.

**In addition to public sources of evidence, capacity-building programs and direct engagement with these jurisdictions can provide valuable information.** Bodies like the PMR, CPLC, Finance Ministers' Coalition for Climate Action, and ICAP provide unique fora to bring together policymakers from the early to more advanced stages of carbon pricing. There have also been expansive bilateral cooperative engagements across jurisdictions that policymakers can build on, including the EU-China ETS cooperation,<sup>32</sup> the German GIZ's Global Carbon Market 2018–2021 project,<sup>33</sup> or the support of state and provincial governments of California and Québec in the ETS pilot program implementation.<sup>34</sup> This not only can provide a source of evidence regarding experience in different jurisdictions but also enables policymakers with direct experience in dealing with these issues to share best practices and ideas for addressing novel or emergent challenges.

**Further, jurisdictions can build on other relevant domestic and international policy experience when considering CPIs' impacts.** For instance, policies that have looked at reforming and/or raising energy taxes, as well as those reforming fossil fuel subsidies, are likely to have analogous impacts to introducing a CPI. Thus, jurisdictions can build on a large amount of existing evidence that has looked at the impacts of energy taxes, ranging from their distributional impacts<sup>35</sup> to revenue

raising and wider economic impacts.<sup>36</sup> Similarly, they can consider if other domestic or international policies or outcomes bring insights on the likely impacts of a CPI, such as trade policies and exchange rate movements that can affect the international competitiveness of trade-exposed industries and provide a benchmark against which to assess carbon pricing impacts. Existing carbon prices will provide frameworks, tools, and access to third-party vendors and experts that can reduce the time to set up these functionalities. Building on the structures established in existing markets in other areas, like commodities, can also reduce start-up costs.

## 1.6 FURTHER GUIDANCE

The following resources may provide useful introductions to key carbon pricing concepts:

- ▶ PMR (Partnership for Market Readiness). 2017. *Carbon Tax Guide: A Handbook for Policy Makers*.
- ▶ World Bank. 2019. *Using Carbon Revenues* (Technical note No. 16).
- ▶ World Bank. 2020. *State and Trends of Carbon Pricing 2020*.
- ▶ PMR (Partnership for Market Readiness), and ICAP (International Carbon Action Partnership). 2021. *Emissions Trading in Practice: A Handbook on Design and Implementation*. Washington, DC.
- ▶ PMR (Partnership for Market Readiness). 2021. *A Guide to Developing Domestic Carbon Crediting Mechanisms*.
- ▶ PMR (Partnership for Market Readiness). Forthcoming. *The Development Benefits of Carbon Pricing*.

31 See the PMR's *Carbon Leakage: Theory, Evidence and Policy Design* 2015.

32 EU-China Emissions Trading System 2020.

33 GIZ 2019.

34 Climate Scorecard 2020.

35 Pizer and Sexton 2019.

36 OECD 2019a.

## 2. THE JURISDICTIONAL CONTEXT

### Key takeaways:

- ✓ A carbon pricing policy is most effective when it takes into account the local context.
- ✓ Assessing the local context includes developing an understanding of the environmental, economic, governance, and political contexts, as well as the capacity of institutions to implement and regulate the carbon pricing instrument (CPI).
- ✓ A jurisdiction's objectives should guide the selection process, but different objectives may compete against each other. Policymakers should choose an evolutionary approach to CPI design that accommodates both short- and long-term objectives.

**Grounding a carbon pricing recommendation in the local context leads to targeted and more compelling advice.** Considering the local context shifts carbon pricing from a theoretical option to a policy recommendation calibrated to address jurisdictional challenges and priorities.

**Mapping CPI options against the jurisdiction's objectives, context, and capacity of key actors helps policymakers identify the parameters for a practical and desirable CPI choice.** The jurisdiction's objectives will influence what role the CPI plays in the policy mix, as well as which instrument is most effective in achieving those objectives. But the extent to which this plays out in reality depends on the jurisdiction's environmental, economic, political, and governance landscapes. Finally, considering the capacity of specific actors in the government and private sector is necessary to understand the practicality of different options and identify capacity-building needs.

### This chapter is structured as follows:

- ▶ [Section 2.1](#) discusses how to align a recommendation on carbon pricing with a jurisdiction's objectives;
- ▶ [Section 2.2](#) outlines how to map the jurisdictional context, including the emissions profile, economic profile, governance landscape, and political context; and
- ▶ [Section 2.3](#) sets out an approach to assess a jurisdiction's capacity for implementing a carbon price and how that influences instrument choice.

### 2.1 JURISDICTIONS' OBJECTIVES

**There are several types of benefits that may be of greater or lesser importance to jurisdictions and the relative priority of these objectives can determine whether a carbon tax or emissions trading system (ETS) might be preferred.** There may also be competing or contradictory demands in achieving multiple objectives

and policymakers will have to consider and think through these trade-offs. Throughout, policymakers should consider the environmental integrity of CPIs. A relatively ambitious tax could deliver more emissions reductions than an ETS with a loose cap, even if a jurisdiction's objectives point toward an ETS. The environmental integrity will be contingent on local factors like enforceability (see [Section 2.3](#)) and the political context (see [Section 2.2](#)).

**Achieving emissions targets cost-effectively is a primary focus of jurisdictions when implementing a carbon price.** Carbon pricing allows for the least-cost mitigation options to be found and implemented across sectors and so both taxes and ETSs are considered cost-effective policy instruments. An ETS has the additional benefit of minimizing costs across time through its countercyclical price response, which means it has greater temporal flexibility when compared to a tax. However, an ETS may have additional administrative costs relative to a carbon tax. If carbon pricing is the primary means for a jurisdiction to achieve its emissions reduction targets, policymakers may prefer the use of an ETS (which has an emissions cap) instead of a carbon tax. This can guarantee that the jurisdiction limits emissions to a predefined level.

**Carbon pricing can benefit low-carbon investment, raise revenue, and deliver broader environmental and development benefits.** Low-carbon investment is mobilized through transparent, predictable, and increasing prices. Carbon taxes can give policymakers direct control over the carbon price, thus allowing them to choose the strength of the price signal. Policymakers also control the strength of the price signal in an ETS, but this is done indirectly by adjusting the quantity of allowances in the market or using measures to constrain low or high prices.<sup>37</sup> Both carbon taxes and ETSs can raise revenue, but taxes may offer a more predictable source of revenue. Further, broader fiscal reform or tax shifting may open a political space for a carbon tax to be enacted. Both ETSs and

<sup>37</sup> These options are discussed further in the Partnership for Market Readiness' (PMR) and International Carbon Action Partnership's (ICAP) *Emissions Trading in Practice: A Handbook on Design and Implementation* 2021.

taxes can deliver local benefits like improvements in air and water quality. However, policymakers concerned with maximizing these benefits might want to limit the use of international offset credits or allowances from linked ETSs, which may result in some of these benefits shifting abroad.

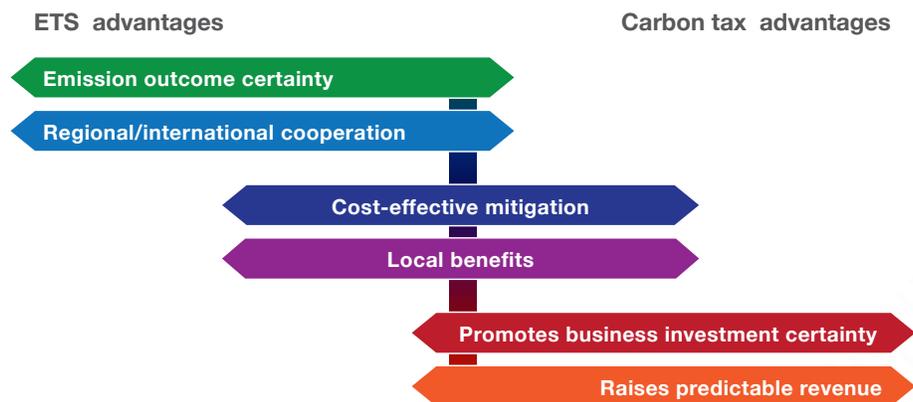
**Jurisdictions may look to galvanize regional or international cooperation through their carbon price.** Thus far, jurisdictions have achieved this international cooperation via linking ETSs and through crediting mechanisms. It is easier for policymakers from different jurisdictions to agree on a cap to emissions rather than a price level, making an ETS preferable for regional and international cooperation. Further tradable allowances and credits enable businesses to trade, providing a bottom-up channel for cooperation.

**Overall, both a carbon tax and an ETS can be effective tools for achieving a wide range of objectives, yet each has specific areas in which they may outperform the other.** Figure 6 shows objectives that jurisdictions may look to pursue and an indication of what CPI may best meet that objective.

**In some cases, the objectives of a jurisdiction will lead to a clear CPI preference.** For instance, the Regional Greenhouse Gas Initiative (RGGI) in the northeastern United States enabled linking across states. Additionally, an ETS was a known and tested option for these states, going back to their participation in the allowance trading program under the federal Acid Rain Program that had been established in 1990. This also means that individual RGGI jurisdictions do not have to agree on a price, as the market sets the price in an ETS. Conversely, Mexico's carbon tax was introduced in the context of a broader fiscal and taxation reform, with the more predictable nature of revenue from a carbon tax making it the obvious choice for introduction.

**Jurisdictions do not always have clear-cut objectives that align with a CPI choice.** For instance, many jurisdictions look for certainty in their emissions level, which is best achieved through an ETS. However, many also wish to generate a reliable source of revenue, which is best done through a carbon tax. Policymakers must decide what is more important on balance and design the instrument to accommodate conflicting objectives as much as possible, which is discussed in [Section 4.1.3](#).

**Figure 6** Considering objectives and potential preference for ETS or carbon tax



**These objectives may also point to different instruments in the short and long runs.** Short-run objectives like the ease of planning and implementing the instrument often skew toward a tax. Conversely, long-run objectives like achieving emissions targets or cooperating with other jurisdictions are better achieved through an ETS. [Section 2.1](#) provides more detail on balancing these objectives and the potential evolution of the instrument over time.

**To determine the role that a CPI can play, it is important to consider the perspectives of stakeholders from an early stage.** Stakeholders affected by CPIs represent a wide array of interests and include businesses, households, government, and civil society groups. Typical concerns are the environmental effects of the CPI; its impact on the competitiveness of industry; and the flow-on effects on low-income households, affected workers, or other disadvantaged groups. These channels are discussed further in [Chapter 3](#). However, stakeholders will often have views and may seek to provide input on the form of a CPI, its level of ambition, and its scope. As such, engaging stakeholders early in the process is essential to making an informed decision and building support.

## 2.2 THE LOCAL CONTEXT

**The effectiveness of a CPI varies with jurisdictional context — there is no “one-size-fits-all” approach.** There are a wide range of variables that can be relevant for the choice and operation of a CPI. Some factors may be more important or influential in the overall direction of design of a jurisdiction's carbon pricing approach. Some factors, like administrative capacity, may be overcome with targeted capacity-building programs and tools.

Figure 7 Aspects of jurisdictional context



The following subsections lay out the key aspects of jurisdictional context that should be assessed. Specifically, they discuss the environmental context, economic profile, governance landscape, and political considerations that should be considered. These are summarized in [Figure 7](#).

To better focus their work, the questionnaire attachment (see [Box 5](#)) sets out the key questions policymakers should answer about the local context.

#### Box 5 Questionnaire on jurisdictional context

This questionnaire (see [Attachment 2](#)) helps policymakers build a structured understanding of their jurisdictional context and how it feeds into decision-making. It outlines potential areas of focus alongside a brief description of why they matter for the decision to adopt a CPI and which instrument to select. Policymakers should consider each of these questions before selecting an instrument. This questionnaire only provides a general guide, however, so there may be other questions that a policymaker will need to consider to better understand their local context.

#### Policymakers can assess jurisdictional context through a range of sources, including a review of data sets and extensive stakeholder engagement.

National statistics agencies and international institutions often produce data on relevant economic and emissions indicators (see [Box 6](#)) and are often the first place to look. Where the data needed does not exist, policymakers should consider how it may be collected or proxied. Quantitative data must be overlaid and augmented with qualitative information on stakeholder perceptions and concerns about carbon pricing (see [Section 3.1.4](#)).

#### Box 6 Data tip sheet

Included with this guide is an attachment (see [Attachment 3](#)) that introduces potential sources of data that policymakers may need throughout the selection process. These are categorized by topics of interest and are meant to provide a starting point for the data collection process. This list is not exhaustive and should be supplemented with local knowledge and expertise.

### 2.2.1 Environmental context

The key objective of a carbon price is environmental; it aims to mitigate the adverse effects of climate change by incentivizing emissions reductions. It is therefore essential to understand a jurisdiction's environmental context. Most important for a carbon price are the emissions profile and a jurisdiction's specific emissions reduction targets. Nonetheless, broader environmental objectives can be influential in determining the design and operation of a CPI. These topics are discussed in turn below.

#### (1) Emissions profile

Assessing the emissions profile of the jurisdiction allows policymakers to understand the level and sources of emissions and develop targeted policy solutions. The emissions profile plays a crucial role in determining the role of carbon pricing within the broader policy mix, the scope, and selecting an appropriate CPI. Once policymakers know where emissions are coming from — and how they are expected to grow over the next years — they can figure out where a carbon price can fit in to help reduce emissions. For example, other sector-specific regulations may be preferable to a CPI if nonprice barriers to mitigation are most important for that sector, as these are not directly addressed by a carbon price. Alternatively, if emissions are from sectors where long-run investment in mitigation technologies is required, then a carbon tax can provide price certainty, which can underpin investment decisions (see [Section 1.3.1](#)). Developing an understanding of the jurisdiction's emissions profile can also help policymakers situate their circumstances within

the broader global context. Understanding which other jurisdictions have similar emission sources may help in applying international best practices to local circumstances and understanding potential impacts more easily.

**In particular, the following facets of the jurisdiction's emissions profile might be informative:**

- ▶ **Current level of emissions and their trend over time:** The levels of past, current, and future emissions determine how ambitious a jurisdiction's mitigation policy needs to be to meet its climate commitments. Carbon pricing seeks to drive long-term reductions in emissions, so the direction of emissions over time is a key consideration. Certain sectors may become of greater or lesser importance over time. Analyzing sector activity and emission trends over extended periods is thus important. For example, rising emissions in domestic aviation may indicate that this is an important sector to include under a future carbon price. Emissions projections can be used to prioritize mitigation opportunities across sectors. The scale and associated costs of these mitigation opportunities, in turn, can help determine the emissions reduction response to the CPI.
- ▶ **Share of emissions by sector and source:** Generally, CPIs will cover a subset of emissions from certain sectors or sources. As such, looking at the share of emissions across these sectors and sources can help to identify which sectors and sources are most important to national emissions and are therefore most important to decarbonize. The sectoral composition of emissions will also influence CPI choice or design (particularly the point of regulation), because an ETS is more suited to certain sectors. For example, coverage of the power sector often underpins an ETS. This sector is typically a significant source of emissions, and emitters are sophisticated enough to engage in relatively complex secondary market interactions, which helps to ensure market efficiency. The European Union (EU) ETS's first phase covered only carbon dioxide emissions from power generators and energy-intensive industries. A carbon tax can be used in any sector that responds to prices. However, it is easier to implement in sectors with existing tax infrastructure. For example, carbon taxes are often employed in the transport sector because they can piggyback off existing tax arrangements on transport fuels, such as excise taxes.
- ▶ **Share of emissions by type of gas:** This can affect coverage decisions for the CPI. Carbon dioxide is almost always covered because it is often the largest source of GHG emissions. Jurisdictions will usually cover a broad range of greenhouse gases (GHGs) to improve policy effectiveness and efficiency. Some jurisdictions may need to pay particular attention to certain gases. For instance, New Zealand has adopted separate targets for long-lived GHGs (carbon dioxide and nitrous oxide) and for short-lived GHGs

(biogenic methane from livestock and landfill waste). This approach aims to reach net zero long-lived GHG emissions by 2050, and to stabilize short-lived GHGs at 24 to 47 percent below 2017 levels by 2050. This approach was developed to reflect the Intergovernmental Panel on Climate Change's special report, which found that in scenarios limiting warming to 1.5 degrees with limited or no overshoot, the central range of reductions in global agricultural methane emissions is 24 to 47 percent below 2010 levels.

- ▶ **Emissions intensity:** This is a metric that captures the emissions released per unit of output or revenue for firms, consumption, or relative to GDP at a country level. The emissions intensity (along with abatement costs) provides information on the relative impact the carbon price is likely to have. Typically, the same amount of emissions reduction, say 10 million metric tons of carbon dioxide equivalent (tCO<sub>2</sub>e), will be significantly easier for a jurisdiction with a GDP of USD 1,000 billion to abate than a jurisdiction with a GDP of USD 100 billion. This is because economies with a high GDP generally have better access to the capital, research, technologies, and other resources required for cost-effective abatement. A larger pool of resources means the lowest-cost option is more likely to be available or be developed. Additionally, the relative economic impact of reducing emissions is likely to be lower given the larger GDP involved. Economies with a low emissions intensity (Switzerland or Singapore, for example) are likely to be relatively less affected by carbon prices, all else being equal, but may have a harder time achieving low-cost GHG reductions. Finally, it is important to identify emissions-intensive sectors because they have a large emission share relative to their economic size. Abatement investments in these sectors can lead to large reductions in emissions. However, as they may be more sensitive to competitive pressures that could result from a carbon price, sectors that are highly emissions intensive may need assistance in the initial stages of the CPI.

## (2) Environmental objectives

**The environmental objectives of a jurisdiction will also influence the recommendation on carbon pricing.**

Well-designed CPIs can deliver ambitious environmental outcomes. Nonetheless, the specific nature of a jurisdiction's mitigation ambition and the jurisdiction's other environmental objectives should be considered in CPI design.

Two factors to consider here are

- ▶ **Mitigation ambition:** The fundamental purpose of carbon pricing is to incentivize GHG mitigation. The target adopted, and its ambition, can therefore be an important consideration for CPI selection and design. For ETSs and carbon taxes, ambition is a function of the level of the cap and the tax rate, respectively. The rate

at which the cap declines, or the tax rate increases, will determine the progress of ambition over time. However, policymakers may find that one instrument can deliver more ambitious outcomes than the other given their jurisdictional circumstances. For example, it may be difficult to adjust the level of the tax if it is not delivering the emissions goal, due to barriers to frequently updated fiscal codes and political barriers to explicit price increases (the requirement of a supermajority vote to raise a tax, for instance). In this situation, an ETS with a cap might be preferable because there is less of a direct connection between the government decision on ambition and eventual price, which is determined by market forces. Policymakers may consider the ease with which ambition might be ratcheted up or political risks (such as repeal) when deciding what type of CPI to implement. Having a clear trajectory of high ambition and mechanisms for review and adjustment will help ameliorate political risk for both taxes and ETSs while also meeting mitigation targets.

- ▶ **The potential for broader benefits, like air quality improvements:** In addition to emissions mitigation, carbon pricing may lead to other beneficial outcomes, which may be a priority for jurisdictions. Reducing air pollution is, for example, important to many jurisdictions. If a carbon price could be designed to complement air quality improvement efforts by the government, this may increase the level of support for the policy. This prioritization may affect other design choices in the CPI, though. For instance, it could reduce the appeal of using international crediting mechanisms, where local air quality benefits — and the scale of those benefits — may shift to a different jurisdiction. Certain sectors may also be associated with specific environmental benefits, and therefore might be priorities for coverage or crediting. For instance, emissions reductions from avoided deforestation can bring a number of benefits to the environment and local communities.

### 2.2.2 Economic profile

**The economic context of a jurisdiction determines the impacts of a carbon price and who will be impacted, and also can affect the way specific CPIs function.** The economic impacts of carbon pricing are often a key area of contestation for carbon policy. Further, CPIs can function very differently depending on the characteristics of the market, leading to very different costs and benefits. These factors are discussed in turn below. Revenue use and its distribution will influence the final economic cost and benefit distribution, which is discussed in more detail in the PMR's *Using Carbon Revenues Guide*.<sup>38</sup>

#### (1) Economic impacts

**The economic profile of a jurisdiction is a key determinant of the cost of abatement and how the cost is distributed across sectors and geographies.** The economic profile refers to the structure of the economy, including its size and split among different sectors (like manufacturing, services, power, and government). It is therefore a vital part of the background against which carbon pricing policy is set. Policymakers may wish to identify sectors, regions, or communities likely to face significant impacts and possible measures to mitigate these impacts within the final recommendation. For example, if higher electricity prices as a result of a carbon price raises concerns about energy affordability for low-income households, the policy recommendation may also identify additional measures, like direct financial compensation or energy efficiency projects, to reduce this impact. If the analysis reveals that carbon pricing may have a negative impact on domestic competitiveness, policymakers could consider options to address these risks, for instance through free allocation in an ETS or benchmarked rebates in a tax. The economic profile and type of impacts identified can also influence how policymakers engage with stakeholders, as well as the modeling and evidence-gathering process (see [Chapter 3](#)).

#### Key factors to include:

- ▶ **Abatement opportunities:** Different sectors will have different opportunities and obstacles to reduce their emissions. Industries that produce a large amount of process emissions may find emissions abatement challenging. For example, cement production creates significant process emissions through the chemical reactions during the production process, for which mitigation options are limited. Firms in these “hard-to-abate” sectors may require specific policies and additional support measures to develop low-emissions technologies and processes.
- ▶ **Preexisting trends:** Carbon pricing does not occur in isolation and may interact with other trends or disruptions in particular sectors. For example, heavy industry has faced a steady decline in developed economies for many years. The introduction of a carbon price may compound this shift and therefore generate strong opposition. Sometime these changes can have disruptive impacts; for instance, the unconventional gas boom in the United States led to an unanticipated and rapid fall in demand for allowances in RGGI, which depressed carbon prices for several years. These trends will be specific to each jurisdiction, but it is typically useful to conduct an analysis of macro-level indicators (for example, employment, output, and trade statistics) over time and by sector to spot trends or irregularities.

- ▶ **Export and import composition:** This can help policymakers understand what products and sectors face international competition and who may bear the brunt of increases in costs from carbon pricing. The impact of a carbon price on the energy sector will also have flow-on effects for international trade in fossil fuels, energy independence, and terms of trade. These factors, combined with the level of international trade exposure an economy faces, will also be relevant to issues around domestic competitiveness. These competitiveness impacts and potential risks of carbon leakage are discussed more in [Section 3.1.1](#).
- ▶ **Employment:** While existing CPIs have thus far had limited impacts on employment (see [Section 3.2.1](#)), over the long term, CPIs aim to shift the composition of the economy to a lower-emissions pathway. Some sectors will face significant challenges in reducing emissions and may contract in size while others will benefit from increased innovation and growth, with consequences for employment.<sup>39</sup> Understanding current sectoral employment levels and employment trends will build an understanding of how current and future employment may be affected.<sup>40</sup> Unemployment can have significant economic and social impacts, particularly when concentrated in certain localities. Understanding impacts on employment can therefore help policymakers develop an appropriate policy response (for example, through job creation and retraining programs). Employment impacts can be politically contentious, and a thorough investigation of the nature of employment in the jurisdiction is required to factor opportunities and risks associated with the CPI's employment impacts into decision-making.
- ▶ **Demographic characteristics:** Carbon pricing may interact with demographic characteristics and existing inequality across dimensions such as race, income level, or gender. This could cause concerns around, for example, energy affordability for vulnerable communities. Modeling and surveys can help

understand these impacts (see [Section 3.2](#)) and inform the design of policies to mitigate or offset their effects. Policymakers will need to make sure they have or can access data related to those dimensions (for instance, census information or household surveys indicating race, income level, or gender). Revenue recycling or funding social programs can help policymakers compensate for potential social impacts from a carbon tax or ETS from the outset.

- ▶ **Geographic characteristics:** Understanding geographic characteristics, particularly the regional distribution of sectors that are impacted by the CPI, is important to understanding where impacts will be felt. High-carbon industries are often regionally clustered, which means that the impact of carbon pricing may also be geographically concentrated. For instance, in South Africa a large proportion of coal mining activity is concentrated in the Witbank Coalfield.<sup>41</sup> Those industries, and the communities and jobs that indirectly rely on them, will likely be more acutely affected than others (see [Section 3.2.2](#)).

**External factors can influence the economic environment and can create opportunities for carbon pricing.** [Box 7](#) outlines how carbon pricing can play a role as part of a coordinated policy response to the COVID-19 pandemic. As well as changing the economic environment, major shocks like COVID-19 can influence the politics of introducing carbon pricing (see [Section 2.2.4](#)). For example, public perception of the environmental and human health benefits from climate action and decarbonization may be heightened following the COVID-19 pandemic. Economic shocks may also influence the choice of CPI. By design, an ETS has a variable carbon price that adjusts quickly in times of economic downturn. Legislative initiatives in response to economic shocks may create opportunities for carbon pricing implementation. For example, a stimulus package or broader tax reform may create an opportunity for legislating an ETS or carbon tax rather than starting from scratch.

39 Organisation for Economic Co-operation and Development 2020.

40 Employment intensity, or employment elasticity, is a measure of how much employment is expected to grow for a given increase in economic growth. This is important to consider for the rate and level of support needed for growing or contracting sectors.

41 Minerals Council South Africa 2020.

### Box 7 Post COVID-19 recovery and opportunities for carbon pricing

As well as seriously impacting the health of populations, COVID-19 presents major economic challenges, including reduced growth, increased unemployment and poverty, and declining government revenue. The initial focus of the response to COVID-19 has been on the public health emergency, maintaining liquidity for households and businesses, and humanitarian support for the worst affected. Following this, attention turns to economic stimulus and recovery. The quality, content, and strength of the stimulus packages will determine both economic and environmental outcomes for decades to come. Carbon pricing presents opportunities to support a resilient and sustained economic recovery from the COVID-19 crisis:

- ▶ **Green jobs:** Carbon pricing supports sustainable industries and promotes the competitiveness of low-emission products and processes, such as renewable energy and energy efficiency. Global estimates show the high job creation potential of renewable energy and energy efficiency: while USD 1 million spending in fossil fuels would create 2.7 full-time equivalent (FTE) jobs, that same spending would create 7.5 FTE jobs in renewable energy and 7.7 FTE jobs in energy efficiency.<sup>42</sup>
- ▶ **Green investment and economic resilience:** Carbon pricing can help direct investments toward low-emissions technologies and mobilize much-needed revenue. For example, by ensuring fuel prices capture both supply and environmental costs, carbon pricing reduces the risks of locking in carbon-intensive capital. Such lock-in can be very costly to reverse later.
- ▶ **Increased revenue:** Carbon pricing presents an opportunity to regain lost revenue and strengthen frameworks to support debt and spending growth. This is particularly relevant in the context of falling fossil fuel prices. Futures prices indicate that oil prices may remain low for several years. This would allow the government to capture some of the benefits of low prices as revenue, while reducing the impact of reform on households and businesses.

## (2) Sectoral attributes

In some cases, the economic makeup of a jurisdiction can directly affect the viability or design of a CPI.

Market attributes to consider include

- ▶ **Market structure and concentration:** The market concentration (that is, the number of firms operating in each sector and their market share) will impact recommendations for a CPI. If a handful of emitters are responsible for most of the pollution, an ETS might struggle with secondary market liquidity. Conversely, if the sector is made up of numerous small emitters, the administrative burden of engaging in a secondary market might be too high. In developing countries like Brazil, a significant share of emissions comes from the agricultural sector, which is often made up of many small emitters. This may lead policymakers to choose other regulatory instruments in these sectors because putting a price on carbon can be challenging in these conditions. If using a CPI, it makes the inclusion of crediting a potentially attractive design feature (for a tax or an ETS) to capture those more challenging sectors because it provides a positive incentive for entities to reduce emissions (without penalizing those that cannot).<sup>43</sup> CPI design may accommodate for varying market structures by placing the point of regulation at the most concentrated part of the supply chain (see Section 1.3.1). The market structure may also influence the abatement incentives of firms. Emitters in concentrated markets may be able to pass on their increase in costs rather than abate (see Section 3.1.1).
- ▶ **Abatement options and incentives:** Firms in different sectors will have different incentives and abilities to abate. In cases where there are limited options for mitigation, a carbon price may be complemented by policies to help develop and deploy new technologies. However, a carbon price often plays an important role in incentivizing mitigation from unexpected sources from across the supply chain. Market structure will also influence the ability and incentives for firms to abate.
- ▶ **Access to supporting services:** While jurisdictions often consider high-emitting sectors of the economy when selecting a CPI, other sectors can also play an important role in determining a CPI's operation. For example, the UK's large and sophisticated financial services sector supports trade in a wide range of commodities with similar attributes, including electricity, energy, and physical commodities trading. This means the UK has more actors engaged with trading and businesses with a high degree of capacity, suggesting it may support relatively liquid markets even for relatively small market sizes. Similarly, countries with sophisticated support ecosystems (like legal services or a network of auditors and verifiers) might find implementing an ETS easier.

<sup>42</sup> Garrett-Peltier 2017.

<sup>43</sup> While it is rare to cover the agriculture and forestry sector directly within an ETS or tax (not via crediting mechanisms) it is certainly possible. New Zealand, for example, covers these sectors within its ETS. Also see the forthcoming World Bank publication *Designing Fiscal Instruments for Sustainable Forests* for details on carbon pricing in relation to deforestation and land use changes.

- ▶ **Interactions between sectors:** These interactions determine how the carbon price spreads throughout the economy, particularly to noncovered entities. Knowledge of these interactions can then inform CPI considerations around the point of regulation and sector coverage. For instance, some sectors, such as power generation, have the potential to pass on higher carbon costs to sectors that use their electricity, such as industrial manufacturers. This means that even a sector with low direct emissions may still be highly impacted by a carbon price if it is heavily reliant on fossil fuel inputs. For instance, aluminum smelting often produces relatively low levels of direct GHG emissions relative to indirect emissions because its production requires significant electricity consumption, which may be reliant on fossil fuel generation.
- ▶ **Market regulation:** Market regulation might influence the effectiveness of a carbon price, especially in electricity markets.<sup>44</sup> In a fully liberalized electricity market, a carbon price would push up the prices for electricity generated from fossil fuels, a mechanism known as cost pass-through. This encourages electricity generators to switch to cleaner and more efficient ways of producing electricity and motivates firms and households to reduce electricity consumption. Conversely, where prices are strongly regulated carbon cost pass-through may be inhibited. Policymakers may wish to target such regulated sectors with companion policies — for example, renewable portfolio standards, which have been used in California.
- ▶ **Experience with carbon pricing:** Certain sectors or firms may have voluntarily participated in existing carbon markets like the Clean Development Mechanism or the Verified Carbon Standard. This experience may increase the capacity of the government and firms to implement carbon pricing requirements such as robust monitoring, reporting, and verifying (MRV) systems. Further, large firms may also have experimented with internal carbon pricing or may already face carbon prices in other jurisdictions in which they operate.<sup>45</sup> This might make them better able to engage with a jurisdictional carbon price.

### 2.2.3 Governance landscape

**The governance of a jurisdiction spans both the legal context of the jurisdictions and the institutions that operate within this context.** Existing legal and institutional factors can differ substantially across jurisdictions and have a large impact on CPI choice and design. These factors may constrain CPI options and

provide systems that can be leveraged or adapted for carbon pricing, and will likely determine which government bodies will control future policy design. Key issues to consider include

- ▶ **Constraints on feasibility and design:** The existing legal and institutional structure may make some policies more feasible than others, which will influence the role of the CPI as well as the instrument selected. Rules on taxation and spending, in particular, will likely determine the design of the CPI, or even which CPI options are feasible. For instance, in the EU, tax measures require unanimous agreement to introduce, while the requirements on environmental measures are less onerous (requiring a “qualified majority”).<sup>46</sup> This means tax measures are more difficult to implement than environmental measures, such as an ETS. The initial proposal for a carbon tax in France in 2009 was deemed unconstitutional because of a number of exemptions and the design of the compensation for low-income households.<sup>47</sup> Legal factors may also influence specific design features of interest to decision-makers. For example, some jurisdictions might place restrictions on the earmarking or the specific uses of tax revenues. There are also often constitutional or legal limitations on the type of taxes that can be enacted at a subnational level in federal systems, as is the case in the US. In some cases, existing market rules may make it more challenging to implement a carbon price. For instance, the regulation of prices in the electricity sector can often restrict a firm’s ability to pass through cost increases to end consumers and can make covering the electricity sector challenging.
- ▶ **Ease of implementation:** Existing institutions and frameworks can be useful to either facilitate or create barriers to the implementation of CPIs. The introduction of CPIs often draws on rules and legislation developed for other policies. For example, it is common for CPIs to build on existing fuel taxes, particularly in the transport sector, by using the existing fuel tax infrastructure for measuring and reporting emissions and levying the carbon tax. In many jurisdictions, the implementation of a carbon tax is often quite straightforward if these systems are already in place. ETSs usually require the establishment of new institutional frameworks to operate. In some cases existing institutions can be used; for instance, registries for trading renewable energy certificates have similar functionalities and processes as those needed for an ETS. Nonetheless, establishing an ETS generally requires at least coordination across a range of entities and institutions, and the establishment

44 Acworth et al. 2018 discuss the use of ETSs in regulated electricity markets in detail. Carbon pricing instruments can operate in regulated electricity markets but there may be ramifications on how the instrument is designed; some insights are provided in Acworth et al. 2018.

45 Internal carbon pricing creates effective, or shadow, carbon prices for operations within the company. For example, the internal carbon price may be used in a cost-benefit analysis of a project.

46 The qualified majority is a procedure that requires more than a majority support but less than unanimous support.

47 PMR 2017.

of the infrastructure required to support secondary markets when this is not already in existence.

- ▶ **Control of policy design and implementation:** Internal structures within government might have different objectives, administrative capacity, expertise, and responsibilities. This may influence the choice of CPI, and who controls it. For example, Ministries of Finance might prefer a carbon tax due to their experience with and knowledge of fiscal instruments. Often, Ministries of Finance will be responsible for the implementation of carbon taxes, while Ministries of Environment will be responsible for the implementation of ETSs. For instance, in the UK, the ETS policy was within the remit of the Department of Energy and Climate Change,<sup>48</sup> while carbon taxes, including Carbon Price Support, were controlled by the Treasury.

These legal and institutional issues should be carefully reviewed to assess their impact on the functioning of a proposed CPI.

### 2.2.4 Political considerations

**A jurisdiction's political context can play a significant role in the selection and longevity of a CPI.** For instance, changes of government in Australia, Ontario, and New Jersey precipitated the repeal of carbon pricing (and, in New Jersey, its recent reintroduction).<sup>49</sup> Introducing a carbon price is therefore not just a technical decision, but also a political one. Political acceptability can evolve over time and CPIs may become more durable over time as the public sees the benefits of carbon pricing and support for climate action grows.

**Policymakers should engage in early discussions with a wide range of stakeholders to assess political support and develop an effective communications strategy.** This can build acceptance internally across the government and externally with key stakeholders from the private sector and civil society. Opinion surveys, focus groups, and other forms of market research can be important tools for understanding public opinion (see Section 3.1.4). The PMR's *Guide to Communicating Carbon Pricing* has a more detailed discussion of communications research and communications strategy. Furthermore, engaging with stakeholders that are skeptical or unsupportive of carbon pricing is particularly important since understanding their concerns early gives policymakers time to acknowledge and address those concerns. In deciding to adopt a CPI, decision-makers will want to know that the views of interest groups are understood and have been considered.

Considerations around political context that should be assessed include

- ▶ **Political positioning:** Political actors will differ in the way they position themselves on climate ambition and policy approaches. Some governments will view the implementation of an ambitious carbon pricing policy as an opportunity to demonstrate their environmental credibility to domestic constituents and/or on the international stage. For example, the EU is widely seen as a leader on carbon pricing, and a decision to follow in its footsteps and implement a similar system could be desirable for some emerging economies. On the other hand, some governments and political parties would like to be perceived as prioritizing domestic economic issues. Such jurisdictions may therefore choose the instrument that most effectively raises revenue. The beliefs of the political parties that comprise the government (or are active in the opposition) could also influence the ambition and design of the CPI. For example, New Zealand's recent reforms to adopt a 2050 target and strengthen carbon pricing were implemented under a Labour-led coalition government, with a Green Party representative as Minister for Climate Change.
- ▶ **Public opinion:** Understanding the importance the wider population places on climate action will help gauge support for ambitious policies. Without strong public support, carbon pricing will remain at risk of backsliding from governments, thereby undermining its long-term effectiveness. The political opportunity for carbon pricing is often short, which means policymakers should utilize periods of public support when it arises. The proliferation of net zero commitments globally has created the opportunity to strengthen climate policies, including a carbon price. Clear communication and stakeholder engagement can also help avoid or navigate public concern. An approach that has been used to limit the initial cost shock is to start with a low price or low stringency and clearly communicating that the price will gradually increase over time. Future prices and stringency are particularly important to long-lived capital investment decisions and a gradual approach can reduce price shocks while still sending the signal that low-carbon innovation is valuable. The use of revenues to support policies or programs can also help improve public acceptance when paired with effective communication of the environmental, social, and economic benefits of carbon pricing.<sup>50</sup>
- ▶ **Policy preferences:** Businesses, interest groups, and the general public may prefer a tax or an ETS, with opinion polls in various countries consistently showing

48 Department of Energy and Climate Change is now part of the Department for Business, Energy & Industrial Strategy.

49 Santikarn et al. 2018.

50 Burke et al. 2019.

taxes to be less popular than other regulations.<sup>51</sup> Entrenched views on taxation may therefore limit instrument choice. This may be remedied with design attributes such as recycling revenues and the use of crediting mechanisms. The British Columbian carbon tax, for example, has widespread support partly because revenues are partially recycled. On the other hand, some stakeholders may oppose a market-based instrument like an ETS because it is perceived to be in the interest of industry by “privatizing” and commodifying the climate.<sup>52</sup> However, if the CPI is presented as a package or part of broader reform, instrument options may be more flexible since potential opposition to carbon pricing can be mitigated through support for the broader policy package that seeks to achieve a range of policy objectives rather than focusing on how the policy instrument works.

- ▶ **Interest groups:** Groups representing business, environmental, and social organizations often play an important role in shaping the public discourse on carbon pricing. Business opposition to carbon pricing is often one of the major barriers to its implementation. Businesses often organize themselves in powerful lobbies, which can influence government decision-makers and inhibit their ability to implement a carbon price or increase its ambition. Building coalitions among supportive businesses and sectors can help increase the likelihood of implementing a carbon price and having it last. Business support can provide confidence in the system, showing that the regulated entities acknowledge the need for carbon pricing and environmental policy, and that they can participate effectively. Environmental organizations can often be among the most vocal supporters of climate action, though they may not always be supportive of a carbon price as the means of tackling climate change, preferring other policies and raising environmental justice and/or equity concerns. They will often lobby for policymakers to adopt stronger emissions reduction targets, to adopt policies with local environmental benefits, and to limit levels of assistance to businesses. Early outreach to climate and environmental advocates to understand their concerns and discuss the distributional impacts of the CPI can inform policy makers’ program design. For instance, to assess whether complementary policies or design adjustments are needed to ensure local environmental benefits are generated and equally distributed. Having their support, particularly for more ambitious policies, can help balance corporate interests against increased climate action. Finally, social organizations, including labor unions and civil society groups, may be

particularly focused on how these policies will affect jobs and on achieving a “just transition,” the latter of which looks at making the low-carbon transition equitable and inclusive (see [Section 3.1](#)). Active engagement with labor and social organizations to explain the rationale and benefits of a CPI can help build a broad-based coalition supporting the policy. The impact on employment is a key concern for government regardless of the policy, designing a CPI and supporting policies to generate low-carbon jobs and ensure the transition from high-carbon jobs is manageable can help dispel the false narrative that climate action comes at the expense of the economy.

- ▶ **Alignment with other jurisdictions:** The extent to which the jurisdiction aims to align its policy with another jurisdiction (such as a major trade partner) will affect CPI selection and design. The potential for linking is often a key consideration in both the design and the evolution of ETS design over time. For instance, jurisdictions in the Western Climate Initiative have agreed on key design parameters for their linked ETS. Similarly, Switzerland made changes to its ETS design to coordinate its regulation with the EU prior to linking the two systems.<sup>53</sup> Other international agreements may also play a role; for instance, the Association Agreement between the EU and Ukraine required the Ukraine move toward implementing an ETS.<sup>54</sup>

## 2.3 CAPACITY FOR IMPLEMENTATION

**An important step in ensuring that a CPI is appropriate for a given jurisdiction is mapping the complexity of CPIs against the capacity of government to implement and enforce policies, and businesses to respond to them.** Both instruments can still achieve ambitious outcomes with simple designs, but there are some inherent differences in the level of capacity required for implementation. This section outlines how CPIs differ in complexity both inherently and by design, and how the capacity of governments and businesses can vary both within and between jurisdictions. The ability of government and businesses to handle the complexity of different CPIs will influence what policy can be implemented and its design features. Limited existing capacity should not discourage CPI implementation. Capacity can be built up over time through trainings and investments in infrastructure (such as registries and exchanges for secondary market trading), while some CPI designs require limited new capacity. However, simple design does not guarantee easy implementation, especially if key actors have little experience with carbon pricing.

51 This finding is consistent across a wide range of countries, including Australia, Austria, Bangladesh, Canada, Finland, Germany, Norway, Sweden, Switzerland, Taiwan, and the United Kingdom. See numerous sources summarized in Lachapelle 2017.

52 Paterson 2010.

53 This is discussed further in the linking section of the PMR’s and ICAP’s *Emissions Trading in Practice: A Handbook on Design and Implementation* 2021.

54 EU 2014.

### 2.3.1 Capacities needed for CPI implementation

Jurisdictions have differing capacity in both the public and the private sectors, which impacts the effectiveness of CPIs. Historically carbon pricing has been pursued by largely developed nations that are able to utilize existing institutions and policy frameworks built up over many years. Even then, carbon pricing implementation, particularly of ETSs, has required additional institutions to be set up, as well as trainings and workshops to build the required capacity among government regulators and regulated businesses. In recent years, however, the uptake of carbon pricing in developing economies has accelerated as jurisdictions experiment with CPI designs that are suitable for their specific context. There has also been increased participation in crediting mechanisms, which has built private sector capacity to engage in carbon markets. In the early stages of carbon pricing consideration, jurisdictions need to assess the capacity — and identify any gaps — of businesses and regulators.

**Capacity can be considered in terms of governance and market requirements.** Governance capacity focuses on what is needed for CPI compliance, while market capacity looks at what is needed to trade on a carbon market (that is, in an ETS or a carbon crediting mechanism). Figure 8 outlines the capacity needs for regulators and businesses based on these two metrics.

### 2.3.2 Identifying instrument complexity

**CPIs differ in their inherent complexity relating both to the governance of the CPI and its interaction with markets.** As Figure 8 outlines, establishing a comprehensive MRV structure that generates accurate and reliable data will be the foundation for any CPI. Beyond this requirement, a carbon tax will need an enforcement mechanism but otherwise does not require a secondary market and is generally easier than an ETS to implement. This means they can be quite rapid to implement because many jurisdictions may have tax systems in place, particularly for fuel taxes, that can be utilized and adapted. Crediting mechanisms, which can be used in both taxes and ETSs, also require some market infrastructure to function. However, only an ETS requires additional systems for allocating allowances, either through auctions or for free. Critical to all CPIs will be sufficiently robust and effective MRV systems, as well as the capacity for governments to enforce, and businesses to comply with, the MRV requirements.

**The need for additional market capacity should not discourage the implementation of an ETS.** The nature of an ETS means that it has the broadest capacity requirements, with allocation and compliance systems needing to be implemented in addition to the structures needed for trading. While markets add additional complexity, they are only one part of the considerations for CPI selection. Market capacity can be developed while planning and rolling out the ETS. Policy makers can look to other ETSs to provide resources like learning opportunities, frameworks, existing tools, and access to third-party

Figure 8 Capacity requirements may differ for different CPIs

Capacity required		Regulatory capacity		Business capacity	
Carbon tax	<b>Governance</b>	<b>Compliance</b> 	<ul style="list-style-type: none"> <li>▶ Credible enforcement mechanisms and punishments for emissions liabilities</li> </ul>	<ul style="list-style-type: none"> <li>▶ Clear lines of responsibility</li> <li>▶ Access to emissions verification or auditing service providers</li> </ul>	
		<b>MRV</b> 	<ul style="list-style-type: none"> <li>▶ Monitoring and reporting institutions for other policies (such as taxes) or standalone data gathering and reporting system</li> </ul>	<ul style="list-style-type: none"> <li>▶ Established data collection processes</li> <li>▶ Access to verification services</li> </ul>	
Emissions trading system	<b>Markets</b>	<b>Market oversight</b> 	<ul style="list-style-type: none"> <li>▶ Financial market regulation that provides stability and punishes misconduct</li> </ul>	<ul style="list-style-type: none"> <li>▶ Businesses' ability and willingness to comply with regulation</li> </ul>	
		<b>Trade infrastructure</b> 	<ul style="list-style-type: none"> <li>▶ Registry for holding/trading units</li> </ul>	<ul style="list-style-type: none"> <li>▶ Liquid market, operating through exchange based trading</li> <li>▶ Internal carbon risk management processes</li> </ul>	
		<b>Allocations</b> 	<ul style="list-style-type: none"> <li>▶ Production and emissions data for determining free allocations</li> </ul>	<ul style="list-style-type: none"> <li>▶ Understanding of allocation design and competitiveness implications</li> </ul>	
Crediting					

vendors and experts that can reduce the time to set up these functionalities. Building on the structures established in existing markets in other areas, like commodities, can also reduce start-up costs. As ETSs become established policy tools, a greater variety of external vendors can assist in establishing a well-functioning secondary market.

#### **Design choices will also impact instrument complexity.**

Covering emissions from transport upstream at the point of fuel distribution, for example, means fewer firms are directly covered by the regulation, which substantially reduces complexity and administrative cost. Alternatively, complexity can also be reduced by building on existing policies — for instance, environmental regulations that require air pollution monitoring may establish much of the reporting requirements needed for MRV systems.<sup>55</sup> Finally, the complexity of the CPI will also depend on the sectors covered. Whereas coverage of electricity generation can often enable a CPI to cover a large share of emissions from a small number of entities, sectors with diffuse emissions sources like waste and agriculture may be far more challenging to cover. Specific design elements are covered in detail in the *ETS Handbook*<sup>56</sup> and *Carbon Tax Guide*.<sup>57</sup> ICAP’s report on options to keep ETS design simple<sup>58</sup> may also provide useful guidance on minimizing complexity.

### **2.3.3 Mapping capacity to instrument complexity**

**To identify an appropriate instrument, it is crucial to map the level of complexity of the CPI with the capacity of both government and businesses.** This can help identify what CPI designs are likely to have a high chance of success, determine which sectors are most ready for coverage, and provide a compelling rationale for the design choice in the policy recommendation. It can also help policymakers target training programs and the creation of tools and other support options to address any capacity gaps needed to implement a CPI. To aid in mapping, this guide includes a capacity assessment tool (see [Box 8](#)).

#### **Box 8 Capacity assessment tool**

The capacity assessment tool (see [Attachment 4](#)) helps policymakers map the capacity of business and government to the requirements of different CPIs. Policymakers fill in the color code based on current capacity for each component, which is then mapped onto the requirements of differing CPIs. This will aid policymakers in understanding what capacities they have, and which CPI those strengths are compatible with. The tool will also point to where capacity needs to be developed. Included with the tool is a worked example, as well as a list of questions to aid in thinking about the existing capacity.

**The complexity of CPIs and the capacity of governments and businesses that must implement and respond to them will change over time.** This means that the most appropriate CPI design may also evolve over time with these circumstances.

**Carbon pricing should be designed to accommodate scaling up of ambition and the use of more efficient and complex designs as capacity grows over time.** For instance, the introduction of elements such as offsets may improve the overall efficiency of a policy but may require the development of both regulatory and business capacity to implement effectively. However, simple designs do not equate to a lack of ambition; a simple carbon tax can still set a strong carbon price to drive emissions reductions. Sweden’s carbon tax utilizes existing revenue collection systems and is levied on all fossil fuels. While administratively straightforward, it is set at EUR 110/tCO<sub>2</sub>e, the highest in the world. The ambition of the tax has been increased over time. When first introduced in 1991, the tax level was EUR 23.<sup>59</sup> Political challenges sometimes mean that simple design does not mean simple implementation. South Africa experienced a 10-year policy development process despite enacting a relatively “simple” carbon tax.

**Some jurisdictions have found implementing a simpler CPI or starting with a voluntary pilot program has paved the way for a more complex CPI design over time.** New Zealand phased sectors into the ETS by initially having one year of voluntary reporting and, for most sectors, one year of mandatory reporting prior to the introduction of surrender obligations under the ETS. The Republic of Korea smoothed introduction to its ETS by introducing a Target Management System, which involved both mandatory reporting and firm-specific emission reduction targets, applied to the same parties that were expected to be regulated by the ETS. To prepare for

<sup>55</sup> For more see the PMR’s *Developing Emissions Quantification Protocols for Carbon Pricing: A Guide to Options and Policy Makers* 2020.

<sup>56</sup> PMR and ICAP 2020.

<sup>57</sup> PMR 2017.

<sup>58</sup> Eden et al. 2019.

<sup>59</sup> Government Offices of Sweden 2020.

the Mexico ETS, policymakers had a period of learning, engaging with policymakers from jurisdictions with existing ETSs. In addition, they had extensive stakeholder consultation before introducing a pilot ETS in 2020. They also simulated market trading to train potential ETS participants. The benefits from adding to or changing a new CPI should be weighed against the potential uncertainty that unanticipated changes can create. Clear communication of the objectives of the CPI, and the fact that its design may change over time to better achieve these objectives, can help avoid surprises and reduce opposition when these changes occur.

## 2.4 FURTHER GUIDANCE

The following resources may be useful for understanding the jurisdictional context and capabilities:

- ▶ PMR (Partnership for Market Readiness). 2015. [Checklist on Establishing Post-2020 Emission Pathways.](#)
- ▶ PMR (Partnership for Market Readiness). 2017. [Carbon Tax Guide: A Handbook for Policy Makers.](#)
- ▶ PMR (Partnership for Market Readiness), and CPLC (Carbon Pricing Leadership Coalition). 2018. [Guide to Communicating Carbon Pricing.](#)
- ▶ PMR (Partnership for Market Readiness), and ICAP (International Carbon Action Partnership). 2021. [Emissions Trading in Practice: A Handbook on Design and Implementation.](#)

## 3. IMPACT ASSESSMENT

### Key takeaways:

- ✓ A carbon price has implications across the economy. Early engagement with stakeholders is critical to understanding the impacts of, and building support for, a carbon price.
- ✓ A carbon price will increase the relative cost of carbon-intensive goods and services. An impact assessment will help identify how these changes may affect business operations and policy options to help businesses transition, noting the carbon pricing impacts will vary across and within sectors.
- ✓ Households will experience a change in the price of goods from passed-on carbon costs, and vulnerable groups may need additional support.
- ✓ Modeling provides a powerful quantitative evidence base for carbon pricing but is only one part of the evidence base. If modeling is used, the approach, assumptions, and results should be presented clearly and transparently.

**Impact assessments show how a carbon price could affect the economy and key stakeholders.** These assessments provide important inputs for carbon pricing instrument (CPI) selection and design by identifying and quantifying the potential costs and benefits of carbon pricing. Impact assessments give an indication of the distributional impact of carbon pricing and can show the magnitude of the costs and benefits. It is up to policymakers to then assess which potentially negative impacts need to be addressed. For example, a cost increase for high-income households can be reasonably borne, whereas low-income households may need support. Outlining the economic, social, and environmental impacts of a CPI in the policy recommendation and ways in which negative impacts can be ameliorated can increase support for the proposed policy. The impact assessment can alleviate concerns from stakeholders in cases where concerns are shown by the impact assessment as unfounded. The data and insights from assessing the jurisdictional context (see [Chapter 2](#)) can help identify priorities for the impact assessment. Impact assessments can also be informative when deciding on the role of the CPI, designing complementary policies, selecting the appropriate instrument, and engaging in the design process. A central part of the impact assessment is stakeholder engagement, which can help identify priorities, assumptions, and concerns about a carbon price.

**Modeling is an important source of insight for an impact assessment.** There are a wide range of models that are used for developing a carbon pricing impact assessment. Generally, relevant models are economic in focus, but these may also seek to represent complex energy or natural systems where climate change and carbon pricing have a large impact. The scope of modeling can vary from specific sectors or technologies to economy-wide impacts. Economic modeling can simulate changes in policy design and their impacts on the jurisdiction. However, modeling must be used with care as it relies

on a combination of assumptions, theory, and data, all of which bring inherent uncertainty. Models can provide an indication of potential outcomes and impacts but cannot be solely relied on to provide definitive answers.

### This chapter is structured as follows:

- ▶ [Section 3.1](#) outlines how carbon pricing can impact different sets of stakeholders, particularly businesses and households potentially affected by increased costs; and
- ▶ [Section 3.2](#) discusses the approaches to modeling the impacts of carbon pricing on these stakeholders, including the role and potential limitations of economic modeling.

## 3.1 STAKEHOLDER IMPACTS

**The impact of carbon pricing on key stakeholders is of crucial importance to governments, as it can influence both the effectiveness of the policy and its political success.** Carbon pricing will create winners and losers across society, even if the overall impacts of carbon pricing are small. Understanding stakeholder impacts, for instance, through stakeholder engagement and impact assessments, must therefore inform the design of carbon pricing policies. Understanding these impacts can also help policymakers identify constituencies that may support or oppose a carbon price.

The key stakeholder groups that are impacted by a carbon price include

- ▶ **Businesses:** Firms may be impacted by a change in demand for their products and a change in supply for intermediate products after the introduction of a CPI. This may impact output and employment, as well as shifting relative costs of inputs.
- ▶ **Households:** Individuals purchase goods and services and provide labor to businesses. The price of goods

(including environmental services) may change with a carbon price. Employment may also be affected through changes in business demand.

- ▶ **Other stakeholders:** This includes stakeholders within government, given the carbon price's interactions with existing policies, and civil society stakeholders who represent impacted interest groups.

**Policymakers seek to quantify these impacts to assess the direction, scale, and importance of these different types of impact.** Understanding impacts early on gives policymakers a chance to adjust the design of their CPI to limit any potentially negative effects. Some impacts may represent reasonable or desirable costs that should be borne; for example, price rises on carbon-intensive goods to drive demand for lower-carbon products. These assessments should consider how behavior change can contribute to reducing these costs. A carbon price could encourage product substitution; for instance, consumers could avoid additional energy costs by riding to work instead of driving. Such behavioral responses should be considered in the impact assessment. A fall in demand for carbon-intensive goods does not require policymakers to compromise on the price signal or to sacrifice environmental ambition. Policymakers should look to ensure low-carbon alternatives are available and affordable. Other impacts may require amendments to CPI design or additional policies, for example, to reduce excessive cost impacts on households. In some cases, revenues generated from the carbon price can offset these negative effects. Some impacts will be small, or of a lower priority; for example, changes due to the carbon tax on income tax revenue by the carbon price will likely be small.

### 3.1.1 Businesses

**The primary impact of a CPI on businesses is increased costs, which can sometimes affect the international competitiveness of firms, and stimulate demand for low-carbon alternatives.** Firms that are covered by the CPI will experience a change in their production costs to varying extents. In many cases, firms will be able to pass on some or all these costs to consumers, which will spur product substitution and behavior changes, such as switching to lower-carbon fuels and/or improving energy efficiency. However, in some cases these increased costs cannot be passed on to consumers.<sup>60</sup> This presents a risk to firms' international competitiveness, which will be most pronounced for firms that have a large increase in costs because of the carbon price and are unable to pass on this increase (typically because of international competition). These industries

are referred to as emissions-intensive, trade-exposed (EITE) industries. Firms outside of the direct scope of the CPI may also be indirectly affected, facing changes in production costs if, for example, they receive production inputs from firms facing a carbon price. These costs should be considered within the context of the broader policy mix, as existing policies may interact with carbon pricing (see Section 2.1.3), which will affect the overall competitive position of firms.

**Carbon leakage is a risk for industries that experience a loss in international competitiveness.** If international competitors do not need to comply with equally stringent carbon regulation, the carbon price creates a differential in production costs. As a result, domestic firms are competing in markets (through imports or exports) where foreign producers may not face an equivalent carbon price. This potential loss of competitiveness can cause firms to reduce their production or investments into productive capacity. Carbon leakage occurs when a reduction in domestic production is replaced by more emissions-intensive production in other jurisdictions. This is important to consider since it may appear that the carbon price has reduced emissions. However, if production has simply moved to a jurisdiction with less stringent environmental regulation, emissions could increase overall.

**Empirically, there is little evidence of carbon leakage, and any risk of leakage will fall with greater global action on climate change.** There has been limited empirical evidence of employment losses arising from CPIs, even in EITE sectors.<sup>61</sup> Many other factors, like the cost of production capital, market access, or the availability of labor are more important for production decisions. In most cases, carbon pricing is likely only a small component of the production and investment decision, meaning the risk of leakage is low. However, most existing CPIs include provisions to protect against carbon leakage risk. This may also help to explain why there has been no evidence of leakage to date. Additionally, it may be due to the modest carbon prices thus far; hence carbon costs have only played a small part in the production decision. This could change as national targets become more ambitious and CPIs are strengthened as a result. Policymakers will need to continuously assess carbon costs, particularly those of their trading partners, to determine the risk of leakage and to competitiveness. Despite the lack of carbon leakage to date, leakage risk remains an important issue for industry. [Figure 9](#) summarizes the potential for carbon pricing cost pass-through in firms. Carbon leakage, and approaches to address leakage, are discussed in detail in the Partnership for Market Readiness' (PMR) [Carbon Leakage Report](#) and [Carbon Tax Guide](#) and the PMR's and International Carbon

60 See the Carbon Pricing Leadership Coalition's (CPLC) *Report of the High-Level Commission on Carbon Pricing and Competitiveness 2019* for a detailed discussion on carbon pricing and competitiveness.

61 Joltreau and Sommerfeld 2018.

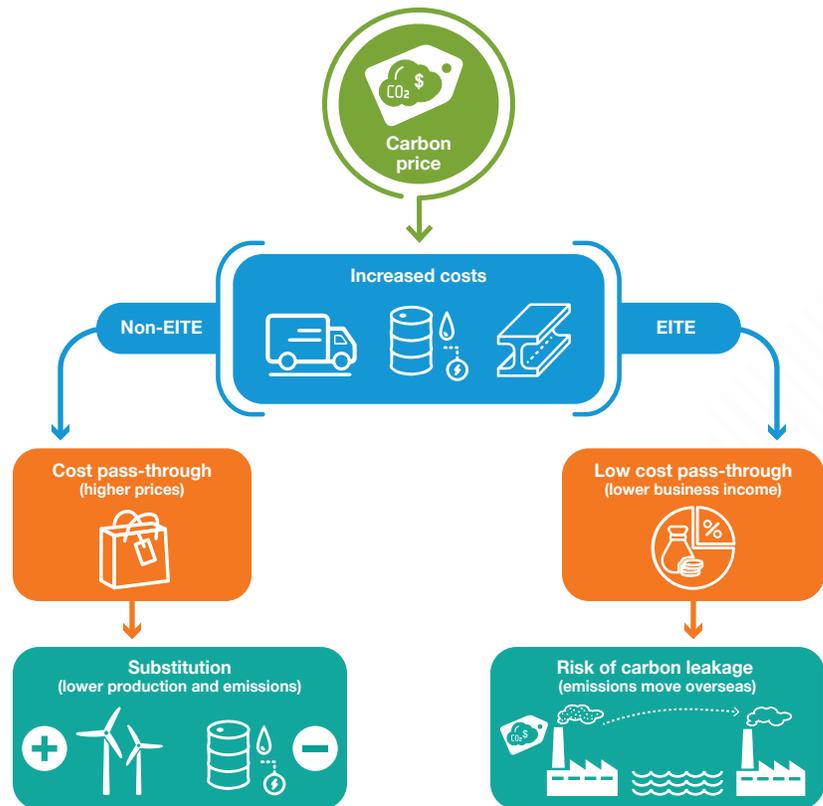
Action Partnership's (ICAP) *Emissions Trading in Practice Handbook*.<sup>62</sup>

**Carbon pricing can increase the demand for low-carbon products, expanding or opening new consumer markets.** Firms that benefit from the CPI can partially counteract the losses experienced in the negatively impacted sectors.<sup>63</sup> The imposition of a carbon price incentivizes firms to move away from polluting inputs and methods, and rewards those that do. For example, energy producers would be incentivized to increase the share of renewable energy in their mix. This will therefore increase demand for producers of renewable energy equipment, such as wind turbines and photovoltaic panel producers. Another channel is increased demand for producers of greener production inputs. For example, steelmakers may increase their purchases of recycled steel as a production input and reduce iron ore, as the processing of recycled steel is less emissions intensive.

**Carbon pricing can also motivate firms to change their conduct in a way that benefits their overall competitiveness.** It can encourage firms to innovate, either in their production methods to reduce carbon and energy costs, or by offering low-carbon products and services to attract new sources of demand.

Expenditure on research and development may increase in response to the increased incentives for carbon abatement.<sup>64</sup> Firms can also invest in capital, upgrading to more efficient technology and processes to reduce overall costs. Carbon pricing may stimulate demand in other sectors outside of industry; for example, new sources of demand for marketing may arise to market green aspects of products. The number of sectors and extent to which they benefit from a carbon price will influence the weighing up of the costs and benefits for the CPI and can often provide a powerful political case for a CPI.

**Figure 9** An illustration of Cost pass-through for different sectors



**Note:** EITE is defined as emissions intensive and trade exposed, referring to sectors that both have emissions-intensive production and face high international competition, so are not able to pass through costs.

**Modeling and data on trade flows can help assess a potential CPI's impact on business.** There are a range of well-established methods and models to assess competitiveness impacts, price changes, and demand shifts from carbon pricing (see Section 3.2). Where modeling tools are unavailable, metrics can be created using trade data to approximate the risk of a loss in competitiveness. Metrics like trade intensity and revealed comparative advantage can indicate which sectors are high risk. Table 2 presents examples of trade metrics that can be used to help assess competitiveness impacts.

62 PMR 2015a, 2017, 2021.

63 Hafstead and Williams 2020.

64 For example, van Leeuwen and Mohnen 2017 find evidence of increased innovation in response to environmental regulation in the Netherlands.

**Table 2** Trade metrics and their use in assessing competitiveness impacts

Indicator	Definition	Use
Absolute trade	Quantity/value of the trade in a sector/product.	This can be used to assess the magnitude of trade from a jurisdiction.
Import/export share	Share of a country's total exports/imports relative to the world's total exports/imports.	This can be used to assess changing world market share of a jurisdiction over time.
Revealed comparative advantage	Uses relative export shares to indicate whether a country has an advantage or a disadvantage in a particular product market. Divides a product's share of total country exports by the same product's share of total global exports.	It can inform whether the share of a jurisdiction's exports in a specific product is higher or lower than the global average export share in that product.
Export specialization	A modified revealed comparative advantage index, where the denominator is measured by specific markets or partners. This means it indicates whether a country has an advantage or a disadvantage in a product relative to a market of interest. Divides a product's share of total country exports by the same product's share of total imports into a particular market.	It provides an indication of whether the share of a jurisdiction's exports in a specific product is smaller or larger than the import share of that same product for a specific jurisdiction. In other words, it shows the relative dependence of a product for a jurisdiction's exports relative to a target market's imports.
Trade intensity index	A measure of a jurisdiction's trade intensity in a particular product to a particular market, relative to the global average trade intensity in that product and market.	It informs whether a jurisdiction's export share of a specific product to a specific market is smaller or larger than the average world export share of that product to that specific market.

Figure 10 presents an example of one of these metrics, using a common trade intensity calculation to assess the risk of competitiveness impacts for two firms. Firm A's trade with external markets makes up a larger share of imports and production than Firm B's. To estimate cost pass-through and price changes without modeling, simple formulas and relationships can be used. These can be combined with estimates of elasticity (that is, the responsiveness of demand to changes in price) to approximate demand changes. Using a collection of trade metrics can provide a rounded picture on the sectors that are trade exposed and the relative importance of international trade to the sector and wider economy.

**Consulting with businesses, including understanding channels of risks and trade partners, can help provide a more holistic picture of potential competitiveness impacts.** Engaging with sectors identified as high risk through quantitative analysis can provide qualitative insight into the channels through which they will be impacted. In understanding the change in competitiveness, it is also important to consider the climate policies of a jurisdiction's trade partners. The increase in costs from a carbon price are less likely to be detrimental to competitiveness if the trade partner also has a carbon price. The more ambitious the partner's carbon price, the lower the risk of competitiveness losses and carbon leakage.

**Strategies to address business impacts need to be considered as part of the broader policy recommendation.** Listening to concerns, modeling, and developing initial policies to protect against

**Figure 10** Example trade intensity calculation

	Firm A		Firm B	
	Measure	Firm value	Measure	Firm value
	Imports	100	Imports	100
	Exports	200	Exports	20
	Production	700	Production	1,400
<b>Trade intensity % calculation:</b>				
	$\frac{\text{Imports} + \text{Exports}}{\text{Imports} + \text{Production}}$			
	$\frac{100 + 200}{100 + 700} = 37.5\%$		$\frac{100 + 20}{100 + 1,400} = 8\%$	
	Higher risk of competitiveness impact		Lower risk of competitiveness impact	

competitiveness concerns can help to reduce political pushback. The role of carbon pricing and supporting policies in the policy mix is discussed in detail in the PMR's and ICAP's *Emissions Trading in Practice Handbook* and the PMR's *Carbon Tax Guide*.

### 3.1.2 Households

**How a carbon price affects households can vary substantially across economic, employment, and regional groups both within and across jurisdictions.**

The primary channels are through increases in the price of emissions-intensive goods and services, as well as impacts on employment (see Figure 11). Metrics policymakers typically focus on when assessing these channels include energy access, consumption and affordability, poverty rates, employment, and income levels. Household impacts can be moderated by the specific design of the CPI and its interactions with other policies.

**Figure 11** An illustration of impacts on households

**Firms producing energy or high-carbon goods may pass their increased costs on to consumers through higher prices.** Lower-income households may not be able to manage these higher costs as easily as higher-income households. For example, they may be unable to easily substitute for poorly insulated homes or purchase energy-efficient products to counteract increased energy costs. Reduced purchasing power combined with low income and high bills may reduce energy access in these households. Differences in purchasing power may play out regionally. For instance, in some regions people will spend more on energy because of climate conditions (either extreme heat or extreme cold). Rural populations that are more dependent on personal vehicles for transport may also face a larger increase in costs than urban populations.

**CPIs can have a progressive or regressive impact on household income and energy consumption depending on the underlying economic conditions in a jurisdiction.** For instance, research suggests CPIs tend to be more progressive in jurisdictions with relatively lower incomes. More progressive policies means that the lower-income groups benefit more (or are negatively impacted less) from the policy than higher-income groups, which results in a reduction in the gap between higher- and lower-income groups. CPIs are more progressive where lower-income groups have limited access to fossil fuels relative to higher-income groups. As a result, they are likely to be less directly affected by a carbon price.<sup>65</sup> However, a carbon price can prevent them from moving toward lower-carbon fuel sources or expanding their energy mix. For instance, lower-income groups may be unable to move away from coal to alternatives due to increases in the price of other fuel sources like natural gas or grid electricity. Equally, low-income groups may face a negative impact in absolute terms, and additional support to these groups may be necessary. In developed countries,

carbon-intensive spending as a share of income is often higher for poorer households despite wealthier households producing more carbon emissions in absolute terms due to greater overall consumption. For instance, in the US low-income households tend to spend a larger proportion of their income on energy for cooking and heating, which have fewer (affordable) options for substitution.<sup>66</sup> To help address this issue, the 11 US states participating in the Regional Greenhouse Gas Initiative (RGGI), which covers electricity in those regions, require at least a quarter of the revenue from the auction of allowances be used for low-income efficiency investments, which reduces the cost of electricity to those users (even as the price may increase). After more than a decade, this has resulted in a reduction in electricity demand and lower average prices than when the program first started. Detailed evaluation of potential CPI impacts, along with data on household energy usage and household income levels, can help draw a more nuanced picture for policymakers.

**Like other climate policies, the impacts of a CPI are generally concentrated in certain sectors, which can result in equally concentrated impacts on certain regions' and households' employment.** For example, emissions-intensive industries typically experience greater economic impacts than service-based industries. Industries such as coal mining and oil refining may become obsolete as a result of the global low-carbon transition and workers may require reskilling or retraining. These industries are often highly regionalized. Regions with high concentrations of emissions-intensive industries or that rely on extraction of fossil fuels may experience disproportionate economic impacts. In Canada, the province of Alberta accounts for 65 percent of Canada's coal-fired electricity generation, where the coal phaseout will lead to approximately 2,000 to 3,000 jobs being phased out by 2030.<sup>67</sup> Alberta has implemented a CAD 40 million

65 Dorband et al. 2019 and CPLC 2020. The corollary of this is that in countries where lower-income groups use fossil fuel-based energies there is a greater risk of negative impacts where there are high levels of poverty and measures are not taken to address these impacts.

66 Sager 2017.

67 Natural Resources Canada 2020.

transition fund that began operating in 2018 to finance support programs for affected coal workers.<sup>68</sup>

[Box 9](#) provides examples from the European Union (EU) on the sector-specific risks from decarbonization.

### Box 9 Sector-specific risks from a low-carbon transition

Coal production is highly regionalized in many jurisdictions, which means that the costs of decarbonization from reduced consumption of coal could be disproportionately concentrated.

In the EU, the coal sector faces significant transformation with the EU's ambition of climate neutrality by 2050 and with a broad package of policies from member states such as Germany targeting the phaseout of coal use. In the EU in 2020, 200,000 people were employed in the coal sector. Without support, it was estimated that around 160,000 of those jobs could be lost,<sup>69</sup> including up to 41,000 coal-related jobs in one coal region of Poland alone.

However, through the Just Transition Mechanism, investments in sustainable technologies and infrastructure, as well as the reskilling of workers, are expected to transform the EU's coal regions. These are expected to create up to 460,000 jobs by 2050, providing employment opportunities that should to some extent offset losses incurred in the coal sector.<sup>70</sup>

**Fairness is an important issue in assessing household impacts.** In the context of environmental policy, fairness is strongly linked to the concept of environmental justice (see [Box 10](#)). Environmental justice looks to deliver improved environmental outcomes while avoiding excessive costs on vulnerable groups, distributing environmental benefits and costs in a fair manner. Carbon pricing may reduce emissions cost-effectively, but this does not guarantee emissions are reduced everywhere or that they are reduced equally across a jurisdiction. However, carbon pricing will likely have beneficial distributional impacts, especially in the longer run. A shift toward renewable energy and electric vehicles will reduce domestic air pollution. This could have a proportionally greater beneficial impact on lower-income or minority households, which are less able to avoid pollution exposure.<sup>71</sup> This may reduce existing health inequalities, especially in heavily polluted cities where lower-income households are more likely to live in locations affected by poor air quality. Understanding these impacts and the communities affected is the first step in developing an appropriate response.

**Well-designed and carefully implemented CPIs can help mitigate potentially negative effects, provide support, and allow for fairer environmental outcomes.** Where energy costs make up a larger share of income in low-income households, a portion of the carbon revenues can be used to compensate these households via direct transfers. Governments can employ revenues to assist workers in sectors or regions that are highly affected by a carbon price. For example, in France, revenues from the EU ETS were targeted at improving the energy efficiency in homes occupied by low-income households. British Columbia's carbon tax recycles much of its revenue to households to largely offset price increases and has reduced emissions by 5 to 15 percent.<sup>72</sup> The example of the EU in [Box 9](#) demonstrates that with suitable provisions, decarbonization presents an opportunity for sustainable and inclusive growth. Further details on how to mitigate potentially negative impacts are set out in the World Bank's [Using Carbon Revenues](#).<sup>73</sup>

68 For more on the program see Government of Alberta 2021.

69 Alves Dias et al. 2018.

70 Zoi et al. 2020.

71 Sun et al. 2017.

72 Murray and Rivers 2015.

73 World Bank 2019.

### Box 10 Approaches to environmental justice

Environmental justice is concerned with delivering ambitious emissions reductions to mitigate the effect of climate change, while avoiding excessive costs on vulnerable groups both domestically and internationally. Climate change is the greatest risk for the countries that are least able to deal with the consequences. Of the 50 most vulnerable countries to climate change, only two are classed as high- or upper-middle income.<sup>74</sup> Domestically, there is a risk that climate action may have a disproportionate and negative impact on vulnerable groups, for example, through rising energy prices.

An important part of environmental justice relates to the costs of climate action, and which domestic groups bear these costs. Carbon revenues can be targeted to disadvantaged communities to address domestic environmental justice and fairness concerns. For example, California requires at least 35 percent of ETS auction revenue to be spent on projects that benefit disadvantaged communities. In 2019, almost USD \$2 billion in projects was implemented, with more than half going to disadvantaged and low-income communities. The projects include training and job replacement programs in low-emission truck driving and welding, as well as improving drinking water systems to ensure adequate and safe drinking water supply. Revenue generated from RGGI is predominantly spent on energy efficiency and renewable energy. This aids poorer households (as they spend a higher percentage of their income on electricity) and reduces their pollution exposure.<sup>75</sup>

Another facet of environmental justice is ensuring the broader benefits of climate action (such as lower levels of air pollution) are reaped fairly. Requiring offsets to be based domestically is one aspect of carbon pricing design that can encourage investment in projects that aid domestic environmental justice. For instance, from 2021 in California, no more than one-half of the quantitative usage limit for offsets can come from projects that do not provide direct environmental benefits in the state.<sup>76</sup>

**Understanding the impacts on households requires assessing how prices and employment are distributed among different communities.** This could include considering income levels, geography, and other characteristics.

**A range of methods can be used to understand the household impacts.** Formal modeling of consumer price changes is well established, often through methods involving social accounting matrices. These matrices detail how expenditures flow among the different groups of society; for instance, showing how energy costs may impact different households or income groups. Social accounting matrices are often available from finance or employment ministries, or alternatively through academic research. The impact on different income groups is a common concern so they are often modeled. Other groups impacted by, for example, age, gender, geography, or minority community can also be modeled. In identifying the impacts of a potential UK carbon tax on households, five characteristics were considered: income, occupancy, fuel type used, fuel poverty status of the household, and tenure and construction features. The impact of the carbon price on different income levels was also modeled. The results were presented by region.<sup>77</sup> Further guidance on developing a modeling approach is discussed in [Section 3.2](#) and [Attachment 5](#).

**Alternative methods of impact assessment can be valuable; market research and household surveys can be tailored to the primary concerns of the policymaker and can provide both quantitative and qualitative data.** Stakeholder engagement is important in understanding why households are unable to offset higher costs, which can help policymakers decide what kind of additional support is required (see [Section 3.1.4](#)). Policymakers may be able to adapt existing survey data to the needs of their household impact assessment. For example, national statistical bodies may have existing research on living costs and energy expenditure by households. The policymaker can complement this with the simple cost pass-through models described in [Section 3.1.1](#) to make an initial estimate of the impact of the carbon price on energy expenditure.

**Strategies to address household impacts need to be considered as part of the broader policy recommendation.** The role of carbon pricing and supporting policies in the policy mix is discussed in detail in the PMR's and ICAP's *Emissions Trading in Practice Handbook* and in the PMR's [Carbon Tax Guide](#).

### 3.1.3 Other stakeholders

**Carbon pricing has wide-ranging impacts and requires coordination across government and engagement with broader civil society.** Certain service sectors, like auditing and advisory services, will also be impacted by

74 ND-GAIN 2020.

75 RGGI 2020.

76 Center for Climate and Energy Solutions 2020.

77 Burke et al. 2020.

the CPI. Further, the impacts of a CPI on businesses and households also implies engagement of specific interest groups such as business associations, environmental groups, and labor unions.

**Introducing a CPI will have implications across government.** The choice of CPI often determines which ministry has policy responsibility. Carbon taxes are usually the responsibility of Finance Ministries that administer tax systems, while ETSs are often administered by Environment Ministries as part of their broader environmental portfolio. The ministry that controls a given policy should nonetheless consider impacts on other parts of government. For instance, the emissions reductions outcomes from a carbon tax have clear implications for an Environment Ministry's work to achieve a jurisdiction's climate target. Similarly, revenue from an ETS will impact a Finance Ministry that is interested in the government's overall fiscal balance. Given the high interest in fiscal impacts, these are often included in modeling (see Section 3.2). Ministries that represent business and industry covered by the carbon price are a good candidate to engage with these sectors but will likely experience lobbying from industry to scale back the carbon price, or to provide additional support. A carbon price can also result in new requirements on monitoring and enforcing bodies, as well as having funding implications on regional and city-level bodies. Covering sectors, for example waste or power, that may be run by regional governments could result in higher costs faced in providing these services, and a worsened fiscal balance.

**The lead ministry should engage with and consult other government departments to build understanding and communicate potential impacts.** Mapping the responsibilities of key ministries and agencies will help identify those that should be prioritized in engagement. The identifying policy interactions attachment (Attachment 1) can help policymakers decide which areas of government should be engaged with both from the outset and throughout the development of the CPI. It is important to consult between government levels. Depending on the jurisdiction, strong coordination between national government and regional government may be required. Extensive and early engagement is vital in cases of strong opposition or disagreement between national and regional governments. Building understanding of each parties' responsibilities and of key aspects like revenue uses and impacts on local industry are likely to be important topics.

**The impacts of carbon pricing on particular groups or outcomes may be the focus of civil society organizations.** Impact assessments and modeling can identify and/or respond to concerns of these groups. For instance, traditional Computable General Equilibrium

(CGE) modeling could be done alongside models that estimate local benefits like health outcomes from air quality improvements. For instance, environmental organizations will be interested in the impact on emissions and related environmental outcomes such as biodiversity, air, and water pollution. Social organizations representing underprivileged groups may be interested in the distributional outcomes from CPI implementation, while labor unions may be interested in the impact on employment outcomes for their members (see the discussion on assessing household impacts in Section 3.1.2). Understanding these groups, and listening to their interests and concerns, is important for managing the social impacts of carbon pricing and its ultimate acceptance.

### 3.1.4 Stakeholder consultations

**Stakeholder priorities and views will vary among groups.** As described in previous sections, the CPI will elicit different opinions and views from a range of stakeholders. It is important to understand these views, communicate policy measures that will counteract negative impacts, and, where misconceptions arise, provide a forum to correct them. Stakeholder consultation can also draw out impacts that may otherwise be missed to improve the accuracy of the impact assessment. Research may be needed to get a better understanding of stakeholder profiles and their values. For example, there may be strong public interest in specific mitigation options (such as forestry projects with broader environmental benefits) and views regarding particular CPIs (such as opposition to carbon taxes from business groups or skepticism regarding ETSs from civil society groups). Details on how to map stakeholder interests and views are discussed in the PMR's and ICAP's *Emissions Trading in Practice: A Handbook on Design and Implementation*.<sup>78</sup> The World Bank's *Guide to Communicating Carbon Pricing* provides further details on best practices for stakeholder engagement.<sup>79</sup>

**Consultations are important in understanding these views.** Consultations should be open and transparent to provide individuals and groups with sufficient opportunities to engage. This engagement can be used to inform and gather views on the findings of an impact assessment and provide inputs for the development of a communications strategy. Consultation should include internal stakeholders like government ministries with responsibilities that would be affected by climate policy, and external stakeholders like businesses and households.

**Different avenues of communication should be used for different stakeholders.** Workshops and panel discussions are good ways to consult with business and government. Public consultations provide an opportunity for engagement with representative bodies and civil society

<sup>78</sup> PMR and ICAP 2021.

<sup>79</sup> PMR and CPLC 2018.

that represent the concerns of household groups. This multi-venue approach was used by Singapore, which held in-depth consultations with stakeholders using a range of formats.<sup>80</sup> These included bilateral consultations, sector group sessions, and engagement with industry associations to discuss key issues including CPI design; monitoring, reporting, and verification; and carbon leakage. Public consultation was used to receive input from civil society. Generally, they received feedback from environmental groups, academics, businesses, and individuals.<sup>81</sup> The most appropriate option for jurisdictions will likely be shaped by the local context, existing requirements and practices that outline the process for stakeholder engagement more broadly, and the availability of resources.

**Ensuring that groups of different income levels, ethnicities, and sectors are consulted and can provide their input will be important, especially in balancing out the inputs from larger and better-organized stakeholders.** As discussed above, utilizing different avenues of communication can facilitate inputs from a range of participants. However, other methods such as targeted consultations through focus groups or other consultative fora may also play a role, as certain groups may not have the same flexibility and resources to be aware of, attend, and meaningfully engage with these traditional avenues. This may also mean assessing the way in which information is presented. Policymakers should ensure this is clear and employ simple language. Citizens' assemblies are one approach to consulting with a broader range of groups. These are a deliberative body composed of randomly selected citizens who broadly represent the wider population. Through assessing the population's view on carbon pricing, citizen assemblies aim to build consensus and enhance legitimacy of the recommendation. The UK started a citizens' assembly in June 2019 to understand public preferences on how to tackle climate change, with the group delivering its recommendations in September 2020.<sup>82</sup> Demonstrating an understanding of the views expressed in consultation is important to gain support. A policy paper should seek to identify the key concerns and how these will be addressed. This shows decision-makers that potential impacts and stakeholder concerns have been considered.

## 3.2 MODELING THE IMPACTS OF CARBON PRICING

**Carbon pricing works through complex systems, and modeling is a useful tool to help understand the way in which a carbon price operates and how it can affect a wide range of stakeholders.** This can be fundamental to building an evidence base regarding the economic impacts

of a CPI and advise on specific design considerations, such as the stringency of a carbon tax rate or ETS cap. Models have the benefit of allowing policymakers to simulate a variety of policy designs. Comparing modeling results from these different designs can help improve CPI design and identify key potential risks. With opposition to carbon pricing often framed as concern over cost increases, modeling can be used to counteract negative or inaccurate narratives with compelling evidence to support the introduction of carbon pricing.

### **Modeling can provide useful insights but cannot precisely predict the outcomes of implementing a CPI.**

In the sections below the guide introduces the modeling approaches available and sets out the role and limitations of economic modeling, how to undertake modeling, and how to interpret and present results. While a powerful tool, modeling should be used with care and its findings considered alongside other quantitative and qualitative assessments.

#### 3.2.1 Introduction to modeling approaches

**Economic models come in various types and may use vastly different analytical approaches to reach an answer.** To introduce the range of options, the models are grouped based on the systems that they seek to understand. The model groups are summarized in [Table 3 \(Attachment 5 provides further details\)](#). The key model focus areas discussed in this guide are:

- ▶ **Integrated assessment models (IAMs):** IAMs develop long-run scenarios for climate impacts, technological developments, and biophysical systems, and are sometimes used for calculating the social cost of carbon.<sup>83</sup>
- ▶ **Macroeconomic models:** These are top-down multisector models with many inputs. They focus on assessing the impacts of CPIs on variables like GDP, gross value added (GVA), and economy-wide emissions.
- ▶ **Energy system models:** Bottom-up single-sector models with an emphasis on how CPIs impact the specific operation and composition of the energy system.
- ▶ **Land use models:** These models take account of biophysical (for example, water availability or carbon content of different vegetation) and economic characteristics to assess the impact of CPIs on land use and associated emissions, and usually provide spatial results.
- ▶ **Market models:** Models designed to provide insight into specific sector impacts of CPIs, the ways that carbon markets could develop over time and provide opportunity for capacity building.

80 National Climate Change Secretariat (NCCS) 2017.

81 NCCS 2020.

82 Climate Assembly 2020.

83 The social cost of carbon is the costs associated with emitting one ton of CO<sub>2</sub>e.

**Table 3** Types of models commonly used in climate policy analysis

Model focus	Model subtypes	Examples	Brief description
Integrated assessment models	Cost-benefit	DICE, PAGE	Simple economic and physical climate models to evaluate scenarios for climate impacts and mitigation pathways by comparing costs of climate impacts and benefits of mitigation.
	Global system models	REMIND-MAGPIE, MESSAGE-GLOBIOM	Complex technological, biophysical, and economic models that develop detailed scenarios for mitigation options, often combining energy system and land use models.
Macroeconomic	Computable General Equilibrium	VIEW	Detailed economic representations of relationships between industry sectors, consumers, and international markets.
	Dynamic Stochastic General Equilibrium	G-cubed	Models that assess interactions between the financial sector and other sectors of the economy (businesses, government, and consumers).
	Macro-econometric	E3ME	Models that use historical data to estimate relationships between key macroeconomic parameters for forecasting purposes.
Energy system	Whole energy system optimization	MESSAGE, REMIND, TIMES	Models that represent the energy system in detail, often at a global level, to identify key interactions and assess costs of different energy technologies.
	Electricity system optimization	WeSIM	Long-term electricity models that assess options for electricity generation and distribution to assist in network planning and investment.
	Electricity dispatch	PLEXOS	Models that seek to model the electricity sector in very short time steps to shed light on operational decisions and short-term system balancing.
	Simulation	MUSE	Bottom-up behavioral models that represent the behavior of heterogeneous agents to assess likely responses to changed incentives.
	Technology specific	Technology (such as solar, wind, battery, EVs)	Models of various forms developed to assess specific technologies, their pathways, costs, and mitigation potential.
Land use	Allocation optimization	MAGPIE GLOBIOM	Models that match specific parcels of land to optimal use given land characteristics and economic, climate, and policy scenarios.
	Econometric allocation	LURNZ	Models that use historical data to try to identify likely behavioral responses of land use to changed incentives.
Market	Competition models	Various proprietary models	Models that seek to assess likely production decisions given policy and cost scenarios for products/sectors when firms have market power.
	Allowance market models	Proprietary models such as from Refinitiv, BNEF, ICIS	Models that predict behavior and prices in secondary markets given policy and economic settings.

**Carbon pricing modeling can use a mixture of modeling subtypes and focuses.** For instance, a land use allocation model can be linked with an economy-wide model to assess wider impacts of a CPI's role in the agriculture and land sectors. As well as directly testing CPI design, modeling can also shed light on the trajectory of emissions and inform decisions on emissions targets.

A more detailed discussion of the role of modeling in this context can be found in the PMR's [Checklist on Establishing Post-2020 Emission Pathways](#).

**Box 11** describes the modeling technical summary attachment, which discusses the steps needed for successful modeling.

### Box 11 Modeling technical summary

Attachment 5 provides more detail on how policymakers can develop and undertake a carbon pricing modeling study. This sets out the key inputs to a modeling analysis. It then provides a summary of the different economic model types.

The modeling technical summary outlines the different types of models, categorized by their differing focuses. The table provides a description of what the model type does and how it works before outlining the strengths and limitations of the model type and what the model type presents as outputs. The table is designed to help jurisdictions form initial ideas on the models they would be interested in using.

### 3.2.2 Role and limitations of economic models

**Modeling often plays an important role in impact assessments, but it provides just one among several relevant inputs.** Models provide unique, quantitative insights but they must be considered alongside a wider set of evidence. Understanding the role and limitations of economic modeling is important in giving the modeling results the appropriate weighting in the recommendation paper.

**Economic models provide a quantitative framework that combines economic theory with data to create a simplified version of the world that can be used to examine policy questions and understand possible outcomes.** The “world” used in the model contains the essential components needed to answer the questions the model aims to solve. These components will themselves be simplified, and models are designed to only answer a specific set of questions. For example, a model to understand how climate policy may impact land use will focus on sectors like agriculture and forestry. Such a model can help policymakers understand how biophysical characteristics and economic and policy drivers relate to key outputs such as land use choice and productivity. The covered sectors in the model are expressed as simplified sets of equations that establish how the sector responds to a carbon price. However, these simplifications can mean that important interactions can be missed and important changes in the economy not included. For example, models of resource use in the 1970s and 1980s often failed to account for the innovation that pricing could stimulate and many erroneously predicted that energy resources like oil and gas would be exhausted within several decades.

**Models can identify which parts of the economy will likely experience the greatest impacts, and when additional policy action might be required to address adverse outcomes and unintended consequences.** For example, an economic model looking into the impacts on

employment may indicate that employment in the energy sector could increase from the introduction of a carbon price, but some heavy industry may suffer. Additional policy support for the heavy industry sector, like retraining programs, may be needed.

**Economic models can broadly project — but not forecast — the potential economic and social impacts of a CPI.** Many models provide outputs regarding important indicators such as carbon emissions, GDP impacts, energy costs, air quality, and distributional impacts, based on assumptions. The outputs from the model have a degree of uncertainty around them, particularly if they are making economic and emission projections. This uncertainty is often inherent in the complex systems being modeled where data is often imperfect, and simplified assumptions must be made about underlying economic activity. Model results provide a range of potential values insight into key drivers and guidance on the magnitude and direction of economic outcomes.

**Models can test a variety of CPI designs, which can inform policy choice.** For example, modeling different options for covering emissions sectors and sources can provide evidence on whether wider coverage substantively reduces costs or alters the energy mix. Assumptions made in modeling regarding business-as-usual scenarios may become invalid as circumstances change. Changes in technology and underlying economic conditions often have large impacts on business-as-usual projections. Policymakers need to account for any changes in external circumstances when interpreting modeling results.

**Modeling highlights the benefits from carbon pricing, including the benefits from increasing ambition over time.** Carbon pricing has a range of benefits (see [Section 1.1](#)) that modeling can quantitatively assess. Scalability is an important benefit of carbon pricing over alternative policies. Comparing the outcomes from reaching a jurisdiction’s climate targets with and without carbon pricing will likely highlight the benefits (including cost reductions) from a carbon price (see [Section 3.2.5](#)). The ability to ratchet up carbon pricing ambition over time means carbon pricing is a significant driver for future investment. Modeling can display the benefits from increased abatement investment made today by forward-looking actors who account for the increased ambition in their decisions. Earlier abatement is a key driver in minimizing the costs of climate action.

**One of the strengths of economic models is that they can identify unexpected benefits and costs arising from carbon pricing.** The nature of a model may mean that it picks up wider impacts than can be identified by other forms of quantitative analysis, such as interactions in complex, economic, energy, or biophysical systems. For instance, modeling can help quantify the potential implication of carbon pricing on household consumption, employment in

uncovered sectors, or land use response to carbon pricing signals. The extent to which models can identify unexpected impacts will depend on their specification and the number of variables modeled. Where important variables are omitted from the model these impacts will be missed. For example, economic models often do not account for innovation spillovers from technological change,<sup>84</sup> as well as the health and wider environmental benefits of climate mitigation that can be modeled through noneconomic models like dispersion models.

**Importantly, however, models are not suited to compare a carbon tax and an ETS.<sup>85</sup>** In theory, both instruments achieve the same objective of delivering a quantity of emission reduction at a given cost. Most economic models struggle to differentiate between different CPIs, which limits their use in assessing the impacts of different types of CPI. As such, modeling should only ever complement and support policy analysis and rationale for instrument choice as part of a more holistic consideration of the evidence base.

**Multiple models may be used to assess policy impacts and draw on different models' respective strengths.** In these cases, comparisons of outputs across models should be assessed carefully, as they may reflect different model setups, assumptions, or approaches. For example, estimates of cost impacts may differ substantially between a macroeconomic model, which considers interactions between sectors, and an energy systems model, which will only consider systems costs in the energy sector. The more that the same insight is found in multiple models or studies, the more robust that insight.

**Economic models usually do not model barriers to implementation.** One of the simplifying assumptions models usually make is that a policy is “perfectly” implemented, and that noncompliance and government failure are minimal. A policy option that may be preferred by a model may not be better in practice due to difficulties in implementation.

**Models often cannot account for large economic shocks and complex interactions between sectors.** The nature of many models allows for some shocks, like recessions, to be included in the modeling. However, shocks by their nature are unexpected in their arrival and unpredictable in their size. Shocks in the future are unlikely to have been perfectly modeled by those in the past. This includes negative shocks, like the timing and size of recessions, and positive shocks, like the introduction of new technologies. A similar argument extends to interactions between sectors. The interrelationships between sectors are often based on empirical data, meaning that future changes in relationships are unknown and cannot be captured with full certainty. It may be the case that the CPI itself changes the relationships between sectors, which may not be captured by the model.

### 3.2.3 Developing a modeling study

**A well-designed modeling study will incorporate several steps to ensure that it is fit for its purpose and identifies the information needed by a jurisdiction.**

Figure 12 summarizes the key steps in designing and undertaking a modeling study.

**Figure 12** Key aspects required when designing a modeling study

	Steps	Detail
 Identifying the right modeling approach	1. Modeling objectives	▶ Establish key modeling objectives based on key policy questions and stakeholder concerns; this will determine all the following steps of the analysis
	2. Inputs, outputs, and indicators	▶ Set out key data to prevent poor input data issues leading to inadequate depth and misleading conclusions of the modeling analysis; agree on key outputs and indicators
 Running the model	3. Reference scenario	▶ Establish a reference scenario (no carbon price) against which the carbon pricing options will be assessed
	4. Policy scenarios	▶ Develop policy scenarios that are reflective of country context, policy landscape, and emissions profile and vary in key carbon pricing design aspects (e.g., sector coverage, role of offsets)
 Interpreting and presenting results	5. Sensitivity analysis	▶ Identify and test key modeling sensitivities and uncertainties in order to check the robustness of policy scenario results
	6. Results	▶ Present modeling results using the key outputs and indicators helping to analyze the established policy questions

<sup>84</sup> International Monetary Fund 2019.

<sup>85</sup> Direct comparison between different CPI options requires considering a variety of factors, including some that are qualitative in nature.

**Policymakers may need to outsource modeling work, depending on the availability of in-house expertise and resources.** This guide contains an example terms of reference (TOR) document for a carbon pricing modeling project (see [Box 12](#) for details). This document should be used in conjunction with Attachment 5, which provides detail on modeling. The specific model to address the project scope will likely be left open for the bidder to decide. If policymakers are deciding on a modeling approach, the objectives and modeling of requirements should inform the model chosen.

#### **Box 12** Developing a modeling TOR attachment

[Attachment 6](#) helps policymakers draft a TOR for a project on modeling the impacts of carbon pricing.

The attachment provides recommended content, along with examples, of a TOR that covers the key aspects discussed in this section. The attachment covers background, project scope, tasks, main deliverables, input and coordination arrangements, level of effort, qualifications, budget and contract duration, and contacts.

This attachment should be used in conjunction with the modeling technical summary attachment, which provides detail on developing a modeling approach and main modeling types.

### **3.2.4 Identifying the right modeling approach**

**Before starting a modeling study, policymakers should first decide if modeling is even appropriate and feasible given the jurisdictional circumstances.**

For instance, insufficient time or difficulties in sourcing data may create barriers to modeling. These challenges can sometimes be addressed; for instance, jurisdictions may be able to fill some data gaps through methods such as the transparent use of assumptions, clearly indicating what assumptions are used and the data gaps these assumptions fill. In cases where modeling is not appropriate or data gaps cannot be overcome, impacts can be assessed by drawing on alternative methods as described in [Section 3](#).

**If modeling is pursued, policymakers should first decide on the objectives.** Modeling can require substantial time and resources to be done well, which will likely mean policymakers must decide on the key impacts they wish assessed. Understanding the key questions and impacts can help inform the type of model used. A number of factors, including the objectives and context of the CPI (see [Chapter 1](#)) or concerns raised in the initial stakeholder

engagement (see [Section 3.1.4](#)) can help identify issues of concern. Initial estimations through the more informal methods described in [Section 3](#) may help identify where formal modeling may be required. Understanding the context and key policy questions helps design a modeling approach that is tailored to address any evidence gaps.

Policymakers must then decide on the modeling specifications that meet these objectives. This requires

- ▶ **Identifying the required indicators and outputs:** Models have different outputs, where there is a need for the model to provide insights on certain indicators or potential outputs (e.g., impact on GDP or price levels). This can inform model choice. It is critical to make sure that the required indicators and output are well aligned with answering the policy question.
- ▶ **Identifying the required model functionality:** Models have specializations and specific capabilities that may be needed to answer a policy question. Some, for example, are global in nature and attempt to account for the integration of biological systems and regional economies. Others specialize in domestic electricity systems, while others have broader detail about the global energy mix and account for trade flows. Understanding these functionalities require a certain degree of technical understanding but can help ensure that the selected model is appropriate for its intended use.

**The objectives and areas of focus for modeling will influence the most appropriate model.** [Figure 13](#) presents a process policymakers can follow to help select the appropriate model for their policy questions.

[Table 4](#) provides an example of potential impacts that policymakers may wish to assess and the types of models that are most appropriate for assessing these impacts. [Attachment 5](#) provides examples of how policy questions can be linked to modeling output and functionality requirements.

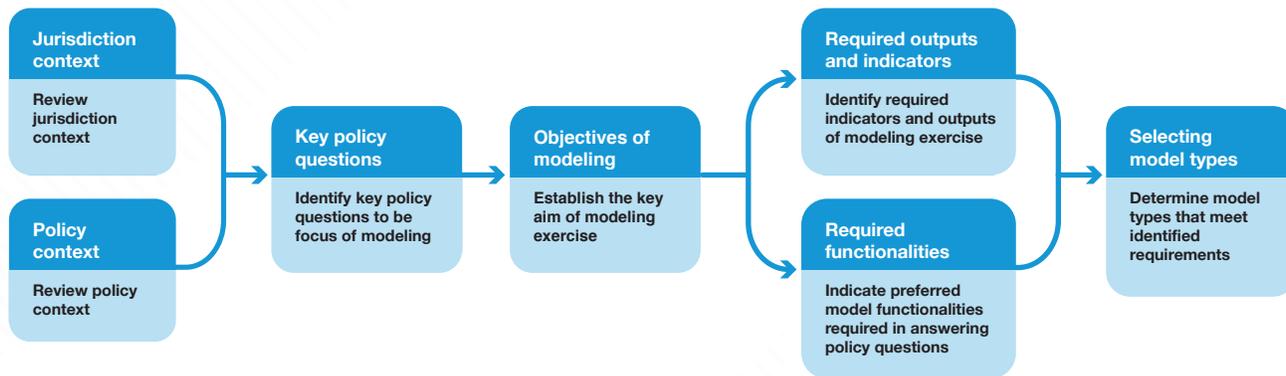
**Because of these different functionalities, jurisdictions may need to draw on a range of modeling approaches.**

For instance, modeling developed for Sri Lanka sought to provide policymakers with policy-relevant information on both the broad economic impacts and impacts on transport and electricity as key sources of emissions through the use of a CGE model linked with a transport sector model.<sup>86</sup> The outputs sought to identify the impacts of a carbon price on emission reductions and carbon revenues and to provide a sector-level breakdown of changes in GVA<sup>87</sup> and employment for different scenarios. These results were presented separately for transport and electricity generation so that the government could assess the different impacts across industry and households. Further, reductions in air pollution were quantified to

86 Vivid Economics 2019a.

87 GVA is a measure of the value of goods and services produced within a specified area, for example within a sector.

**Figure 13** Selecting a suitable model



**Note:** More information on jurisdiction and policy context can be found in Chapter 2.

**Table 4** Mapping of modeling and other approaches to assess potential carbon pricing impacts

	IAM	Macro-economic	Energy System	Land use	Market models	Household surveys*
<b>Businesses</b>						
Demand and supply changes		✓	✓		✓	
Production		✓				
Commodity prices	✓	✓	✓	✓	✓	
International competitiveness		✓				
<b>Households</b>						
Price and consumption impacts		✓	✓		✓	✓
Employment impacts		✓		✓	✓	
<b>Government</b>						
Climate impact	✓			✓		
Revenue impacts		✓				
Options for abatement	✓		✓	✓		

\*Household surveys are not a type of modeling but are commonly used to estimate household impacts.

illustrate the potential benefits from improved health outcomes by applying the modeling outputs to cost and mortality estimates from each pollutant. This showed both significant cost savings and reduction of deaths due to air pollution.

**The modeling options available to a jurisdiction may depend on the data available.** Models require a minimum level of data to run, with more detailed models requiring even greater inputs. Models covering the broad economic impacts of a carbon price are likely to have less-stringent requirements on data granularity but wider breadth of different data inputs across all sectors and activities. For instance, economy-wide models often draw on detailed input-output tables or social accounting matrices that track in detail the interactions between different broad economic sectors. In contrast, models looking at specific sectoral

impacts, such as agriculture and land use activities, would require a detailed data set on aspects such as activity emissions, food price indices, crop/forest yields, water availability, and expenditure shares or land use area metrics.

**Jurisdictions may not have all the required data available.** The existing data may not be specific or granular enough — if it is even collected at all in the jurisdiction. In these cases, data gaps might need to be filled by using assumptions or evidence from applicable sectors or countries, or by interpolating them based on existing trends.

**Successfully identifying the right modeling approach is important for developing a successful carbon price recommendation.** The model identification should be guided by objectives that reflect the areas of concern among policymakers and stakeholders, as well as

addressing gaps in the rest of the impact assessment. Quite often, models and the associated data will be designed or calibrated for a specific region, meaning a model that is appropriate for one jurisdiction may not be appropriate for another jurisdiction.

### 3.2.5 Running the model

**Modeling requires specifying scenarios, each of which is a different state of the world the policymaker is interested in.** A model scenario is a package of different inputs, constraints, and assumptions that reflect a pathway that policymakers are interested in. For example, one scenario may be a 1.5-degree scenario in which it is assumed the jurisdiction implements policies, including a sufficiently high carbon price, to be consistent with 1.5 degrees of global warming. An example of the interpretation of the model under this scenario would be “What is the optimal coverage of the carbon price, given its price is consistent with a 1.5-degree warming scenario?”

**The first scenario should be the reference scenario, which usually sets out the “business-as-usual” projections for emissions, economic growth, or other key variables.** All policy scenarios are compared to the reference scenario to estimate the impacts of specified changes to policies. It is important that the reference scenario accurately represents the current situation, including recent policy and economic developments. Therefore, the reference scenario will likely include established commitments, such as those set out in Nationally Determined Contributions or other policy commitments.

**Next, different policy scenarios can be defined that estimate the impact of implementing different policies, or in this case, CPI designs.** These scenarios should be designed to ensure that they are answering the question of interest to the policymaker. For instance, if the question relates to the cost of achieving different targets, then policy scenarios may test different levels of carbon tax or ETS cap to estimate the relative economic cost. On the other hand, if the question relates to the benefits of broader or narrower coverage, then the policy scenario might keep the same level of cap reduction or the same carbon tax rate while altering assumed coverage. Modeling will often include a scenario that uses alternative policies to carbon pricing to achieve the same target. This is often critical to help make the case for carbon pricing; comparison between reaching the same target with and without carbon pricing will highlight carbon pricing being the least-cost approach. [Box 13](#) presents two case studies of developing CPI scenarios in Mexico and the Philippines.

#### Box 13 Case studies: Development of policy scenarios

Policy analysis often assesses different policy scenarios based on alternative carbon pricing mixes.

Mexico examined four main policy options for carbon pricing, built around the existing policies: a “Limited ETS,” an “ETS Only,” an “Overlapping Tax & ETS,” and a “Hybrid ETS.”<sup>88</sup> These four options reflect different levels of sectoral coverage and policy mix.

The Philippines also modeled a range of CPI design features, including scope, cap design, and legal and institutional requirements. The four CPI options aim to address the interplay of different sectoral coverages (extending a cap from the power to include major industrial emitters); absolute and intensity-based caps; and a range of legal options for scheme compliance (from voluntary agreements to those requiring primary legislation).<sup>89</sup>

**Finally, the impact assessment should include a sensitivity analysis.** A sensitivity analysis can help to test the robustness of the modeling results by explicitly recognizing and assessing a range of assumptions and uncertainties. It shows when results are highly sensitive to assumptions and when they are robust to a range of circumstances. It can also identify the key drivers of modeling outcomes. By highlighting the range of possible outcomes, a sensitivity analysis can help identify the inherent uncertainties regarding the outcomes of policy interventions. This can help ensure modeling results are used appropriately. Sensitivity analysis will often focus on uncertain factors that are (largely) out of the control of the policymaker, which are often inputted as assumptions. A discrete set of uncertainties is often used for inputs where an extensive scenario analysis already exists. For instance, this could include rates of technological change, commodity prices, rates of economic growth, or exchange rates. Simple approaches to sensitivity analysis, like creating low, central, and high estimates of model inputs, are often used. More complex methodologies can also be used. For example, Monte Carlo simulations sample thousands or millions of variations in each uncertainty and are therefore useful when the range of the input uncertainty is less well known. Further details on scenarios and sensitivity analysis are provided in [Attachment 5](#) and in the PMR’s [Checklist on Establishing Post-2020 Emissions Pathways](#).<sup>90</sup>

88 GIZ GmbH 2017.

89 Economic Consulting Associates 2020.

90 PMR 2015b.

### 3.2.6 Interpreting and presenting results

**Modeling results must be interpreted with care because they represent simplified relationships operating under very specific assumptions.** Each model is created with a specific use in mind. Therefore, understanding model results starts with understanding these assumptions. Users of the model must ensure they ask the right questions to correctly interpret the results and understand key outcome drivers and which relationships are captured within the model's framework. Modeling is not a prediction of the future but rather aids in understanding how policies work and their key sensitivities.

**Models can be sensitive to small changes in the underlying assumptions, which can make it difficult to precisely identify the likely scale of impacts.** This could include a wide range of inputs such as price elasticities, business cost pass-through rates, and GDP growth rates. Similarly, when rates of change are rapid, as in the case of renewable technologies, a single assumption on the cost per unit of energy can lead to large modeling errors over short time periods. These sensitivities should be explored, understood, and clearly communicated when modeling results are presented.

**It can be useful to compare modeling results with other pieces of evidence to draw on a broader set of information.** This may include comparing the results to modeling studies with similar sectoral coverage, CPI design assumptions, and reported outputs and indicators. While studies will inevitably differ in certain elements, a comparison can be useful to help check results. Other evidence drawn from literature reviews, expert interviews, or country case studies can aid in assessing modeling results as well.

**A systematic way of comparing and contextualizing modeling results is through a literature review.** In some cases, various models may be used to examine similar policy issues using a variety of assumptions and methods. Comparison of these results can illustrate a range of possible outcomes from a given set of policy choices. This type of analysis was used in Canada's Mid-Century Long-Term Low-Greenhouse Gas Development Strategy, which compared the outcomes of various existing modeling studies to identify a range of potential pathways for long-term decarbonization.<sup>91</sup>

**When comparing modeling results to other studies, points that should be considered include**

- ▶ **The strengths and weaknesses of the analysis:** Quantitative approaches through modeling may have empirical rigor but struggle with some of the challenges mentioned in this chapter, such as struggling to account

for real-life imperfections in policy implementation. Qualitative analysis may provide nuanced insight that quantitative data cannot provide but may lack the scale of quantitative studies. When assessing the studies, policymakers should consider if the outputs of the analysis are of interest to the jurisdiction.

- ▶ **Sources of data and context:** Who was the analysis done by and what objectives could they be looking to achieve through the study? How applicable is the setting compared against the jurisdictions?
- ▶ **The policy being analyzed:** What similarities and differences are there between the policy analyzed in the study and the policies of interest to the jurisdiction?

**Modeling results can provide compelling arguments in support of carbon pricing and adds depth to an assessment of how the carbon price operates in the economy.** Modeling can counter common concerns and misconceptions around carbon pricing. For example, the results may reveal that the economic transformation stimulated by the carbon price is both possible and beneficial to the jurisdiction, and costs arising from the carbon price can be managed. Modeling can also identify when design choices lead to adverse outcomes that may need to be mitigated with policy. However, modeling can be incorrect or imprecise and needs to be viewed as one input to the decision-making process. The reliance of modeling on data, theory, and assumptions may generate misleading results if these inputs are not accurate. Decisions based solely on modeling also ignore other important considerations. The extensive work from earlier chapter topics, like mapping the local context, are equally as important in the decision-making process.

**Modeling cannot support effective policy unless it is effectively communicated.** Clear and jargon-free communication can help policymakers reach a wider audience. Carefully considered presentation will increase the impact of the results and improve the legitimacy of the decision-making process. Some practices that can be drawn on to ensure that modeling results are effectively communicated include

- ▶ **Explaining scenarios:** Any presentation of modeling results should first provide details on the scenario characteristics. For example, these might include the differences in carbon pricing design features like the tax rate or cap stringency or underlying assumptions like the GDP growth rate. The presentation of scenario results should indicate how they differ from one another and why. This information should be clearly illustrated via figures and/or tables. It is advisable to separate the presentation of central scenarios from sensitivities, so that audiences can better focus on how the results translate to policy recommendations.

- ▶ **Establishing time frames:** It should be clear what the time frame of the model is. This helps to identify the possible limitations of the modeling exercise; for instance, potential limits in considering long-term benefits such as improvements in the health and productivity of the labor force.<sup>92</sup> Results should clearly explain how the key outputs of interest are likely to change over time and why. This can help to assess whether costs are expected to fall over time or whether benefits are expected to accrue gradually over time or to peak after a certain number of years.
- ▶ **Providing sufficiently granular results:** Ideally, the reported results should be detailed enough so that they do not overlook important differences at more granular levels. This can shed light on aspects such as distributional and geographical differences or if the impacts are unevenly distributed across economic sectors. A potential approach to presenting detailed results is to first present an overview of the results before going into the detail. However, granular results are not always feasible given resource and modeling constraints, and in these cases the limitation of high-level results should be clearly outlined.
- ▶ **Using consistent units:** Results should be reported in commonly used units that allow for direct comparison. Further, it should be clear whether the outputs are absolute or relative terms; for example, GDP or GDP per capita.
- ▶ **Understanding modeling scope:** The presentation of results should be clear in terms of the type of sectors, stakeholders, and quantified impacts the model covers. Understanding the scope of the exercise can help assess the degree to which the actual benefits and costs of a carbon price may deviate from the modeling results.

- ▶ **Explaining key assumptions, sensitivities, and methodological approach:** A study should be clear on the key assumptions feeding into the model, the rationale, and the sources for these assumptions, as well as an overview of the modeling methodology. Explaining the assumptions made and the uncertainties in the model — for instance, the economic growth rate or development and cost of renewables — can present a clearer picture. The results can then be compared against other studies. The methodology discussions should describe the reference scenario and provide justification for its choice.

**Modeling complements and supports the wider analysis and rationale for carbon pricing, but it should not be the key factor driving policy decisions.** The policy recommendation paper should reflect this role, placing the modeling results in the wider jurisdictional context (see [Chapter 2](#)) and the broader evidence base being considered.

### 3.3 FURTHER GUIDANCE

The following resources provide useful additional detail relevant to developing an impact assessment:

- ▶ PMR (Partnership for Market Readiness), and CPLC (Carbon Pricing Leadership Coalition). 2018. [\*Guide to Communicating Carbon Pricing\*](#).
- ▶ CPLC (Carbon Pricing Leadership Coalition). 2019. [\*Report of the High-Level Commission on Carbon Pricing and Competitiveness\*](#).
- ▶ World Bank. 2019. [\*Using Carbon Revenues\*](#) (Technical note No. 16).
- ▶ CPLC (Carbon Pricing Leadership Coalition). 2020. [\*Distributional Impacts of Carbon Pricing on Households\*](#).

92 See the PMR's forthcoming *The Development Benefits of Carbon Pricing* and Hamilton et al. 2017.

## 4. REACHING A RECOMMENDATION

### Key takeaways:

- ✓ Reaching a recommendation on carbon pricing involves identifying key jurisdiction-specific issues, and understanding the time frames for adopting a carbon price.
- ✓ The design parameters of the recommended carbon pricing instrument (CPI) should reflect the jurisdiction's objectives, context, and capacity.
- ✓ Compelling policy papers will have a clear rationale for the CPI recommendations and demonstrate a good understanding of the key issues and how to address them.
- ✓ Next steps, responsibilities, and timelines for implementation should be laid out alongside recommendations.

**This chapter sets out how to distill key inputs discussed in the previous chapters into a carbon pricing policy recommendation, and how to communicate this recommendation effectively.** While the specific structure of recommendations will differ across jurisdictions, there are some common elements. This will usually include a discussion of the local climate policy context to set out the role a CPI may play in the broader policy mix and in meeting its policy objectives. The key parameters of the CPI will usually be defined; for instance, the type of CPI, as well as its scope and ambition. This recommendation should be backed by a rigorous analysis of the jurisdiction's policy landscape, stakeholder views, political constraints, institutional capacity, and possible economic impacts. Once the decision to implement carbon pricing has been made, further work will be needed for the detailed design and implementation of the CPI and to communicate with key stakeholders. While different jurisdictions may take different approaches to this process, the aim of such a recommendation is to get agreement within government to spur action and kick-start a process of policy development leading to implementation.

### **The recommended CPI and the role it plays within the policy mix can and should evolve over time.**

Jurisdictions have expanded coverage and increased ambition over time. The European Union (EU) emissions trading system (ETS), for example, started by covering the energy and industrial sectors and expanded to include domestic aviation in 2012. New Zealand's 2019 Climate Change Response (Zero Carbon) Amendment Act increased the ETS's ambition, legislating a 2050 net zero target for greenhouse gases (GHGs) (except biogenic methane), and expansion of emissions trading to the agriculture sector is being investigated.<sup>93</sup> Starting with a simple instrument and a low carbon price can be a useful strategy to overcome political resistance to carbon pricing. Scope and ambition can be expanded over time, preferably

through a defined mechanism or review points established at the introduction of the CPI.

### **The following sections set out the steps for translating evidence into a persuasive policy recommendation:**

- ▶ [Section 4.1](#) outlines the high-level process to systematically develop policy recommendations, including identifying key jurisdiction-specific issues, understanding their implications of the time frame for adoption and implementation, and balancing competing policy objectives to reach a recommendation; and
- ▶ [Section 4.2](#) identifies the material that should be covered in a policy paper that makes the case for carbon pricing.

## 4.1 SYNTHESIZING EVIDENCE

**Policymakers utilize a range of sources of qualitative and quantitative information to develop an appropriate carbon pricing recommendation.** This includes the elements outlined in this guide: stakeholder views and concerns, considerations related to the jurisdictional context, and empirical evidence on the impact and performance of the different CPI design options.

### **These different factors must be brought together in a systematic way to assess the options available.**

This section suggests one such process, including identifying key jurisdiction-specific issues ([Section 4.1.1](#)), understanding the implications of the time frame for adoption and implementation ([Section 4.1.2](#)), and making trade-offs between competing policy objectives to arrive at a recommendation ([Section 4.1.3](#)).

**However, jurisdictions can adjust this to meet their own needs.** Singapore, for example, followed a systematic approach to selecting a CPI, including assessing its local context, conducting broad stakeholder consultations,

learning from international best practice, and modeling impacts of different policy options. [Box 14](#) provides details

on Singapore's process of assessing options and its decision to implement a carbon tax.

#### **Box 14** Case study: Singapore's process for selecting a carbon tax

Singapore introduced its carbon tax in 2018 after undertaking a well-structured process for evaluating its options. Policymakers considered both a carbon tax and an ETS and decided to implement a carbon tax of USD 5 per ton of carbon dioxide equivalent (tCO<sub>2</sub>e). The tax covers facilities emitting over 25,000 tCO<sub>2</sub>e a year covering all sectors, and the revenues raised in the first phase are earmarked for abatement projects.

The National Climate Change Secretariat (NCCS) operated from the Prime Minister's Office to coordinate across ministries and ensure that the decisions aligned with broader national objectives. The NCCS led strategic decision-making including regarding the choice of instrument and level of ambition, while implementation (such as monitoring, reporting, and verification [MRV] design) was handled by ministries with relevant technical expertise.

Stakeholder engagement started early and continued throughout the design process. The government first indicated that carbon pricing was being considered as early as 2010, and soon after began a process of stakeholder engagement.<sup>94</sup> This was first targeted at large emitters that would be most affected by the CPI, but then expanded to smaller emitters and those that would be indirectly impacted. This early engagement provided time for feedback well in advance of policy implementation.

International experience was integrated into the evidence gathering process, with Singaporean policymakers meeting regularly with experts from other jurisdictions with CPIs. This helped build the capacity of policymakers and encouraged the sharing of key lessons. For instance, providing insights on how policies can evolve over time and the potential challenges that affect the functioning of the market, such as a small number of emitters in an ETS leading to low liquidity.

An investigation of the country's emissions profile and local policy context provided guidance on the most appropriate policy. Singapore's emissions are highly concentrated in a small number of firms with oil refineries and natural gas used in electricity, accounting for over 60 percent of emissions.<sup>95</sup> This concentrated market suggested a tax may be more appropriate. An ETS was likely to require more entities for a sufficiently liquid market and risked price distortions due to the market concentration in Singapore.

A clear set of objectives guided Singapore's CPI selection. Policymakers decided early on that they wanted a simple and easy to implement CPI that applied equally to all. It was also decided that the CPI's goal was to help provide a price signal rather than necessarily be the main driver of emissions reductions. These objectives, combined with the country's highly concentrated emissions profile and established governance and business capacity in taxation, pointed to a carbon tax. The carbon tax was designed alongside complementary policies to reduce emissions across the economy. This included energy efficiency standards for households and industry, investment in public transport infrastructure, and campaigns encouraging users to shift to less-polluting models of transport, as well as investments in renewable electricity generation.

Modeling was used to assess potential socioeconomic impacts. Policymakers were concerned about possibly negative impacts on households and a Computable General Equilibrium model was used to assess cost pass-through and how household expenditure would be affected by a carbon price. Simpler scenario-based models and calculators supplemented this modeling to inform the design of the CPI and related support packages.

There is also a clearly signaled plan for increasing the tax rate in the future, which allows businesses time to prepare. The tax will remain at USD 5/tCO<sub>2</sub>e till 2023, at which point it will be reviewed. The government has publicly stated that it intends to increase the tax to between USD 10/tCO<sub>2</sub>e and USD 15/tCO<sub>2</sub>e by 2030.<sup>96</sup>

94 Singapore's Prime Minister Lee Hsien Loong announced that the country worked with a shadow carbon price that might be made explicit if there was a global move toward emissions reductions in a speech at the Singapore International Energy Week in 2010. See Straits Times 2017.

95 NCCS 2018.

96 National Environment Agency 2020.

### 4.1.1 Prioritizing key jurisdiction-specific issues

**Policymakers considering carbon pricing will face a unique set of jurisdiction-specific conditions and challenges.** Part of the decision-making process is identifying these factors and understanding which ones are most relevant to carbon pricing policy. This entails an assessment of the local environmental, economic, governance, and political context as well as institutions' capacity for implementation as described in [Chapter 2](#). Of course, stakeholder views and the prevailing politics play a role in all jurisdictions, with impact analysis helping to distinguish the scale of impacts on different groups, as discussed in [Chapter 3](#).

**Key issues identified will in some cases have commonalities across jurisdictions but can also vary substantially.** For instance, in Singapore the key issues related to the challenges of implementing an ETS with a concentrated market and the desire for simplicity (see [Box 14](#)). This tilted the decision in favor of a carbon tax. The UK's decision was made against a broader set of issues following the UK's exit from the EU, including the future trade relationship with the EU, the UK's ambitious net zero policy and the limited implementation time frame available. These factors are described in more detail in [Box 15](#).

#### Box 15 Key issues in carbon pricing policy development in the UK

Following the UK's exit from the EU, the UK established a UK ETS to replace its participation in the EU ETS.<sup>97</sup> The UK considered a range of options, including a UK ETS and a carbon emissions tax. Each option had a wide range of implications when considered against the UK's existing policy context and constraints from the broader political environment.<sup>98</sup> The UK and the EU have agreed to cooperate on carbon pricing in the future and to consider linking their respective carbon pricing systems.<sup>99</sup>

Some of the key issues and trade-offs of potential relevance in this context include:

- ▶ **Integrated markets.** The EU is the UK's largest trading partner. Closely aligning the UK ETS with the design of the EU ETS has advantages in avoiding competitive distortions and ensuring a more cohesive policy suite in Ireland (including the Irish Single Electricity Market). Policy alignment can also simplify potential linking of the UK ETS to the EU ETS, which would provide further benefits through access to an established, large, and liquid market and policy continuity for UK firms. However, depending on the terms of any linking agreement, this could mean less flexibility to tailor the carbon pricing mechanism to the UK's context and additional constraints when considering collaboration with other carbon markets.
- ▶ **UK's 2050 net zero ambition.** The UK government has adopted a target to reach net zero GHG emissions by 2050. Achieving this goal is challenging and will require the adoption and expansion of incipient and as yet undeveloped technologies. In particular, the uptake of GHG reduction technologies at scale in the agriculture, industry, and energy sectors will be essential. The UK ETS can be aligned with a net zero pathway, meaning it can contribute significantly to achieving the net zero target. A linking agreement with any jurisdiction could have impacts on the UK's ability to achieve Net Zero, depending on the way in which the systems are linked, the respective size of the markets, climate ambition and other relevant factors. Linking could also support delivery of Net Zero as it enables emissions to be reduced where it is most cost effective.
- ▶ **Ensuring a well-functioning market.** A standalone UK ETS may face challenges in developing a robust carbon market. Given the relatively low levels of emissions covered by the UK ETS, it may be difficult to develop a liquid secondary market. Further, the close trade ties between the UK and the EU mean that managing competitiveness impacts from differential carbon pricing will be an important focus to avoid distortions. Linking with another market could reduce some of these challenges.
- ▶ **Timeframe for implementation.** The government needed to implement its carbon price by January 2021. Given the short time frame for implementing this policy, an ETS design broadly in line with the existing design of the EU ETS was a relatively easily deliverable option.

<sup>97</sup> See UK Government 2020a.

<sup>98</sup> See for instance Vivid Economics 2019b.

<sup>99</sup> See UK Government 2020b.

**Analysis of the potential impacts of different design parameters can be important for assessing trade-offs in CPI design and in developing companion policies in the broader climate policy package.** For instance, the modeling and impact assessment described in [Chapter 3](#) can be used to identify the necessary level of ambition and the roles of mitigation in different sectors. It may also identify the need to put in place companion policies to alleviate the impact of a carbon price on disadvantaged and disproportionately affected stakeholders. The jurisdictional context can also influence decisions regarding scope of the CPI by identifying emissions patterns and abatement options.

**CPI design should evolve with a jurisdiction's changing context and maturing capacity.** A CPI can be designed to enable the ratcheting up of ambition over time, through either tightened cap trajectories for an ETS or an increased tax rate under a carbon tax. This is consistent with global commitments outlined in the Paris Agreement. Gradually increasing ambition can allow liable entities to familiarize themselves with the CPI. Sometimes a lack of capacity, political barriers, or other context-specific factors can make it difficult to include certain sectors or sources of emissions under a carbon price from the outset. However, in the longer term, expanding coverage can help improve the cost-effectiveness of mitigation, the certainty regarding levels of emissions reductions, and the overall functioning of an ETS. Similarly, if it is not possible to introduce offsets at the start of the program, a jurisdiction may choose to introduce offsets at a later stage. Offsets enable jurisdictions to spread carbon pricing incentives further throughout the economy, but they can be complex to design in a way that ensures environmental integrity. As such, these may be a feature that is only introduced after the CPI has matured.

**Detailed information on designing carbon taxes and ETSs can be found in the Partnership for Market Readiness' (PMR) [Carbon Tax Guide](#) and [ETS Handbook](#) respectively.**

#### 4.1.2 Time frame for adoption and implementation of a carbon price

**The time frame for adopting and implementing a carbon price is a critical factor in decision-making, as short- and long-run considerations may differ.** These factors are often known to policymakers from the outset or are easily revealed through initial research on context and stakeholder impacts as described in [Chapter 2](#).

**In the short run, a jurisdiction is more likely to have its CPI choice constrained by capacity limitations or specific contextual factors, which often points to a carbon tax as the preferred option.** In particular, the

following factors might need to be considered in the short run:

- ▶ **Capabilities and capacity to implement a CPI:** For instance, it might be clear from an early stage that a lack of capacity of businesses would make an ETS difficult to implement without significant capacity development. This might sway policymakers in favor of a carbon tax in the short run, while retaining an option to move to an ETS in the future.
- ▶ **Economic barriers like market concentration or insufficient market liquidity:** This is a particular concern for small economies, where there may be insufficient market participants for efficient trading in an ETS.
- ▶ **Political barriers, particularly when there is a short time frame to introduce a CPI:** Given the greater complexity of an ETS, if a policymaker is seeking to introduce a carbon price in a short political window of opportunity, such as in the context of broader fiscal reforms, a carbon tax may be preferred. On the other hand, political aversion to taxes might mean a carbon tax is not viable in some jurisdictions.
- ▶ **Institutional or legal barriers to implementing a certain instrument:** These barriers could be overcome with time, but in the short run may rule out a particular instrument. For instance, in federalized systems, different (or multiple) levels of government may be responsible for implementing a carbon tax and an ETS.

**A focus on capacity building, education, and stakeholder outreach and engagement can help overcome many of these short-term constraints.**

This means jurisdictions can focus on longer-term policy objectives and considerations (see [Section 1.1](#)), which include

- ▶ **Certainty of emissions:** An ETS allows policymakers to set a cap on emissions, thereby making sure that emissions targets are met. This is a key benefit of an ETS, particularly as global ambition grows and targets are tightened. A tax may achieve a similarly ambitious outcome, but it is more difficult to predict the level of emissions reductions for a given tax rate in advance.
- ▶ **Temporal flexibility:** By allowing trade between entities and across time, an ETS gives regulated entities greater flexibility in their abatement choices. This means that an ETS responds automatically to economic shocks and allows firms to reduce emissions at the time at which it is least costly.
- ▶ **Cooperation with regional or international partners:** If cooperation is an important priority, an ETS may be preferred because it enables linking to carbon markets operating in partner jurisdictions without the need to explicitly agree on a common carbon price.
- ▶ **Price stability and innovation:** A consistent price signal helps provide assurance that carbon prices will remain in place to drive decarbonization, and

investments in innovative technologies are therefore required to operate effectively in the future. A carbon tax provides a stable, more predictable price that can provide greater certainty on investments. An ETS may improve price certainty through implementing a price or supply adjustment measure (PSAM).

- ▶ **Predictability of carbon revenues:** A carbon tax may be preferred if predictable revenue is an important priority. However, an ETS with a suitable PSAM can also achieve this.
- ▶ **Policy simplicity:** A carbon tax is preferable to an ETS if the jurisdiction desires a simple and familiar instrument. This may particularly be the case where local firms have experience with other energy or environmental taxes, or where the carbon tax can utilize an existing tax system such as excise taxes.

**Figure 14 summarizes the short- and long-term considerations that policymakers must balance to come to a recommendation on carbon pricing.**

**These dynamics highlight the potential for a jurisdiction to move to a different CPI or evolve the design of its CPI over time.** For example, sometimes a lack of capacity, political barriers, or other context-specific factors can make it difficult to include certain sectors or sources of emissions under a carbon price from the outset. However, in the longer term, expanding coverage can help improve the cost-effectiveness of mitigation, the certainty regarding levels of emissions reductions, and the overall functioning of an ETS. Depending on the nature of the constraint faced, a jurisdiction may choose to take the time to address it, for instance by building capacity or altering institutional arrangements, or the jurisdiction may choose

to implement an alternative CPI design, with the option to adjust this design at a later point in time.

### 4.1.3 Balancing policy objectives

**To reach a recommendation, policymakers often need to make trade-offs between various policy objectives and stakeholder views.** For instance, a jurisdiction may have a short time window to implement a carbon price (which might incline it toward a carbon tax), but also require the policy to deliver certainty over emissions reductions (which is more easily achieved through an ETS). The jurisdiction might also receive conflicting preferences from different stakeholders, or mixed opinions from the same group of stakeholders.

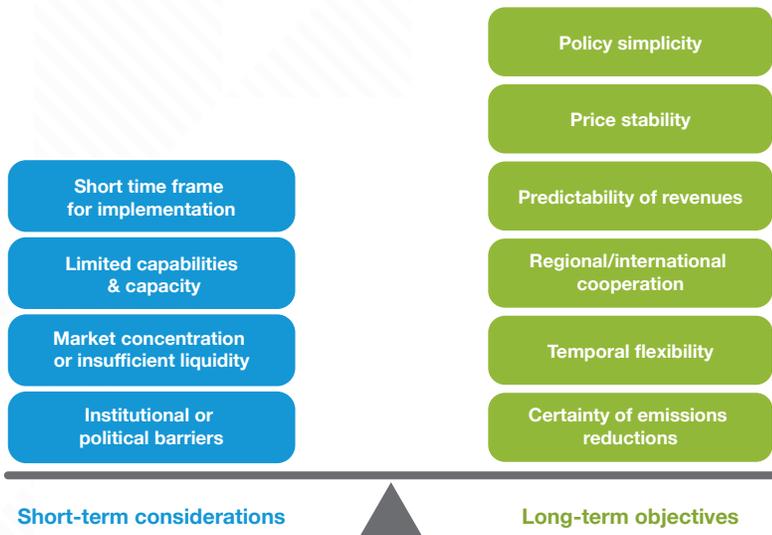
**Policymakers will then need to prioritize these factors and accommodate conflicting factors through policy design to the extent possible.** The eventual ranking of issues will often result from a process of contestation among groups both within and external to government. However, some views and concerns will be more relevant than others. All concerns should be taken seriously and responded to, but not all inputs will require policy adjustment.

**Some tensions in objectives can be allayed through instrument design.** For example, jurisdictions may want to achieve a certain emissions target while also raising a certain amount of revenue. In this example, opting for an ETS with a price floor or designing a carbon tax that can be flexibly adjusted could go some way toward achieving both these goals. Similarly, a jurisdiction may lack the capacity to implement an ETS but find that a carbon tax would face significant political opposition. This might lead

policymakers to implement an ETS with limited scope, begin carbon pricing with a time-limited, voluntary pilot ETS, or use other companion policies while businesses and regulators build capacity.

**Competing priorities can also be addressed by staging of policy changes to ensure the design of a CPI evolves in line with a jurisdiction’s longer-term objectives.** For instance, a CPI could be implemented gradually, initially starting with a relatively simple instrument design, and gradually increasing the complexity to address additional objectives as capacity and experience build. Establishing a clear time frame and plan for expanding coverage can enable the implementation of a CPI in the short run, while these barriers to more comprehensive coverage are addressed. Similarly, a CPI can be designed to have low impact in its initial years while participants and the general public adjust to these costs,

**Figure 14** Jurisdictions must balance short-term and long-term considerations



before ratcheting up ambition over time consistent with the jurisdiction's targets. This could be achieved either through tightened cap trajectories for an ETS or an increased tax rate under a carbon tax.

**Ideally, through this process of balancing competing objectives, jurisdictions should narrow their CPI design options down to one option or a short list, which can be presented to stakeholders for formal consultation.**

The approach to soliciting early feedback on policies will differ across jurisdictions but requesting such feedback can be an important way of identifying potential issues before policy design has progressed too far. Jurisdictions may choose to write an “options paper” detailing the CPI design choices under consideration, convene an intergovernmental task force, conduct opinion polls, have consultations with individual groups of stakeholders, and/or have a wider public consultation.

## 4.2 COMMUNICATING THE RECOMMENDATION

**The final policy recommendation, and the process of developing this recommendation, typically needs to be consolidated into a persuasive policy paper for government decision-makers.** This paper distills the internal process of policy development and the evidence that backs up the recommendation into a clear narrative

that can be easily understood. The paper should address any known points of contention in advance to preempt political pushback where possible. Finally, to avoid lags in implementation, the paper should also outline concrete next steps, assign responsibility, and suggest timelines. With this road map in place, a jurisdiction can move on to developing the detailed policy design, processes, and institutions.

**Providing a transparent and comprehensive document can generate confidence that the policy is well thought through and is the best one for local circumstances.** It can demonstrate that stakeholders' concerns have been taken into consideration. In addition, providing information on the expected sources of mitigation, planned use of revenues, potential development benefits, and the effects on households and businesses can reduce uncertainty and highlights the various benefits of carbon pricing.

**This section sets out the key elements that should be included in a recommendation paper, as summarized in Table 5.** Specifically, the rationale for policy intervention (Section 4.2.1); the policy options available (Section 4.2.2); stakeholder views (Section 4.2.3); the policy recommendation (Section 4.2.4); and conclusions and next steps (Section 4.2.5). These topics should be summarized at the start of the recommendation paper in an executive summary and then discussed in detail in specific sections outlined in the table below.

**Table 5** Mapping between policy paper topics and content of this guide

Policy paper topic	Policy paper subtopic	Corresponding section in this guide
Rationale for policy intervention	Problem statement and global context	Section 1.1. The case for carbon pricing
	The government's objectives, and jurisdictional context (emissions profile, economic profile, sociopolitical context and existing legal and regulatory framework)	Chapter 2. The jurisdictional context
Policy options available	Types of policy instruments along with advantages and disadvantages	Section 1.2. Carbon pricing options
	Quantitative impacts of each option on key stakeholders	Section 3.2. Modeling the impacts of carbon pricing
	Role of carbon pricing in the broader climate policy mix	Section 1.3. The role of carbon pricing
	The CPI's interaction with other companion policies	Section 1.5. Interactions of carbon pricing and other policies
Stakeholder views	Views and positions of key stakeholders	Section 3.1. Stakeholder impacts
Policy recommendation	Policy recommendation and key design features	Section 4.1. Reaching a recommendation
	Rationale for the recommendation including key evidence	Section 4.1. Reaching a recommendation
	International case studies	Section 1.6. Learning from other jurisdictions
Conclusions and next steps	Next steps of action if implementation is approved	Next steps are specific to a jurisdiction and the instrument chosen. Detailed guidance on instrument design is available in the PMR's <i>ETS Handbook</i> and <i>Carbon Tax Guide</i> .

**This report also includes an attachment on developing a policy paper (see Box 16).** It captures best practices for writing such a paper and the key set of evidence needed to present a recommendation to adopting a CPI. The World Bank's *Guide to Communicating Carbon Pricing* provides more detail on how policymakers should communicate to different audiences, including how to translate highly technical concepts into simple persuasive language.

#### Box 16 Recommendation paper best practice

The recommendation paper best practice (see Attachment 7) provides guidance on developing a clear, concise, and persuasive document to present the CPI recommendation to stakeholders.

### 4.2.1 Rationale for policy intervention

**The paper should start with a problem statement, explaining the need for this recommendation paper.** Often this is the importance of action on climate change, and how urgent and coordinated action is needed. Policymakers may also choose to position the issue differently, focusing on the broader benefits of carbon pricing, such as revenue generation or reduction in air pollution. This helps frame the discussion, identify the problem policymakers are trying to solve, and highlight the positive impact of carbon pricing.

**This introductory section can also briefly outline the context for emissions reductions.** This includes discussing the local and global impacts of climate change, global environmental goals on mitigating the effects of climate change (for instance, through the Paris Agreement), and the jurisdiction's commitments to this end. For countries, these commitments are typically in the form of a Nationally Determined Contribution, which sets out commitments and requires policy instruments that support long-term decarbonization and increased ambition over time.

**Policymakers should then establish a case for government action, describing how carbon pricing provides an incentive for businesses and individuals to reduce GHG emissions.** It should describe what existing policies would achieve, gaps to achieving the jurisdiction's mitigation targets, and what the consequences of inaction are. It should also describe the potential benefits of a low-carbon economy for the jurisdiction, such as the growth of new sectors and job generation. The wider objectives of the carbon pricing policy should also be clearly detailed, such as supporting low-carbon investment, reducing air pollution, raising revenue for investment into social or environmental goals or removing distortionary taxes, or facilitating international cooperation.

**The policy paper should identify the government's objectives and describe how a carbon price and the various CPI options align with these objectives.** Describing how a CPI can help meet government priorities is a persuasive argument for carbon pricing. It also helps decision-makers understand the trade-offs involved in choosing a particular instrument or design element.

**Finally, this section should highlight how the jurisdictional context influences the recommendation.** It should underscore how the choice of policy instrument depends on the jurisdiction's emissions and economic profile, legal and institutional considerations, political preferences, and business and regulatory readiness. The questionnaire (Attachment 2) provides a framework to think about issues that should be addressed. It can also describe temporal dynamics, discussing the short-term constraints as well as long-term objectives.

### 4.2.2 Policy options available

**This lays out a list of policy options suitable to the jurisdictional context.** This may include relying solely on regulatory instruments, which prescribe the technologies and standards required to reduce emissions, using a carbon tax or ETS, a crediting mechanism, or a combination of these approaches. It also lays out the options for key design features such as scope and ambition. Policymakers may wish to provide brief qualitative reasoning to demonstrate why these options were chosen and others were not.

**Crucially, this section should explain the advantages and disadvantages of each option.** The qualitative and logical assessment of each option should be laid out clearly. Where possible and where useful, this assessment should be substantiated with quantitative and modeling outputs. This should draw on analytical work done to assess the impacts on stakeholders in addition to wider evidence sources. It should distill the key results of the impact assessment (see Section 3), reporting high-level indicators such as effects on GDP, electricity prices, jobs, and health outcomes. Analytical evidence should be supported with a brief overview of the methodology and uncertainties around the results. While it is important to share quantitative evidence used for evaluation in order to be transparent, presenting modeling outputs in the body of the paper can be confusing and overwhelming for nonexperts. The key messages from the analysis should be presented but detailed outputs should be left in an annex (see Attachment 7 for more information on recommendation paper best practices).

**Finally, this section should explain the role envisioned for the CPI within the wider climate policy package.** This includes the extent to which the CPI drives decarbonization, as well as how it will interact with other companion policies. This may be of interest to other

government departments or ministries because it might affect the policies they have implemented. The policy interactions attachment ([Attachment 1](#)) can be used as a guide for discussing and presenting these interactions.

### 4.2.3 Stakeholder views

**This section summarizes stakeholder views and how the recommended policy has been shaped by these views.** This includes views from businesses, households, other government departments, and any other relevant stakeholders. It should clearly set out how each group's views were taken into account in developing the policy, and how any issues raised will be resolved (either through the choice or design of the CPI, or through companion policies).

**The purpose of this section is to make clear the likely positions of stakeholders and the balance of support and opposition to the proposed policy design.** It recognizes that stakeholders should be active participants in the policy-making process, and that they will bring specific interests and preferences to the policy discussion. These insights on stakeholder views complement the assessment of specific impacts of the policy on these stakeholders and potential policies to mitigate negative effects outlined in the sections above.

### 4.2.4 Policy recommendation

**This section outlines the recommended CPI and key design features and provides a synthesis of the arguments supporting the decision.** This section should synthesize the process followed for arriving at the recommendation and any relevant evidence that was used to make the decision. The rationale for the decision will draw on different sources, and it is important to lay the arguments out clearly.

**Where possible, the recommendation should also set expectations for the long-term trajectory of the carbon pricing policy.** This can include establishing long-term targets and plans for evolution of the instrument (for example, a timeline for increasing the scope, price, or stringency, or moving to a different type of CPI).

**Providing international case studies can also add credibility, particularly when the jurisdictional contexts are similar.** Case studies provide concrete, practical evidence on the effectiveness of carbon pricing. They can also help disseminate good practices and allow for learning from others' experiences designing and governing markets.

### 4.2.5 Conclusions and next steps

**The conclusion should summarize the outcomes of the analysis undertaken in relation to the suitability of a carbon price and its potential role in the policy mix, and the recommended instrument.**

**It should clearly state what remains to be decided and the next steps in the process.** This includes decisions regarding the detailed design of the instrument, or issues related to practical implementation. For example, if policymakers have recommended a tax, implementation may only require small add-ons to existing policy frameworks. Where MRV and other systems do not exist, work will have to be done to establish them. If policymakers have recommended an ETS, it will be necessary to design infrastructure that facilitates issuance and tracking of allowances. Policymakers should also highlight where additional stakeholder consultation or further impact assessments may be needed. Last, policymakers could also schedule regular review periods to assess the progress toward implementation and determine whether the recommendation requires updating. CPI design is an ongoing process that should be revisited as capabilities and circumstances evolve.

**Where possible, this section should identify responsible entities to carry out the next steps and propose an implementation timeline.** This gives impetus to decision-makers and provides a clear path to implementation. It can also provide planning certainty for business and other stakeholders.

**Finally, it could collate resources to assist with implementation.** This includes not only other guides and handbooks, but also recommendations for technical experts and academics, institutions that may be able to provide guidance, and contacts for decision-makers in similar jurisdictions.

## 4.3 FURTHER GUIDANCE

The following resources may provide useful guidance on developing and communicating a recommendation:

- ▶ PMR (Partnership for Market Readiness), and CPLC (Carbon Pricing Leadership Coalition). 2018. [Guide to Communicating Carbon Pricing](#).
- ▶ Eden, A., M. M. De Oca, and C. Haug. 2019. [Striving to Keep ETS Simple: Current Practices to Manage Complexity in Emissions Trading](#).

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# ATTACHMENT 1: IDENTIFYING POLICY INTERACTIONS

## Carbon pricing instruments (CPIs) operate within a complex policy mix and will interact with other policies.

CPIs have a wide reach by design, often impacting much of the economy. This means they will overlap in areas with existing environmental and economic policy.

## Policy interactions will alter the functioning of a CPI.

There are three forms of interaction between policy: complementary, overlapping, and countervailing effects.<sup>100</sup> Complementary policies improve the functioning of a CPI. Overlapping policies replicate the incentives provided by a CPI and overall do not impact the functioning of the CPI significantly. Countervailing policies are those that oppose incentives created by the CPI and worsen its functioning.

Identifying the nature of the interactions will help improve the design of the CPI, allowing it to be sensitive to the existing policy mix, and where existing policy may need to change.

**This attachment provides a framework to assess the policy landscape and how it will impact a CPI.** [Table 6](#) provides examples of policies categorized by the most prevalent form of interaction. [Table 7](#) provides a blank table for policymakers to fill in to assess their own policy mix. [Table 8](#) provides a worked example of how a jurisdiction may assess the interactions between a CPI and existing or upcoming policies.

## A1.1 CLASSIFICATION OF POLICIES

**Table 6** Indicative examples of policies that interact with the CPI

Category	Policies
Complementary	<ul style="list-style-type: none"> <li>▶ Electricity market reform to allow cost pass-through and ensure the carbon price signal is reflected in electricity dispatch and future market investments</li> <li>▶ Land tenure reform to provide clear property rights</li> <li>▶ Energy efficiency financing to reduce financial barriers to uptake</li> <li>▶ Low-carbon industry financing to address financial barriers to uptake</li> <li>▶ Incentives for flexible grids (smart grids, demand side response, storage)</li> <li>▶ Weather forecasting services for renewables</li> <li>▶ Support for electric vehicles charging infrastructure</li> <li>▶ Financial market regulations for secondary emissions markets</li> </ul>
Overlapping	<ul style="list-style-type: none"> <li>▶ Fuel and energy taxes</li> <li>▶ Renewable energy support measures such as feed in tariffs</li> <li>▶ Energy efficiency support measures such as green certificates</li> <li>▶ Waste management and landfill regulations</li> <li>▶ Environmental emissions regulations and standards</li> <li>▶ Applying a social carbon price in regulatory investment decisions</li> <li>▶ Regulation of land use and forestry/deforestation</li> <li>▶ Payments for ecosystem services (e.g., paying farmers for biodiversity outcomes)</li> </ul>
Countervailing	<ul style="list-style-type: none"> <li>▶ Fossil fuel subsidies</li> <li>▶ Industry support mechanisms that promote expansion of high carbon production</li> <li>▶ Subsidies for land use change such as forest clearing for agriculture</li> <li>▶ Subsidies for private cars and transport</li> <li>▶ Tax rebates on high-emission cars</li> <li>▶ Disproportionate planning barriers for renewables projects</li> </ul>



### A1.3 WORKED EXAMPLE

The table below provides a worked example of potential policy interactions for a hypothetical jurisdiction. The table is written with the assumption that emissions in a given sector are also covered by a CPI. Some policies might be complementary or overlapping in different circumstances; where this is the case the table below focuses on examples of overlapping policies as these require careful management. This aims to guide the areas that policymakers should consider when thinking about the interactions.

**Table 8** Worked example of policy interactions for a hypothetical jurisdiction

Sector	Policy	Type	Potential Interaction with CPI
Financial	Financial market regulation of carbon markets	Complementary	Applying financial market regulations to the operation of the secondary carbon market could improve confidence in the market, spurring greater liquidity and improving secondary market functioning.
Electricity generation	Electricity market reform	Complementary	Enabling cost-reflective electricity dispatch and allowing cost pass-through, which allows downstream consumers of electricity to respond to the carbon price signal, which is reflected in greater emissions reductions under a carbon tax and/or lower carbon costs under an emissions trading system (ETS).
	Fuel taxes	Overlapping	Raising the price of fuel prompts consumers to use less of it, or switch to renewable energy technologies. This provides the same incentives as the CPI (in the short term) to reduce fuel use, which is reflected in greater emissions reductions under a carbon tax and/or a lower carbon cost under an ETS.
	Electricity subsidies	Countervailing	Electricity consumption subsidies act as a negative carbon price, making it cheaper for actors to undertake activities that increase emissions. These subsidies decrease the incentive to reduce electricity consumption and can hinder the effect of a CPI, reducing the level of abatement that occurs under a tax or increasing cost under an ETS.
Buildings and construction	Energy efficiency standards for buildings	Overlapping (and complementary)	These standards ensure that buildings have a minimum level of energy efficiency, reducing direct and indirect emissions from buildings. This can duplicate the incentives provided by the CPI to reduce energy consumption. However, it may also complement a CPI by addressing behavioral barriers to investment that the CPI does not address.
	Building ambient temperature standards	Countervailing	Ambient temperature standards for buildings may result in increased fuel consumption from air conditioning or heating. Regulations to maintain specific temperatures are often essential for comfort, health, and safety of workers. Nonetheless, these partly counteract the impact of a CPI, thereby reducing overall mitigation and/or increasing costs.
Transport	Vehicle emission standards	Overlapping (and complementary)	Vehicle emission standards introduce an implicit financial cost for carbon-intensive vehicles that duplicates the incentives provided by a CPI. However, these standards can complement a CPI by supporting technology development and uptake. Standards can result in larger emissions reductions under a carbon tax and put downward pressure on prices in an ETS.
	Tax rebates on high-emission cars	Countervailing	Tax rebates for high-emission cars would work in opposition to a CPI because they reduce consumers' incentives to switch to more sustainable alternatives and avert emission reductions efforts. This reduces the abatement that occurs under a tax and increases the price of allowances in an ETS.
Industry	Financing for low-carbon technology	Complementary	Uptake of low-carbon industrial technologies or processes is often hindered by high up-front and financing costs even if socially cost-effective. Governments may provide financing to support the uptake of these technologies. This would lead to greater emissions reductions in a carbon tax and placing downward pressure on the carbon price in an ETS.
	Industry expansion support	Countervailing	Support to increase production from emissions-intensive industries without reductions in emissions or emissions intensity will encourage an increase in production that counteracts the incentives created by the CPI. This will reduce the level of abatement that occurs in a carbon tax and create upward pressure on prices in an ETS.



**Table 8** Worked example of policy interactions for a hypothetical jurisdiction (continued)

Sector	Policy	Type	Potential Interaction with CPI
Agriculture	Payments for ecosystem goods and services	Overlapping	Policies incentivizing farmers or landowners to manage their land in a way that provides ecosystem services (e.g., water purification, flood mitigation, or carbon sequestration) might duplicate some incentives provided by the CPI, leading to greater emissions reductions under a carbon tax and downward pressure on prices under an ETS.
	Land use change (forest clearing) subsidies	Countervailing	Deforestation is a significant cause of biodiversity loss and carbon emissions. Subsidies for land use change, for instance to support expansion of agricultural production, would countervail the impact of a CPI that provides incentives to reduce deforestation. This would increase emissions under a carbon tax and prices under an ETS.
Waste	Food waste diversion regulations	Overlapping	Food waste diversion can duplicate incentives provided by CPIs by reducing the quantity of waste going to landfill, which is reflected in greater emissions reductions under a carbon tax and/or lower carbon costs under an ETS.
	Mandatory methane capture and combustion	Overlapping	Landfills create methane emissions, a potent greenhouse gas (GHG). The combustion of methane creates carbon dioxide and reduces the overall GHG intensity of landfills. Capture and combustion technologies are sometimes not adopted due to up-front costs or unclear incentives for municipal landfill operators. Mandating these processes duplicates incentives provided by a CPI, which would reduce emissions under a tax and reduce prices under an ETS.

# ATTACHMENT 2: QUESTIONNAIRE ON JURISDICTIONAL CONTEXT

**This questionnaire helps policymakers build a structured understanding of their jurisdictional context and how it feeds into decision-making.** It outlines potential areas of focus alongside a brief description of why they matter for carbon pricing instrument (CPI) selection. Policymakers should consider each of these questions and their impact on the appropriate climate policy mix before selecting an instrument.

**This questionnaire seeks to build a profile of the jurisdiction based on the following areas of interest:**

- ▶ **Economic profile.** The economic profile will determine how jurisdictional circumstances affect the feasibility and desirability of each CPI option. Answers should highlight general economic impacts, potential risks of carbon leakage, risks of constraining economic growth, distributional impacts, loss of competitiveness, and potential political challenges. Awareness of these is important to guide design of CPIs and policies such as revenue recycling that can address potential risks and help prevent/mitigate negative effects of CPIs on different stakeholders.
- ▶ **Emission sources and trends.** The emissions profile shows the sectors that are often most affected by a CPI. It is important to identify emissions-intensive industries and emission trends to build a clear understanding of the key sectors for CPI operation. This informs decisions on, for example, sector coverage and the potential use of offsets. Awareness of the emissions profile can help guide where additional policies may be needed to reduce negative distributional impacts of CPI options, or where additional policies to address nonprice barriers to mitigation are needed.
- ▶ **Ensuring policy coherence.** Interactions with companion policies can boost the effectiveness of the CPI (complementary policies), duplicate incentives provided by the CPI (overlapping policies), or in some cases, offset incentives provided by the CPI (countervailing policies). As such, policy coherence is essential to strengthening carbon pricing policies. Interaction with other policies includes subsidies, fuel taxes, energy prices, and other environmental/mitigation policies. These are discussed further in the [Policy Interactions Attachment](#).
- ▶ **Role of carbon pricing.** This includes the potential objectives of the CPI in the broader policy mix. It is important that policymakers set clear long-run objectives for carbon pricing. Topics may include meeting a jurisdiction's climate targets, raising carbon revenues, generating broader benefits, supporting green growth and competitiveness, and meeting any political commitments. Outlining long-term targets and some indication of future changes is also desirable to provide predictability about the direction of the program. A clear understanding of the role and objectives of carbon pricing will guide the design of the CPI to best meet those objectives.
- ▶ **Identify capacity and implementing institutions.** Understanding current capacity and implementing institutions can help identify how existing institutions can be utilized to implement a CPI and where capacity is lacking. Establishing a carbon price requires both supporting technical and institutional regimes, such as for monitoring, reporting, and verification (MRV). Existing institutions can sometimes be used but this often requires the creation of new agencies, adoption of new processes, and capacity building. Operational capacity refers to the actual capacity of administrative bodies, personnel, and new practices required to implement a CPI.
- ▶ **Public acceptance.** Acceptance is crucial for the long-run effectiveness and continued operation of a CPI. Early engagement and communication on the carbon price can help policymakers gauge people's priorities, concerns, and preferences. This can also feed into the CPI design. Transparently communicating a CPI's objectives and impacts through stakeholder consultation can increase public support. Additionally, demonstrating the visible benefits of a carbon price, for instance, through how the revenue is used, can play a powerful role in increasing public acceptability. Awareness of the level of support across stakeholder groups for the CPI can help target stakeholder engagement and communications to where it is most needed. A broader understanding of public support for different policies can help policymakers anticipate the level of opposition they may face.

**Table 9** Questionnaire

Theme	Questions	Relevant considerations
<b>Understanding economic profile</b> Structure of the economy	What are the key sectors contributing to GDP?	These sectors are likely to be the focus for policymakers and political actors and can be prioritized for analysis.
	How diverse is economic activity?	A broad-based economy with a robust service sector is less likely to be adversely affected by increased costs from carbon pricing.
	Which sectors are the main drivers of economic growth?	Industries that are sources of economic growth are more important for increasing future prosperity, and may be considered more important than industries not growing.
	How competitive/concentrated are local markets?	Concentration of markets determines competition and liquidity of emissions markets; a highly concentrated market is more at risk of market abuse or malfunction.
<b>Understanding economic profile</b> Trade	How open is the economy to international trade?	The openness of the economy will influence consumers' ability to substitute local carbon-intensive goods with imports, thus increasing the risk of carbon leakage.
	Which sectors are trade exposed?	Trade-exposed sectors may have reduced ability to pass on cost increases in the form of higher prices and may be at higher risk of carbon leakage.
<b>Understanding economic profile</b> Power sector	What is the current electricity generation mix?	The higher the share of fossil fuel-based generation, the higher the compliance costs faced by the power sector and higher the costs passed through to electricity consumers.
	How is the electricity market regulated?	Regulations can affect how electricity from power plants is dispatched and whether dispatch is based on a power plant's economic merit. Regulated prices affect the ability of generators to pass through the carbon price to downstream users of electricity via higher energy bills. This means that downstream users will be less likely to change their consumption behavior.
	How many companies operate in the power supply sector?	The number of operators determines the market power held by each company and therefore their ability to pass on prices. For an ETS, the number of firms can also affect secondary market liquidity and market behavior.
	Is the power sector open to private firms?	This impacts the level of revenue raised, as well as source of financing for abatement.
<b>Understanding emission sources and trends</b>	What is the greenhouse gas emission profile and what are the main emissions sources?	High-emissions sectors will likely be the focus for policymakers and political actors and can be targeted for analysis.
	How have emissions evolved over time and how are they expected to evolve in future?	The growth of emissions from rapidly expanding sectors (such as aviation) may be important to curtail to meet future emissions objectives.
	What are the key abatement options? Do key players in each sector have access to these technologies?	Available abatement options will influence the level of carbon price needed to reduce emissions, as firms will only change their behavior or investments if it is cheaper to do so than to pay the carbon price. Policymakers may wish to consider additional policies to supplement the carbon price where abatement is expensive.
	How is your jurisdiction planning to reduce emissions in the future?	CPI design should accommodate future policy aimed at reducing emissions (e.g., with a tighter cap).



**Table 9** Questionnaire (continued)

Theme	Questions	Relevant considerations
Ensuring policy coherence	What are the short-, medium-, and long-term objectives of the CPI?	The objectives of the jurisdiction implementing the CPI will influence the eventual CPI selection and design (see Section 2.2.1 of the guide).
	Is there a comprehensive national or jurisdictional mitigation plan? Are there decarbonization plans for specific sectors? Is the role of a CPI in these plans clear?	The role of the CPI in meeting emissions reductions targets, including nationally determined commitments, will influence CPI selection and design (see Section 2.2.1 of the guide). Other strategies, such as national energy strategies, may also be relevant to ensure policy coherence.
	Could other regulatory rules or laws impede price signaling in electric and transport markets (e.g., electricity price regulation)?	Price signal distortions will reduce the effectiveness of the CPI. Countervailing policies will need to be reviewed (see Section 2.2.2 and the attachment on Policy Interactions).
	Have you assessed the set of companion policies (which may be complementary, overlapping, or countervailing)?	Policy interactions will affect the functioning of the CPI, as well as of the companion policies (see Section 2.2.2 and the attachment on Policy Interactions).
Identify capacity and implementing institutions (Governance and MRV)	Are institutions (e.g., environmental regulators) in place that could administer a CPI? If not, does the capacity to administer a carbon tax or ETS exist or be developed?	This determines the type of CPI that is feasible and the speed at which it can be implemented (see Rapid Assessment attachment). For instance, an existing regulator may have greater capacity to administer and enforce CPI policy and processes.
	Do you have an MRV system in place that can be adapted for use in a CPI (e.g., for fuel taxes or local pollution tracking)?	MRV is integral to any CPI, and the readiness of the MRV system will be a limiting factor on the timeline for implementing the CPI. Often existing fuel tax systems or other environmental policies will be built on to develop locally appropriate MRV systems.
Identify capacity and implementing institutions (Secondary markets)	Does your jurisdiction have any experience with market-based environmental policy instruments?	Government experience with setting up and regulating secondary markets, as well as business experience with engaging in these markets, can help build capacity for an ETS (see Rapid Assessment Tool).
	Have you established an emission registry or similar functionalities for other policies?	A registry is needed for an ETS. If not, other policy mechanisms like renewable energy or energy efficiency trading systems may provide similar functionality.
	Does your financial sector trade in regulated commodities (e.g., electricity)?	Experience delivering financial services can help with smooth functioning of secondary markets for an ETS.
Public acceptance	Is there general public support for environmental and climate change policies and regulation?	High public support means a more ambitious CPI (e.g., more extensive scope) could be implemented at a more rapid pace. Low support could hinder the success of any CPI.
	Is there a public preference for one carbon pricing instrument over another?	Public opinion may make certain forms of CPI very challenging to implement. For instance, opposition to taxes or trading systems have influenced the choice of CPIs and their longevity in several jurisdictions.
	What is the perceived acceptance of carbon pricing or climate policy from industry?	The extent and sources of industry opposition, and the issues raised, will influence the areas of focus for stakeholder engagement, and potentially CPI choice and design.
	What are the key concerns regarding the social impacts of the introduction of a CPI?	This could include sensitivities regarding impacts on interest groups, and the need to ensure a “just transition.” It can help to identify areas of focus for additional supporting policies, modeling, the communications campaign, and stakeholder engagement.
	Are there constraints on earmarking or revenue use generated by a potential CPI?	This could affect the choice of instrument (these restrictions are usually associated with taxes) and the extent of public support.
	Could a CPI negatively affect certain socioeconomic groups or regions?	This could determine the CPI’s sectoral scope, design options (e.g., considering revenue recycling) and varied public support across socioeconomic groups and/or regions.

# ATTACHMENT 3: DATA TIP SHEET

There are multiple sources of evidence that can provide information to understand potential carbon pricing instrument (CPI) impacts:

- ▶ **Literature reviews represent a rigorous, evidence-focused method to map the evidence base in an unbiased way, and to assess the quality of the evidence and synthesize it.**<sup>101</sup> Relevant research findings can prompt recommendations to be put into action. For instance, systematic literature reviews can report on the factors that shape the price of carbon,<sup>102</sup> compare different carbon pricing mechanisms<sup>103</sup> and policy mix,<sup>104</sup> and inform on public acceptability.<sup>105</sup> As such, systematic literature reviews are a key tool for evidence-informed policymaking.
- ▶ **Statistical materials and methods can provide a solid foundation for assessing potential quantitative effects of a CPI on certain groups.** National statistical agencies will often collect data that can be used to assess the potential channels of impact of a CPI on different stakeholders and guide policy decisions accordingly. For instance, household survey data can be used as a tool to measure people's reliance on carbon-intensive energy sources and thereby help to limit negative impacts on vulnerable households. Similarly, data on trade can help identify potential barriers in passing on carbon costs in certain industries. International data sources could be used to understand economic, government finance, business, and household impacts.
- ▶ **Opinion polling and surveys can provide information on stakeholder views and concerns.** Opinion polling and surveys can help identify potential responses to CPIs from key stakeholders, including expected behavior, practices and barriers to the implementation, and perceived or actual risks of negative effects. For instance, in China, a survey of stakeholders found that 77 percent of these expect the emissions trading system (ETS) to affect investment decisions and cause price levels to rise significantly by 2030, suggesting that it would mobilize real behavioral change.<sup>106</sup>

In analyzing the evidence available jurisdictions can make use of several analytical tools and methods to assess the potential implications:

- ▶ **Qualitative analyses can be used to assess the strengths and weaknesses, opportunities, and threats.** This tool facilitates comparative analysis between different options and CPIs and allows policymakers to assess the strengths and weaknesses of different instruments in a systematized way.
- ▶ **Issues trees can provide policymakers with a visual walk-through of the options for pricing carbon and the types of impacts.** Such a diagram can help in exploring a range of carbon price impacts, key decisions ahead, and potential CPI design and policy options.
- ▶ **Rapid evidence assessments can also be used to support decision-making processes by providing rigorous and policy-relevant syntheses of evidence.** They offer a more structured and rigorous search and quality assessment of the evidence than a literature review but are not as extensive and exhaustive as a systematic review.

**Policymakers will require data throughout the selection process.** Building an understanding of the local context may require the use of external data sources. [Table 10](#) provides suggestions for data sources, categorized by topic, that may support or supplement domestic sources such as data from the national environmental or energy agency or ministry and the national statistics agency.

101 Department for International Development 2013.

102 Chevallier 2011.

103 Narassimhan et al. 2018.

104 Narassimhan et al. 2017.

105 Maestre-Andrés et al. 2019.

106 Slater et al. 2018.

**Table 10** Data tip sheet

Topic	Data	Sources
Carbon pricing	Developments	<a href="#">World Bank Carbon Pricing Dashboard</a> <a href="#">ICAP ETS summaries</a> <a href="#">World Bank State and Trends of Carbon Pricing reports</a> <a href="#">IETA carbon market resources</a>
Emissions	Sources of emissions	<a href="#">IEA country/region reports and World Energy Balances</a> <a href="#">WHO Ambient air pollution</a> <a href="#">UNFCCC GHG data from UNFCCC</a> <a href="#">IPCC IAMC Pathway Database</a>
Regulation: Climate	Overview of climate action	<a href="#">Climate Action Tracker NDC assessments</a> <a href="#">Climate Policy Database</a> <a href="#">LSE Climate Change Laws of the World</a> <a href="#">IEA Policy Database</a> <a href="#">UNFCCC for NDCs and BURs</a> <a href="#">IRENA Renewable Power Generation Costs</a>
Regulation: Local policy	Policy overview	<a href="#">USAID country dashboard</a> <a href="#">IEA Policy Database</a> <a href="#">World Bank RISE Index</a> <a href="#">ND-GAIN vulnerability and resilience</a>
Political context	Public opinion	National private and public providers Links to comparative datasets compiled by <a href="#">Oxford University</a> and <a href="#">Princeton University</a>
Institutional context	Policy responsibility	<a href="#">World Bank Governance indicators</a>
Institutional context	Carbon pricing readiness	<a href="#">Climate Policy Database</a> <a href="#">World Bank Country Policy and Institutional Assessment</a> <a href="#">World Bank Doing Business</a>
Economic context	General indicators	<a href="#">World Bank statistics</a> <a href="#">IEA energy statistics</a> <a href="#">IMF Staff Country Reports</a> <a href="#">USAID country dashboard</a>
Economic context	Economic composition	<a href="#">OEC trade flows and economic complexity</a> <a href="#">Atlas trade flows and economic complexity</a> <a href="#">WEF Global Competitiveness Report</a>
Economic context	National statistics	<a href="#">UN partner country list</a>
Potential impacts: Competitiveness	Trade data	<a href="#">OEC trade flows and economic complexity</a> <a href="#">COMTRADE trade data platform</a> <a href="#">Atlas trade flows and economic complexity</a> <a href="#">WITS trade database</a>
Potential impacts: Distributional	Distributional	<a href="#">World Inequality Database</a>

# ATTACHMENT 4: CAPACITY ASSESSMENT TOOL

**Understanding regulatory and business capacity in a jurisdiction is vital to selecting an appropriate carbon pricing instrument (CPI).** Different CPI options have differing levels of complexity. The capacity requirements for some CPI designs may not align with existing government capacity. In this case, policymakers may wish to build capacity before an instrument is implemented or opt for a less complex instrument. A mapping of jurisdictional capacity against CPI requirements will aid in understanding where capacity gaps exist, and therefore what CPI designs are currently possible and areas to develop.

**This tool maps broad CPI requirements against key attributes of capacity for both regulators and businesses to assist in identifying capacity development needs.** Policymakers should assess the capacity of both government and business to build a picture of the existing capacity. This will aid in identifying gaps in capacity and what capacities need to be developed ahead of CPI implementation. Capacity-building needs will vary across CPI options. Carbon taxes have the narrowest requirements, needing capacity in monitoring, reporting, and verification (MRV) and compliance. An emissions trading system (ETS) has the broadest requirements for readiness, with governance and market capacity needing to be in place. Crediting mechanisms require capacity in MRV, market oversight, and trade infrastructure.

**Limited existing capacity should not discourage CPI implementation.** This assessment is intended to identify gaps in capacity, so upskilling can be targeted. Capacity can be built up over time and CPI design can be simplified in some respects. Capabilities can be improved through capacity-building exercises for key stakeholders (for example, training third-party verifiers), or investment in infrastructure. For example, the Regional Greenhouse Gas Initiative and the California Independent Emissions Market Advisory Committee were able to build agency capacity quickly once gaps in capacity were identified.

**The tool requires policymakers to reflect on various elements of capacity and classify their jurisdiction into relevant categories.** These categories are

developed capabilities (green), capabilities need moderate development (amber), or capabilities need significant development (red). Blank templates for policymakers to use are provided in [Attachment 2](#) and [Section A4.2](#), [Section A4.3](#), and [Section A4.4](#) provide worked examples of how this assessment would be carried out for governance capacity and business capacity, respectively. These tables include examples of potential sectors to consider and are not exhaustive. Other elements can be added to the tables to best suit the needs of the jurisdiction.

## A4.1 TEMPLATES: GOVERNMENT CAPACITY

**The ability of governments to effectively implement a CPI depends on their underlying governance capacity and ability to manage trade.** [Section A4.1.1](#) addresses governance readiness, including the ability to enforce compliance and the strength of MRV capabilities. A robust and well-functioning MRV system is the foundation for any carbon price; carbon taxes and ETSs will also require the regulator to enforce domestic compliance. [Section A4.1.2](#) considers a government's ability to manage trade, including facilitating trade, regulating secondary markets, and supporting allocations. In addition to MRV and compliance, ETSs and crediting systems require the capacity to implement and operate a secondary market for trading allowances. This includes the necessary trading infrastructure, capacity for market oversight, and capacity to allocate allowances.

**Government capacity can be developed.** These tables will aid in identifying gaps in capacity where capacity building can then be targeted. These tables include examples of potential capabilities to consider and are not exhaustive. Other elements can be added to the tables to best suit the needs of the jurisdiction.

### A4.1.1 Governance capacity

**Table 11** Governance assessment: Template

<b>Compliance</b>		
<i>Rationale: Lack of capabilities in compliance will make enforcing an ETS or tax challenging</i>		
Capabilities	Rating	Assessment
Processes to investigate potential misreporting or noncompliance		
Enforcement and judicial capacity for timely and regular enforcement		
Ability to levy punitive punishments as incentives to reduce adverse behavior		

<b>MRV</b>		
<i>Rationale: Accurate MRV is needed to ensure that mitigation incentives are well targeted and for the overall credibility of the system</i>		
Capabilities	Rating	Assessment
Measurement of sufficient accuracy (for example Scopes 2 and 3 emissions) across key sectors and sources of emissions		
Reporting systems that can be utilized for frequent (annual) credible updating of emissions or other relevant outcomes		
Verification systems to ensure reporting is accurate to a reasonable degree of certainty (e.g., auditing or third-party verification)		

### A4.1.2 Capacity to manage markets

**Table 12** Capacity to manage trade assessment: Template

<b>Trade and market readiness</b>			
<i>Rationale for assessment: Lack of market readiness may limit the efficiency of markets and creates risks of misconduct</i>			
	Capabilities	Rating	Assessment
Trade infrastructure (ETS)	Registries capable of supporting frequent market trade		
Market oversight	Regulation of markets that detects and punishes misconduct		

<b>Allocations (ETS)</b>			
<i>Rationale for assessment: Lack of capabilities may limit allocation options in the short term</i>			
	Capabilities	Rating	Assessment
Free allocations	Data collection regarding emissions and production if needed for allocations		
Auctions	Auctions mechanism to enable sale of allowances		

## A4.2 TEMPLATES: BUSINESS CAPACITY

**The broader business capacity can help determine the success or otherwise of a CPI.** Key business capabilities include the availability of support and services to aid compliance, the ability to follow MRV requirements, and, in the case of ETSs, the ability to participate in trading. Some services may be more relevant for certain CPI options. For example, brokerage firms will not be required for a carbon tax as there is no secondary market for trading emissions reductions.

**Generally, the potential to cover a given sector can be considered based on the potential of sector participants to comply with MRV requirements.** A mapping of these capabilities can then shed light on capacity building needs and their short-term appropriateness for coverage in a carbon price. There may be multiple ways in which a sector can be covered; hence the guide considers coverage options both at the point of emission as well as upstream and downstream.

**Business capacity can be developed.** These tables will aid in identifying gaps in capacity where capacity building can then be targeted. These tables include examples of potential capabilities and sectors to consider and are not exhaustive. Other elements can be added to the tables to best suit the needs of the jurisdiction.

### A4.2.1 Enabling environment assessment

**Table 13** Enabling environment assessment: Template

<b>Business capacity</b>					
<i>Rationale for assessment: A lack of business capacity may limit engagement, increase transaction costs, and reduce the overall efficiency of the market</i>					
	Capabilities	Carbon tax	Crediting	ETS	Assessment
Compliance	Legal advisory services				
MRV	Auditors and/or verifiers				
Trade infrastructure	Brokerage or over-the-counter trade				
	Exchange-based trade				
	Project developers for origination				

### A4.2.2 Sector capacity assessments

**Table 14** Sector capacity assessments: Template

<b>MRV potential</b>				
<i>Rationale for assessment: Lack of business capacity for MRV in points of the supply chain may limit point of regulation options in the short term, increase transaction costs, and reduce the overall efficiency of the system</i>				
Potential covered sectors	Upstream	Point of emission	Downstream	Assessment
Power				
Industry				
Buildings				
Transport				
Aviation (domestic)				
Waste				
Forestry				
Agriculture				

## A4.3 GOVERNMENT CAPACITY ASSESSMENT WORKED EXAMPLE

This section provides a hypothetical example of how the tool can be used to assess government capacity.

Section A4.3.1 provides an example of assessing governance capacity, while Section A4.3.2 provides an example of assessing the capacity to manage trade.

### A4.3.1 Governance capacity

The worked example in Table 15 shows that, for this hypothetical jurisdiction, there are gaps in both the compliance and MRV systems. The first table shows that a lack of sufficient punishments for noncompliance risks undermining enforcement of the system, while the second table shows that the lack of a robust verification system calls into question the integrity of the MRV system. While this jurisdiction may not be immediately ready for a carbon price, these capacity gaps can be filled in and addressed.

The findings suggest capacity should be built in those two areas to support CPI implementation. For instance, strengthening punishments for noncompliant behaviors can increase the credibility of the compliance system, while training of third-party verifiers could improve the capacity of the MRV system. Early identification of capacity building needs and utilizing frameworks developed from existing CPIs will prevent these constraints from delaying implementation.

**Table 15** Governance assessment: Worked examples

Compliance worked example		
<i>Rationale for assessment: Lack of capabilities in compliance will make enforcement challenging</i>		
Capabilities	Rating	Assessment of capabilities
Processes to investigate potential <b>misreporting or noncompliance</b>	■ Developed capabilities	■ Processes in place including spot-checks and targeted investigations
<b>Enforcement and judicial capacity</b> for timely and predictable enforcement	■ Developed capabilities	■ Sufficiently established rule of law and competent enforcement authorities
Ability to levy <b>punishments</b> as incentives to reduce adverse behavior	■ Capabilities need moderate development	■ Low cost of punishments fails to punish noncompliance and change behavior
MRV worked example		
<i>Rationale for assessment: Accurate MRV is needed to ensure that mitigation incentives are well targeted and for the overall credibility of the system</i>		
Capabilities	Rating	Assessment
<b>Measurement of sufficient accuracy</b> (for example Scope 2) across key sectors and sources of emissions	■ Developed capabilities	■ Measurement methodologies are tailored to local circumstances and within a reasonable uncertainty range and without bias
<b>Reporting systems</b> that are credible and can be utilized for frequent (annual) updating of emissions or other relevant metrics	■ Developed capabilities	■ Reporting systems established through taxation systems can be utilized
<b>Verification systems</b> to ensure reporting is accurate to a reasonable degree of certainty (e.g., auditing or third-party verification)	■ Capabilities need significant development	■ A lack of sufficiently robust verification systems undermines confidence in reported outcomes

### A4.3.2 Capacity to manage markets

The worked example in [Table 16](#) shows that, for this hypothetical jurisdiction, allowance allocation capacity needs to be built to effectively implement an ETS. The first table shows that sufficient trade infrastructure is in place as it relates to functioning registries and market oversight systems. The second table shows auctioning capacity needs to be developed if an ETS is pursued. In the short term it may choose to outsource to third-party providers while it builds up internal capacity.

**Table 16** Capacity to manage trade assessment: Worked examples

<b>Trade and market readiness worked example</b>			
<i>Rationale for assessment: Lack of market readiness may limit the efficiency of markets and creates risks of misconduct</i>			
	Capabilities	Rating	Assessment
Trade infrastructure (ETS)	Registries capable of supporting frequent market trade	■ Developed capabilities	■ Electronic registry in place for renewable certificates, which can be adapted for use in an ETS
Market oversight	Regulation of markets that detects and punishes misconduct	■ Developed capabilities	■ Effective and well-resourced market oversight agencies

<b>Allocations worked example</b>			
<i>Rationale for assessment: Lack of capabilities may limit allocation options in the short term</i>			
	Capabilities	Rating	Assessment
Free allocations	Data collection regarding emissions and production if needed for free allocations	■ Developed capabilities	■ Data available for developing benchmarks and providing free allocations
Auctions	Auctions mechanism to enable sale of allowances	■ Capabilities need significant development	■ Lack of capacity to run auctions of allowances

## A4.4 BUSINESS CAPACITY ASSESSMENT WORKED EXAMPLE

This section provides a hypothetical example of how the tool can be used to assess business capacity.

Section A4.4.1 provides an example of assessing the enabling environment, while Section A4.4.2 provides an example of sector capacity assessment.

### A4.4.1 Enabling environment assessment

Table 17 provides a worked example for a hypothetical jurisdiction, identifying the capabilities of the enabling environment. In this example, the jurisdiction has a broadly strong business ecosystem but lacks existing environmental exchange-based trade capabilities. A strong business ecosystem will help regulated entities engage and comply with a carbon price.

**Table 17** Enabling environment assessment: Worked example

<b>Business ecosystem capacity worked example</b>					
<i>Rationale for assessment: A lack of capacity in the business ecosystem may limit engagement, increase transaction costs, and reduce the overall efficiency of the market</i>					
	Capabilities	Carbon tax	Crediting	ETS	Assessment
Compliance	Legal advisory services	■ Developed capabilities	■ Developed capabilities	■ Developed capabilities	■ Wide range of service providers available
MRV	Auditors and/or verifiers	■ Developed capabilities	■ Developed capabilities	■ Developed capabilities	■ Established verification and auditing services
Trade infrastructure	Brokerage or OTC trade		■ Developed capabilities	■ Developed capabilities	■ Several brokers for energy/environmental products
	Exchange-based trade			■ Capabilities need significant development	■ No exchanges for energy/environmental products
	Project developers for origination		■ Developed capabilities		■ Project origination well developed from Clean Development Mechanism

#### A4.4.2 Sector capacity assessments

**Table 18** considers the MRV potential, describing the capacity to measure and report emissions at different points in the supply chain. For example, the waste sector has low MRV potential upstream due to the numerous and disparate sources of waste. MRV potential improves lower down the supply chain, at the point of emissions (that is, at the landfill level).

**Table 18** Sector capacity assessments: Worked example

<b>MRV potential worked example</b>				
<i>Rationale for assessment: Lack of business capacity for MRV in points of the supply chain may limit point of regulation options in the short term, increase transaction costs, and reduce the overall efficiency of the system</i>				
Potential covered sectors	Upstream	Point of emission	Downstream	Assessment
Power	■ Developed capabilities	■ Developed capabilities	■ Capabilities need moderate development	■ Able to deal with upstream or point of emission regulation
Industry		■ Developed capabilities	■ Capabilities need significant development	■ Able to deal with point of emission regulation
Buildings	■ Developed capabilities	■ Capabilities need moderate development	■ Capabilities need moderate development	■ Able to deal with upstream regulation
Transport	■ Developed capabilities	■ Capabilities need moderate development		■ Able to deal with upstream regulation
Aviation (home)	■ Developed capabilities	■ Developed capabilities		■ Able to deal with upstream or point of emission regulation
Waste	■ Capabilities need moderate development	■ Developed capabilities		■ Able to deal with point of emission regulation
Forestry		■ Capabilities need significant development	■ Capabilities need significant development	■ Capacity building required for forestry MRV capabilities if included in carbon price
Agriculture	■ Developed capabilities (Fertilizers)	■ Capabilities need significant development	■ Capabilities need significant development	■ Able to deal with upstream regulation for fertilizers; otherwise requires capacity building

# ATTACHMENT 5: MODELING TECHNICAL SUMMARY

**This attachment seeks to provide more detail on the development and implementation of a modeling approach.** Once the jurisdictional context is understood, policymakers should start on the impact assessment. Modeling is often an important source of evidence in the impact assessment. This attachment explores some of the

key steps required in modeling to more depth than in the main report.

**We then provide a detailed model summary sheet that aims to match models to desired objectives and deliverables of the model.**

## A5.1 MAPPING POLICY QUESTIONS TO MODEL SELECTION

**Table 19 provides examples of how policy topics can be mapped to required model outputs and functionalities.**

**Table 19** Linking policy questions to modeling output and functionality requirements

Carbon pricing instrument (CPI) policy topics	Subtopics	Examples of outputs and indicators	Model functionality required
How do CPIs perform against other instruments?	What is the performance of different instruments in reducing carbon emissions? How will a CPI and other instruments interact with other policies?	Cost-effectiveness (total abatement cost (\$) / total size of abatement [carbon dioxide equivalent]) Cost efficiency (abatement cost and saved damages [\$])	Explicit representation of different policy instruments (CPIs and other) across the economy
What are the broad economic impacts of CPI instruments?	What are the economic costs and benefits of a given CPI? How will sectoral economic output and composition change?	GDP impacts; energy prices; regional impacts (\$) Output and prices for economic sectors (\$)	Ideal requirement: macroeconomic/general equilibrium module; minimum requirement: economic costs
What are the implications for government finance?	What government revenue is expected under different CPIs? What are the wider economic impacts of different government revenue policies?	Government revenue from different CPIs (\$)	Macroeconomic module including representation of government spending impacts, or systems model with price/cost and emissions
What are the broader benefits of carbon pricing?	What are the broader benefits in addition to greenhouse gas (GHG) mitigation, such as human health, environmental protection, or energy security?	Air quality impacts; soil improvements; water and biodiversity impacts; energy imports	Health and broader environmental benefits require specific (non-economic) model (e.g., dispersion models for air pollution); energy security benefits require specific functionality on trade balance of energy and fuels
How will a given sector respond to a CPI instrument?	How will the CPIs change technologies, practices, or behaviors? How will energy and nonenergy inputs change? How will businesses comply?	Technology costs (\$); sectoral energy/resource use and fuel consumption (terawatt-hour; tons)	Sectoral representation of technologies, practices and behaviors; elasticities of demand for fuels
How will a CPI affect international competitiveness?	What is the impact on sectoral competitiveness? What is the carbon leakage?	Carbon leakage rates (emissions' increase in one jurisdiction/ emissions' decrease in other jurisdiction); production and output losses	Ability to assess global trade effects and technological response of individual industries



**Table 19** Linking policy questions to modeling output and functionality requirements (continued)

Carbon pricing instrument (CPI) policy topics	Subtopics	Examples of outputs and indicators	Model functionality required
What are distributional impacts of different CPIs?	What is the distributional impact on householders and consumers? What are the impacts across different business sizes?	Energy bills across household and businesses types (\$)	Ability to disaggregate households/businesses to different groups (income, behavior, turnover)
How will the carbon market operate?	How will the market operate under different CPI options? How will it react to increased targets or to external shocks?	Volume of trading activity and market prices (\$); emission abatement and cost-effectiveness (\$/tCO <sub>2</sub> -e)	Targets and market allowance setting; different trading types' behavior; marginal abatement cost curves
What is the right level of ambition?	What level of action is appropriate to match climate costs and benefits? What is required to meet current and future Nationally Determined Contribution (NDC) targets?	Social cost of carbon (\$/tCO <sub>2</sub> -e), mitigation scenarios (GHGs and mitigation cost by sector)	Integrated mitigation costs and climate benefits or detailed techno-economic representation of sectors

## A5.2 SCENARIOS AND SENSITIVITY ANALYSIS

### A5.2.1 Defining a reference scenario

The reference scenario models what would happen without a CPI in place. This provides a comparison, or reference point, to assess the results of the policy scenarios against. Without a reference scenario, the impact of a CPI on outcomes cannot be assessed. The reference scenario outputs are the same as those that will be used in the policy scenario. The difference in outputs between the reference and policy scenarios form the basis of the analytical approach as to how modeling assesses the impact of CPI.

The ambition of the reference scenario can differ and should be decided on early. One option is to model what would happen in a world where neither a CPI nor any new policies past already committed policy are developed. This is referred to as the “business as usual” (BAU) scenario. An alternative scenario is to model the achievement of the objectives without the introduction of a CPI. This would mean alternative policy measures would be implemented. Most modeling uses the BAU as the reference scenario so that multiple policy scenarios can be compared with each other and with the option of no further action on climate mitigation. Under the BAU scenario, existing policies will likely not achieve the NDC objectives. In these cases, the NDC can be a policy scenario. The policy scenarios will draw on aspects of the reference scenario; for example, how energy demand is expected to develop in the future will be a required input in both reference and policy scenarios.

Further details on developing reference and policy scenarios for jurisdictions can be found in the Partnership for Market Readiness’ (PMR) *Checklist on Establishing Post-2020 Emissions Pathways*.<sup>107</sup>

### A5.2.2 Defining a policy scenario

This process allows the establishment of a list of policy scenarios that are mutually exclusive, directly comparable, and sufficiently differentiated to assess the policy options in question. To create a set of possible policy scenarios, policymakers need to identify the most important policy variants that need testing. These variants should directly relate back to answering the policy questions that were established in Section 3.1.1 of the guide and the modeling objectives discussed in this annex. If multiple scenarios are being tested, these should be defined to test preferred options to enable direct comparison of the subset of viable options. Alternatively, modeling can be defined in terms of testing boundary conditions, particularly where there is likely to be a predictable relationship between the policy variable and the outcome of interest.

**Certain underlying assumptions should be held constant between a reference and policy scenarios.**

This is to ensure comparability between different scenarios and to maintain the integrity of the modeling. Aspects that may be held constant could be the wider socioeconomic trends or demand projections in unaffected industry. These may be tested in sensitivity analyses (discussed below).

**Any defined policy scenarios, as well as reference scenarios, are not a precise prediction of future outcomes given the uncertain nature of future events.**

The main aim of modeled scenarios is to facilitate the representation of different policy decisions regarding,

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for example, time and risk preference; uncertain nature of the future regarding aspects directly relevant to the CPI, like technology, market prices, or stakeholders' behavior; uncertain nature of wider trends such as GDP and population growth. Scenarios should therefore be interpreted as a projection, rather than a forecast, of expected policy and wider economic outcomes given a range of uncertainties and assumptions.

**It may be worthwhile testing the design of scenarios with stakeholders as part of the consensus building.**

Any modeling exercise will be based on a variety of data sources and modeling assumptions. Where useful in building common understanding across different groups (for instance, government departments), a summary of key scenario assumptions can be discussed and tested with the main policymakers. Further, assumptions should be available in the impact assessment report to increase the transparency of the quantitative analysis.

### A5.2.3 Defining sensitivity analysis

**A sensitivity analysis assesses how responsive the model outputs are to changes to inputs and assumptions.** Model results carry with them a degree of uncertainty; sensitivity analysis helps to assess where the uncertainty comes from and the range of uncertainty. These can arise, for instance, due to

- ▶ uncertainty related to input data;
- ▶ inherent uncertainties in the market and wider economic reaction to different CPI designs; or
- ▶ general uncertainties regarding future economic and societal outcomes, such as growth rates of GDP and exchange rates as a result of external shocks such as the global coronavirus pandemic.

**This first requires that a set of uncertainties be represented in the model.** These uncertainties may relate to factors that are (largely) out of the control of the policymaker. For instance, this could include rates of technological change, commodity prices, rates of economic growth, or exchange rates. These uncertainties need to then be modeled. This can be done through simple methods, like creating low, best, and high estimates of model inputs. A discrete set of uncertainties is often used for inputs where extensive scenario analysis already exists, such as fossil fuel prices. More complex methodologies like Monte Carlo simulations can sample thousands or millions of variations in each uncertainty and are therefore useful when the range of the input uncertainty is less well known.

**Policymakers may wish to stress test the models to assess extreme scenarios.** There are numerous potential sources of large shocks; for example, large economic recessions disaster risks. These can have an impact on the effectiveness of the CPI through channels such as reducing activity, thereby reducing the number of covered

entities and policy revenue or industry capacity to comply with regulation. Ultimately this could mean that the CPI objectives are not met. Therefore, stress testing provides a way for policymakers to understand how sensitive the impacts of the CPI are to large shocks. This understanding coupled with local knowledge on the risk of large shocks occurring can help to guide policymakers in whether complementary policy is required.

## A5.3 AVOIDING COMMON CHALLENGES THAT OCCUR IN MODELING

**Economic models can be complex, resulting in modeling projects often facing a range of challenges that can be anticipated.** Some common challenges are

- ▶ **Poor input data:** Modeling projects can face issues with compiling enough granular data. Thus, the practitioners should check expected data needs and data availability prior to procuring modeling exercises and try to align modeling approaches with the data available. Alternatively, they may choose to not specify a modeling approach but ask for clear enumeration of the data sources that will be utilized in the modeling process and contingency plans to address data gaps. Further, processes to identify and validate input data early in the modeling process can help avoid problems. Depending on budget and resources, primary data collection may be required to supplement or update existing data sources to be utilized.
- ▶ **Model suitability:** The practitioners should ensure that the model being proposed is appropriate to answer the policy question being asked. For instance, an econometric model relying on historical data may not be suited to evaluate likely outcomes in a rapidly changing sector. Thus, through the procurement, the practitioners should ask for details on how a given modeling approach was used, or is suitable, in answering similar questions.
- ▶ **Model enhancements:** Often, existing models are not sufficient to answer the policy questions and will require certain model enhancements, such as further disaggregation of sectors, baseline, and data updates. Thus, it is important to capture these necessary model requirements from the onset of the impact assessment project to understand the risks and challenges of tailoring the model to a given context and policy questions.
- ▶ **Scope creep and moving goalposts:** Given the uncertainty in modeling future outcomes, modeling exercises can result in a long set of scenarios that were considered only at a later stage of the project. This is likely to result in missing initial timelines and expected resource needs. Thus, it is critical to invest enough time in the initial stages of the modeling project so that a clear definition of objectives and scenarios is established. Further, practitioners should put in place operational processes to manage a shifting scope, such

as contingency arrangements or provisions for further scenarios or sensitivity analysis. Finally, securing early buy-in from stakeholders regarding policy objectives and modeling scenarios can help prevent later changes in scope.

**Table 20 illustrates good practice in mapping policy options while explaining key assumptions.** This approach can help ensure that the modeling scope is well specified given the most pressing objectives.

**Table 20** Example of a good practice in defining modeling policy scenarios

Scenario reference	Instrument	Sectors	Offsets	Permit allocation	Point of regulation		Threshold (electricity)	Emission reduction vs BAU
					Electricity	Transport		
Scenario 1	Carbon tax	Electricity, transport	No	N/A	Upstream	Upstream	N/A	20%
Scenario 2	Carbon tax	Electricity, transport	Yes	N/A	Upstream	Upstream	N/A	20%
Scenario 3	ETS	Electricity, transport	Yes	Free allocation to 2025; then auctioning	Downstream	Upstream	20 MW	20%

### A5.4 MODEL SUMMARY SHEET

The model summary sheet below seeks to help policymakers decide whether modeling is needed and, if so, the most appropriate model to use to assess the operation and impacts of CPIs. It outlines different types of techno-economic

models that are commonly used in climate policy analysis, categorized by the differing focuses of models. The table provides a brief description of what the model type does and how it works before outlining the strengths and limitations of the model

type and what the model type presents as outputs. The table aims to help policymakers identify which types of model may be best suited to their needs and should be used in conjunction with Chapter 3 of the guide, “Impact Assessment.”

Model subtypes	Examples	Brief description	Analytical approach	Strengths	Limitations	Typical outputs
Integrated assessment models (IAMs)						
Cost-benefit	DICE, PAGE	Very long term Simple economic and physical climate models to evaluate scenarios for climate impacts and mitigation pathways by comparing costs of climate impacts and benefits of mitigation.	IAMs calculate the optimal path for investment decisions given the economic benefits and costs that arise from climate change. Economic theory and evidence are used to set up the parameters for the model. They simplify complex economic and geophysical relationships to produce quickly computable, highly aggregated results.	<ul style="list-style-type: none"> <li>Simple model allows for multiple runs of different scenarios quickly</li> <li>Models operate over very long time period, often hundreds of years, to consider long-term societal issues</li> <li>Able to incorporate more detailed sector-specific models in some cases</li> </ul>	<ul style="list-style-type: none"> <li>Tend to be highly aggregated, with no sectoral disaggregation</li> <li>Not well suited for short-term analysis</li> <li>Results can have large uncertainties</li> <li>Can be very sensitive to changes in assumptions</li> </ul>	Economic outcomes, carbon emissions, global temperature rise, abatement costs, social cost of carbon, and carbon prices
Global system models	REMIND-MAGPIE, MESSAGE-GLOBIOM	Long term Complex technological, biophysical, and economic models that develop detailed scenarios for mitigation options, often combining energy system and land use models.	These models integrate the costs of climate change calculated through detailed physical and climate-based models in addition to models used in conventional cost-benefit IAMs.	<ul style="list-style-type: none"> <li>Explicitly models climate change</li> <li>Captures feedback loops between climate and economic impacts</li> <li>Comprehensive modeling of different sectors</li> <li>Comprehensive set of outputs considering a range of sectors</li> </ul>	<ul style="list-style-type: none"> <li>Very technical and computationally expensive</li> <li>Climate tipping points and their impacts are challenging to model accurately</li> </ul>	Wide-ranging outputs that include economic outcomes, climate outcomes, energy pathways, and land use; exact outputs will depend on the additional models incorporated



Model subtypes	Examples	Brief description	Analytical approach	Strengths	Limitations	Typical outputs
<b>Macroeconomic</b>						
Computable General Equilibrium (CGE)	VIEW, IGEM, ADAGE	Medium to long term Detailed economic representations of relationships between industry sectors, consumers, and international markets.	“Predictive approach” based on historical data Top-down approach with a key focus on economy-wide impact, carbon leakage analysis, and competitiveness analysis. CGE models are built to capture feedback loops between different sectors. Therefore, they will capture the knock-on impact of carbon price across whole economy.  These models place structure on the data using economic theory.	<ul style="list-style-type: none"> <li>Predict values for many economic variables including GDP</li> <li>Consider policy interaction with other sectors at a good degree of granularity</li> <li>Theoretically rigorous through its incorporation of economic theory</li> <li>Consider distributional impacts</li> <li>Able to capture resource limits since it looks at a closed system</li> </ul>	<ul style="list-style-type: none"> <li>Assumes specific economic relations, which might be unrealistic</li> <li>Assumption of rational behavior and single representative agent</li> <li>Doesn't capture specifics of technological change within sectors</li> <li>Can be hard to capture the impact of economic shocks</li> <li>Data- and time-intensive</li> </ul>	GHG emissions (economy-wide GHG, covered-sector GHG, carbon leakage), economic aggregates (GDP/GNI), sectoral impacts (output, GVA, employment), energy prices, social prices (carbon price, distribution, carbon revenues)
Dynamic Stochastic General Equilibrium (DSGE)	G-cubed, GCAM	Medium to long term Assess interactions between the financial sector and other sectors of the economy (businesses, government, and consumers), taking into account the business cycle.	Similar to CGE models in placing a structure on the data using economic theory. They are dynamic in the sense that it accounts for time, capturing business cycle dynamics and the associated policy responses. This introduces uncertainty about the future.	<ul style="list-style-type: none"> <li>Intertemporal decisions are captured, with decisions made that are forward looking. This means that time-varying optimal CPI pricing can be solved</li> <li>Incorporates economic shocks from different sources (not normally done in CGE models)</li> <li>Can be extended to include additional countries</li> </ul>	<ul style="list-style-type: none"> <li>Assumes specific economic relations, which might be unrealistic</li> <li>Assumption of rational behavior and single representative agent</li> <li>Sector-level breakdown of limited granularity</li> <li>Doesn't capture specifics of technological change within sectors</li> <li>Data- and time-intensive</li> </ul>	GHG emissions (economy-wide GHG, covered-sector GHG, carbon leakage), economic aggregates (GDP/GNI), sectoral impacts (output, GVA, employment), prices (carbon price, energy prices), social (distribution, carbon revenues)
Macro-econometric	E3ME	Medium to long term Uses historical data to estimate relationships between key macroeconomic parameters for forecasting purposes.	Takes a top-down and predictive approach based on historical data. Places less restrictions on the data, letting the data “talk” as opposed to CGE, which puts structure on the data. The historical patterns of economy-wide responses in the data are key exogenous variables, which are then used to predict future changes. This approach does not require market clearing.	<ul style="list-style-type: none"> <li>Predict values for many economic variables</li> <li>Considers indirect effects</li> <li>No need to assume specific economic relations</li> <li>Flexible in terms of the variables that can be included</li> <li>Can consider policy interaction</li> <li>Capture general equilibrium effects</li> </ul>	<ul style="list-style-type: none"> <li>Technology level assumed constant due to reliance on historical data</li> <li>Omits consumers'/producers' behavior</li> <li>Data defines structure and so requires checking that assumptions are based on causal relations</li> <li>Very data-intensive</li> <li>Potential for data mining</li> </ul>	GHG emissions (economy-wide GHG, covered-sector GHG, carbon leakage), economic aggregates (GDP/GNI), sectoral impacts (output, GVA), prices (carbon price, energy prices), social (carbon revenues)



Model subtypes	Examples	Brief description	Analytical approach	Strengths	Limitations	Typical outputs
<b>Energy system</b>						
Whole energy system optimization	MESSAGE, REMIND, TIMES< NEMS	Medium to long term Represent energy system in detail, often at a global level, to identify key interactions and assess costs of different energy technologies.	Takes a bottom-up approach, with inputs of baseline energy service demands, existing stock of energy technologies, the characteristics of future technologies available, and a projection of future energy supply and trade. It then optimizes the level of investment and operation of energy system technologies and fuel supply/trade in order to minimize total system cost subject to technical, environmental, and economic constraints.	<ul style="list-style-type: none"> <li>Consider technological adaptations and developments, unlike economy-wide models</li> <li>Can measure response to a change in demand</li> <li>Detailed outputs on the energy sector trends</li> </ul>	<ul style="list-style-type: none"> <li>No connection with other sectors unless linked to another model</li> <li>Energy demand is often exogenously determined</li> <li>Assumes cost minimization, which may not be realistic</li> </ul>	Energy system costs and all GHGs, energy investment, and energy system technologies
Electricity system optimization	WeSIM	Long term Long-term electricity models that assess options for electricity generation and distribution to assist in network planning and investment.	Electricity system optimization model that characterizes the investment in and operation of the electricity system resources needed to meet energy demand and minimize the overall cost of the electricity system, while maintaining security of electricity supply.	<ul style="list-style-type: none"> <li>Identifies optimal investment as well as dispatch</li> <li>Can provide detailed, temporally disaggregated results by technology in addition to system-wide results</li> </ul>	<ul style="list-style-type: none"> <li>Limited connection with other sectors and other subsectors of the energy sector</li> <li>Requires detailed data on electricity networks for full functionality</li> </ul>	Generation capacity by technology, hourly generation by technology, fuel consumption, CO <sub>2</sub> emissions, electricity system cost
Electricity dispatch	PLEXOS, IPM	Short to medium term Models that seek to model the electricity sector in very short time steps to shed light on operational decisions and short-term system balancing.	Bottom-up approach Identifies least-cost dispatch given merit curve, hourly demand, and wind and solar generation profiles.	<ul style="list-style-type: none"> <li>Details of key effects over consumption and prices</li> <li>Flexible, low cost, based on simple data</li> <li>Many of the benefits from technology-specific models</li> </ul>	<ul style="list-style-type: none"> <li>Indirect effects are not considered</li> <li>Very sensitive to parameters (e.g., supply elasticities)</li> <li>Does not consider optimal investment or network infrastructure needs</li> </ul>	Hourly generation by technology, fuel consumption, CO <sub>2</sub> emissions, electricity system operating cost



Model subtypes	Examples	Brief description	Analytical approach	Strengths	Limitations	Typical outputs
Agent-based simulation	MUSE	Short to medium term Bottom-up behavioral models that represent the behavior of heterogeneous agents to assess likely responses to changed incentives.	Looks at how agent behavior, viewed at a micro-individual view, can impact carbon pricing. The models, unlike top-down models, have heterogeneous agents with different characteristics and attributes, in addition to detailed modeling of the energy system.	<ul style="list-style-type: none"> <li>Individual decision-making, including for complex actors like financial investors</li> <li>Inclusion of investors helps to provide input on abatement investment opportunities</li> <li>Acts as bridge between disciplines with detailed modeling of actors and the energy system</li> </ul>	<ul style="list-style-type: none"> <li>Empirical validation/small changes in parameters have large effects on results</li> <li>Reducing complex problems means that correct specification is hard to agree on</li> <li>Interpretation of results can be challenging because models do not provide a mathematical solution, so the model cannot be generalized</li> </ul>	System costs and composition, spatial breakdown of energy resources, infrastructure costs and the distribution of demand and impacts on climate (CO <sub>2</sub> emissions, etc.)
Technology-specific	Technology (e.g. solar, wind, battery, EVs)	Medium to long term Models of various forms developed to assess specific technologies, their pathways, costs, and mitigation potential.	A bottom-up approach, considering substantial changes in technologies or practices. It can be used to build up marginal abatement cost curves (MACCs).	<ul style="list-style-type: none"> <li>Details of technology development, giving explicit technological representation</li> <li>Identification of potential contribution in emissions reduction</li> <li>Easy to interpret, the MACCs that get built are easy to understand</li> <li>Simpler to construct than complex economic models</li> <li>Focus on specific activities, which can help focus investment into those that are most cost-effective and to help guide where the scope of the CPI may be needed/supported</li> </ul>	<ul style="list-style-type: none"> <li>Indirect effects are not considered/secondary impacts are missing</li> <li>Difficult to define the reference case when technologies are new</li> <li>Cannot model complex energy systems (e.g., electricity)</li> <li>Individual models can vary significantly in approach and quality</li> </ul>	Varied depending on the specific technology, but generally includes technology prevalence and cost
Land use allocation	MAGPIE, GLOBIOM, MARKAL	Medium to long term Dynamic recursive partial equilibrium model that allocates land to optimal use to meet demand for food, feed, and fodder given spatial biophysical constraints and economic, climate, and policy scenarios.	Top-down in that the objective function is to minimize total costs. The objective function of the land use model is to minimize total costs for a given amount of regional food and bioenergy demand. Inputs often from other models or studies rather than recovered using the data for the model.	<ul style="list-style-type: none"> <li>Spatial results across time capturing something that is poorly modeled/not considered in other models</li> </ul>	<ul style="list-style-type: none"> <li>Limited consideration of human decision-making/institutional factors</li> <li>Inputs like GDP forecasts will likely need another model to generate these (GDP exogenous input into model)</li> </ul>	Model derives specific land use patterns, yields, and total costs of agricultural production for each grid cell



Model subtypes	Examples	Brief description	Analytical approach	Strengths	Limitations	Typical outputs
Econometric allocation	LURNZ	Medium to long term Models that use historical data to try to identify likely behavioral responses of land use to changed incentives.	Estimates demand and supply through aggregation of individual choice modeling. Uses econometric methods to recover the parameters used in the model.	<ul style="list-style-type: none"> <li>Provides spatial results across time</li> <li>Builds on historical data regarding response to changed circumstances</li> <li>By modeling processes explicitly, it accounts for endogeneity of prices and other market-level or non-market feedbacks</li> </ul>	<ul style="list-style-type: none"> <li>Inaccurate for large changes from historical conditions</li> <li>Requires estimates of future commodity prices to make forecasts</li> <li>Data gathering can be challenging given the relationships between spatial and temporal scales</li> </ul>	<p>Spatial changes in land use, water quality (in LURNZ), changes in prices and yields. Provides GHG emissions spatially</p>
Market						
Competition models	Various proprietary models	Medium to long term Seek to assess likely production decisions given policy and cost scenarios for products/sectors when firms have market power.	Explicitly represents firm-to-firm and consumer-to-firm interactions encompassing a range of differing behaviors (profit-maximizing and sales-maximizing). Based on popular competition economic frameworks (Cournot/Bertrand, etc.).	<ul style="list-style-type: none"> <li>Does not assume perfect competition</li> <li>Can use publicly available data if firm-level data is not available</li> <li>Wide range of output metrics</li> <li>Can be calibrated audited and subject to sensitivity analysis</li> <li>Allows for entry and exit, capturing potential carbon leakage</li> <li>Can incorporate free allowance allocation and indirect carbon costs</li> </ul>	<ul style="list-style-type: none"> <li>Data requirements are high, given need for firm-level data</li> <li>Does not capture wider effects of carbon pricing, including “multipliers” that may counteract demand reductions</li> <li>Analysis is focused on large firms in established markets; smaller firms or markets with differentiated products less easy to analyze</li> </ul>	<p>Cost pass-through and changes in market prices, total reduction in sector output and profit, firm exit, total increase in foreign output and profit, carbon leakage rate, level of abatement</p>
Allowance market models	Proprietary models e.g., by BNEF, ICIS, Refinitiv	Short term Predict behavior and prices in secondary markets given policy and economic settings.	Defines ETS attributes (market size, technology, shock distribution), then models emissions trading systems with varying degrees of policy (e.g., banking, supply adjustment measures, linked ETS systems).	<ul style="list-style-type: none"> <li>Flexible in the varying aspects of ETS, can assess impacts from e.g. linking, thereby allowing exploration of differing ETS design</li> </ul>	<ul style="list-style-type: none"> <li>Narrow in its considerations: only the development of supply, demand, and prices over time; and abatement of covered sectors</li> </ul>	<p>Demand, supply, and prices of allowances, as well as estimating the interactions that occur within the market</p>

# ATTACHMENT 6: EXAMPLE TOR

**Many jurisdictions will rely on external experts for the development and operation of quantitative models to assess climate policy impacts.** Like all public procurements, this requires a clear and open process that aligns country needs with the potential delivery of services from potential providers.

**In engaging with external experts, a clear and well-presented terms of reference (TOR) is hugely beneficial.** A clear TOR allows bidders to understand what is required in the project and its core objectives. From this, they can assess whether they can fulfill the demands of the project. It also means that bidders can write a proposal that is tailored to the requirements of the jurisdiction. This means that the jurisdiction benefits from a targeted pool of higher-quality proposals to select from. Poorly presented TORs risk bidders missing key information to include in their submission and creating misconceptions about the project objectives.

**Expert reviews of proposals are important to pick the most appropriate submission.** Once submissions have been received, jurisdictions should ask for carbon pricing experts to review the proposals. This is particularly important for identifying the extent to which the model can answer core questions through a demonstrated track record, how well the bidder has discussed risks of the project, the limitations of their submission, and whether the bidder has made suitable provision of expert resources for their project.

**This attachment provides an overview of the key sections to include in a TOR.** It first provides a description, *in italics*, of what constitutes good practice for a given section, including key elements and why the section is important. Also provided for each section is an annotated example from a previous Partnership for Market Readiness (PMR) TOR (in original form or lightly edited) that embodies these good practices.

**Requirements for TORs will differ in different jurisdictions and contexts.** The sections below use excerpts from a PMR template used by different jurisdictions as examples, and outline good practices for standard sections included in a TOR, including

- ▶ Background,
- ▶ Project Objective and Scope,
- ▶ Tasks,
- ▶ Deliverables,
- ▶ Coordination Provisions, and
- ▶ Other Provisions.

## A6.1 BACKGROUND

**This section should provide contextual information so potential bidders understand why the project is being undertaken and whom the project is for.** The following are some possible components of the Background section, although the tenderer should tailor these to local circumstances, which may not require such detailed description:

- ▶ **Country context:** This should outline the current policy efforts made toward reducing emissions, which will likely include the Nationally Determined Contribution (NDC) commitments.
- ▶ **Information on the PMR:** With the PMR as the coordinator of the project it is recommended to provide background information on why the PMR is involved in and its overall objectives.

### A6.1.1 Sri Lanka example: Country context

Sri Lanka is a rapidly growing lower middle-income country with a total population of 21.0 million people and per capita income of USD 3,924 in 2015. Following a 30-year civil war that ended in 2009, Sri Lanka is considered to be, in many respects, a development success story. For example, growth has averaged over 6 percent per year in the past decade and poverty rates have declined dramatically, from 22 percent in 2002 to 9 percent in 2010.<sup>108</sup>

Sri Lanka's greenhouse gas (GHG) emissions in 2012 were approximately 0.78 tons of carbon dioxide equivalent (tCO<sub>2</sub>) per capita, far below the world average value of 4.44.<sup>109</sup> According to Sri Lanka's Second National Communication on Climate Change Submissions to the United Nations Framework Convention on Climate Change (UNFCCC), the energy sector, which accounted for 61.4 percent of total GHG emissions in 2000, represented the largest share of total national GHG emissions. The agriculture sector was the second highest GHG emitter, representing 25 percent of total emissions. This was followed by the waste sector (10.8 percent) and the industry sector (2.6 percent).

Sri Lanka has set the following GHG emission reduction targets under its NDC for the Paris Agreement: (a) by 2030, reduce GHG emissions in the energy sector against business as usual (BAU) scenario by 4 percent unconditionally and an additional 16 percent conditionally; and (b) by 2030, reduce GHG emissions against BAU scenario by 10 percent in other sectors by 3 percent unconditionally and an additional 7 percent conditionally.

Under the NDC, the Government of Sri Lanka has mapped out a comprehensive set of actions to reduce emissions in the five priority sectors — energy (specifically focusing on electricity generation), transport, industry, forestry, and waste — and has already developed a number of policies and plans to support their implementation. Activities under the building blocks (BBs) of the Market Readiness Proposal are summarized in the figure below.

← Example drawn from a TOR developed by the PMR and the Government of Sri Lanka

← Background on the country. If bidders wish for further information, they can consult external resources.

← Summary of jurisdiction's GHG profile shows key economic sectors.

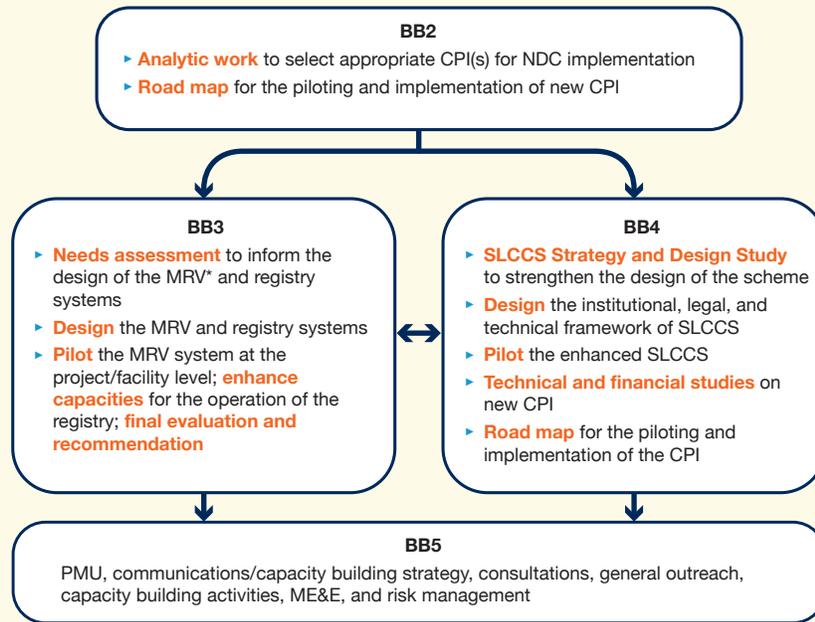
← Overview of the country's NDC, outlining the key emissions reduction goals.

← Details of the NDC that are important to the project to build understanding of policies that may need to be included in modeling.

→

<sup>108</sup> For more information, please refer to the World Bank's Overview of Sri Lanka 2020b.

<sup>109</sup> For more information, please refer to Sri Lanka's Organizing Framework for Scoping of PMR activities (Ministry of Mahaweli Development and Environment 2016).



\*monitoring, reporting, and verification

Figures can help bidders to visualize certain aspects of the project. This figure visualizes the framework to enhance the role of CPI(s) in achieving the NDCs.

### Sri Lanka's power sector

The power sector is a critical component of any future climate policy for Sri Lanka. According to the Sri Lanka Sustainable Energy Authority, Sri Lanka's GHG emissions for the energy sector (both energy and end-use sectors) nearly doubled from 5,447 in 1994 to 10,430 GgCO<sub>2</sub>e in 2000. Within the energy sector, electricity generation accounted for 26.6 percent of emissions. Furthermore, Sri Lanka relies entirely on imports to meet its fossil fuel demand; and the cost incurred from fossil fuel imports are significant, covering approximately 50 percent of Sri Lanka's export income. Mitigation efforts in the power sector therefore has significant development benefits for the country by reducing its reliance on fossil fuel imports and enhancing the country's fiscal resilience.

The current draft of the Long-Term Generation Expansion Plan includes a proposal for the total addition of renewable energy within in the next 20 years of 1,205 megawatts of wind power, 1,232 megawatts of solar power, 200 megawatts of mini-hydro power and 80 megawatts of biomass power. This would be a 640 percent increase from the current nonconventional renewable energy capacity of 422 megawatts. The Government of Sri Lanka needs to develop new policy instruments and identify sources of financing to expand the renewable power sector at this rate.

### Sri Lanka's transport sector

According to Sri Lanka's Second National Communication on Climate Change, emissions from the transport subsector represented 35 percent of Sri Lanka's net tCO<sub>2</sub>e emissions, and almost half of emissions from the energy sector in the year 2000. The transport sector in Sri Lanka (both passenger and freight) is predominantly dependent on road transportation. Therefore, gasoline and diesel are the two major sources of energy used to meet transport demand. Due to a lower rate of rail utilization, efficiency in energy use for transport demand is lower than expected. Given the expected economic growth and growth rate of private small passenger vehicles like cars, two-wheelers, and three-wheelers in the country, the modal share is expected to shift drastically toward private vehicle driven passenger-kilometers compared to public vehicle.

Further details on specific sectors of interest clearly establish the context and focus for the project.

### A6.1.2 Example: Information on the PMR

The PMR, which brings together more than 30 countries, provides funding and technical assistance for supporting countries to prepare and implement cost-effective instruments, including carbon pricing policies. Since its launch in 2011, the PMR has been supporting the PMR implementing countries in preparing their Market Readiness Proposals, which lay out a country's readiness plan for developing and implementing carbon pricing and other mitigation instruments. To complement the countries' domestic efforts, the PMR has developed a Technical Work Program that includes technical components such as MRV, baseline setting, data management, and registry.

A Policy Analysis Work Program under the PMR has been set up to support implementing country participants identify a suitable package of climate mitigation policies and measures. This includes assessing the role and impacts of (and barriers to) explicit carbon pricing instruments, in the context of the preparation and implementation of NDCs. The Work Program is delivered through the development and application of modeling tools and approaches, the modeling and analysis of policy impact/interaction and design options, and capacity building and training in modeling and policy analysis.

In collaboration with the World Bank's Energy Sector Management Assistance Program, the PMR Policy Analysis Work Program supported Costa Rica's Ministry of Environment and Energy (MINAE) with just-in-time analytical input as part of MINAE's intended NDC determination process in 2015. The work, carried out by an ad hoc team anchored at MINAE's Climate Change Directorate, focused on bottom-up modeling and analysis comprising (i) development of preliminary reference scenarios for sector activity and associated GHG emissions in five sectors (energy, transport, forestry, agriculture, waste management); (ii) assessment of a subset of (current/planned) emissions mitigation options by sectors and subsequent development of marginal abatement cost curves; and (iii) exploration of alternative emissions reduction scenarios to reach different levels of mitigation ambition by 2030.

Example drawn from a TOR developed by the PMR and Government of Costa Rica

An overview of the PMR. This helps bidders to understand why the project is being tendered.

Details on what the PMR does. Bidders can begin to understand how the project is expected to be delivered.

Details on how the PMR has worked with the jurisdiction. This helps bidders to understand the relationship between the PMR and the jurisdiction.

## A6.2 PROJECT OBJECTIVE AND SCOPE

**This section provides a very brief overview of the project objectives and scope.** This is an important snapshot of the objective and main tasks of the project. Bidders may be looking at multiple projects and may only read this section to decide if the project is appropriate to bid on. Therefore, it should be well written and clearly convey what is desired out of the project and the project's scope. Further details on the project scope and tasks are then provided in the next section.

**The project objectives should be grounded in the jurisdiction's policy goals.** The section should link the project objectives to key impacts and desired indicators that will allow jurisdictions to understand how their policy goals can be achieved.

### A6.2.1 Colombia example: Project objective

The objective of this activity is to provide just-in-time advisory assistance to the government of Colombia in the assessment of carbon pricing policy instruments to implement national GHG emissions reductions targets in Colombia. In the context of Colombia's participation in the PMR, the World Bank is contracting consulting services to support the technical team of the National Planning Department (DNP) and the Ministry of Environment and Sustainable Development (MADS) in Bogota, Colombia, currently in charge of carrying out this assessment.

It should be noted that there has been no political decision whether to set up a particular explicit carbon pricing instrument in Colombia. The specific objective of this assignment and its outputs is to inform key stakeholders, which will use them to build informed dialogue and facilitate the relevant decision-making.

Example drawn from a TOR developed by the PMR and the Government of Colombia

Brief outline of the project objective and who the project is for.

Text noting how outputs may be used can guide responses.

### A6.2.2 Thailand example: Project scope

This assignment comprises the following tasks:

1. Review and develop economic modeling for carbon tax and emissions trading system (ETS) with and without crediting mechanism to determine the potential contribution to Thailand's NDC mitigation goal.
2. Model and assess the interaction and consistency between the carbon pricing policy (carbon tax/ETS) and national existing policies and regulations.
3. Support capacity building and dissemination of the knowledge and understanding of the effectiveness of the carbon pricing instruments for the mitigation goal achievements.

Example drawn from a TOR developed by the PMR and Government of Thailand

Brief outline of the key tasks of the project. The text clearly states the project tasks.

## A6.3 TASKS

**This section provides detailed information on the tasks expected from the bidder.** This section is used by the bidder to further their understanding of the project and to build their methodology. The task breakdown should build on the project scope outlined in the previous section. Often, the tasks are broken down further into subtasks with each subtask having a bullet point outline of what is expected from the bidder.

**The jurisdiction should specify any key methodology elements required from the bidders in this section.** For example, the jurisdiction should specify if there are any scenarios or sensitivities that must be modeled, or any key outputs that must be included in the modeling results. The jurisdictions can summarize the minimum and desirable outputs of the analytical exercise. Expected touch points over the time frame of the project should also be included in this section; for example, interim project reports.

**When specifying tasks, desired features, and outputs the tender should recognize existing capabilities and limitations of modeling frameworks.** Some of the tasks may be overly ambitious and require modeling design features that are not commonly available. This can create issues further down the project that could have been avoided. The jurisdictions should refer to the main guide (Section 3.2) and Model Summary Sheet attachment when drafting tasks related to specific modeling output requests and consider their feasibility given existing capabilities and available resources.

### A6.3.1 Colombia example: Task breakdown for an activity

#### Task 1: Provide expert advice and input for the adaptation of MEG4C model to assess the macroeconomic impact of carbon pricing instruments

The objective of this task is to provide expert advice to DNP and MADS in the process of adapting DNP's Modelo de Equilibrio General Computable de Cambio Climático para Colombia (MEG4C) in order to introduce proper and robust capabilities that will allow the assessment of sectorial and macroeconomic effects caused by the introduction of carbon pricing instruments in determined sectors of the Colombian economy. This Computable General Equilibrium (CGE) model was developed by DNP, based on the Organisation for Economic Co-operation and Development GREEN model, and was built for the assessment of the economic consequences of climate change in Colombia as well as the various public policies and response measures that can be proposed to address climate change. The adjusted MEG4C model should allow testing different sectorial scopes of application of carbon pricing instruments, namely a carbon tax and a cap and trade system. It will be important to ensure that the MEG4C model is able to simulate distinct allocation criteria (e.g., grandfathering, auctioning schemes, etc.) and different options to set caps (i.e., relative or absolute targets).

**(a) Economic impact of a plain shock of either (i) applying a carbon tax without recycling revenues, or (ii) applying GHG emissions caps without trading features.** This scenario is necessary to measure the relative benefits of revenue recycling and/or trading features. The MEG4C model should be capable to assess impacts of (i) a carbon tax and (ii) emissions caps expressed in tCO<sub>2</sub>e, on all or part of the following variables:

- ▶ gross domestic product,
- ▶ consumption of goods by production sectors,
- ▶ household consumption of goods,
- ▶ labor demand and supply,
- ▶ wage rate,
- ▶ prices,
- ▶ terms of trade,

Example drawn from a TOR developed by the PMR and Government of Colombia

A brief summary of what this task looks to achieve.

The jurisdiction has some desired features for the modeling, which are clearly detailed here.



- ▶ imports and exports of goods and services,
- ▶ investment,
- ▶ capital income,
- ▶ taxes and subsidies,
- ▶ total government revenue, and
- ▶ government debt.

Special attention would be given on measuring impact on, inter alia:

- ▶ GDP growth,
- ▶ job creation,
- ▶ distributional impacts, in particular on households, and
- ▶ competitiveness of affected sectors.

Specific desired outputs from the modeling can be detailed here.

**(b) Mitigation of the economic costs of introducing a GHG emissions reduction target shock.** The MEG4C model should be capable of assessing variations on the above mentioned variables, when comparing the initial plain shock with consideration of

- i) recycling options of the revenues from a tax, or selling of allowances; and
- ii) select trading features.

The consultant/s will thus work with the DNP modeling team in charge of Colombia's MEG4C model to carry out the following subtasks:

- 1.1. Review of other CGE carbon pricing models (carbon tax/ETS):** Desk review of international experiences of cap and trade/carbon tax design, mechanics, and functionalities in other CGE models in order to gather insights for the definition of the implementation plan of carbon pricing and trading features in the MEG4C model.
- 1.2. Discussion and definition of pricing and trading features:** Propose and substantiate a preliminary list of desired trading features to be potentially prioritized and implemented in the MEG4C model. Following discussions with DNP and MADS, elaborate a strategy for the incorporation of caps and trading features in the MEG4C model. This will guide the coding of trading features.
- 1.3 Review of GHG emissions parameters, sector database, and mechanisms:** Review the GHG capabilities of the MEG4C model. As may be identified, provide DNP with recommendations to enhance those GHG capabilities, in order to enable sound execution of simulations and production of results.
- 1.4 Suggest methods and provide technical input to DNP for the soft-linking of MEG4C and LEAP-Colombia models.** Such support may include support DNP in the definition and estimation of linking variables. The purpose of the linking is to improve the analysis of economy-wide implications of carbon tax and cap and trade schemes.
- 1.5 Guidance for the implementation of (possible) new functionalities:** Based on the recommended implementation plan, provide technical guidance to assist in the coding of carbon pricing and trading features in the MEG4C model.

Where possible, and critical to project success, the request can provide a clear breakdown of subtasks.

## A6.4 DELIVERABLES

**This section should provide a clear summary of the deliverables expected from the winner of the project.** These should build on the tasks outlined in the previous section. While there may be some overlap in the content of this section and the previous section, it is important that there are no contradictions. Bidders will use the deliverables as the framework to build out their methodology and project timelines.

**Included in this section should be an indication on the level of effort required for the project's deliverables.** This is often done through providing a timeline of project deliverables and when they are expected to be completed. This helps the bidder to gauge the resources required for the project, and whether they can meet this.

### A6.4.1 Thailand example: Deliverables and timeline

The consultant will deliver the output as following:

Activity	Output(s)	Tentative deadline
<b>Activity 1:</b> Economic modeling and scenario analysis of carbon pricing instruments	<ul style="list-style-type: none"> <li>▶ Economic model and coding or relevance.</li> <li>▶ Analytical report including technical briefs and recommendations.</li> </ul>	June 2018
<b>Activity 2:</b> Interaction and consistency between the country's ETS/carbon tax and existing policies	<ul style="list-style-type: none"> <li>▶ Analytical report including implementation plan and recommendations.</li> </ul>	March 2018
<b>Activity 3:</b> Support to cross-sectoral, inclusive policy development and dialogue for the carbon pricing instruments	<ul style="list-style-type: none"> <li>▶ Organize at least four workshops, or dissemination materials on modeling capacity and application of modeling.</li> <li>▶ Organize at least three dialogues to relevant ministries and key stakeholders to understand role of carbon pricing instruments in supporting NDC achievement.</li> <li>▶ Slide deck/presentations/minutes of the meeting and summary notes.</li> </ul>	March 2019

Example drawn from a TOR developed by the PMR and the Government of Thailand

A summary of the deliverables expected by the bidder, along with the associated deadline.

The Consultant shall prepare the reports as following:

Report	Content	Tentative deadline
<b>1. Inception report</b>	Work plan and timeline.	1 month after contract signing
<b>2. Progress report (1)</b>	Framework and economic model for Activity 1 and results of scenario analysis 1 and 2. Outputs of Activity 2.	4 months after inception report submission
<b>3. Progress report (2)</b>	Outputs of Activities 1 and 2. Framework for Activity 3. Report some part of Activity 3, operated within this phase (summarize comments from trainings, workshops, or dissemination).	6 months after the first progress report submission
<b>4. Draft final report</b>	Report some part of Activity 3, operated within this phase (identify key finding/learning and summarize relevant comments from trainings, workshops, or dissemination).	4 months after second progress report submission
<b>5. Final report</b>	All elements from Activities 1-3.	March 2019

A summary table of the project reports expected from the bidder; the progress reports underline the communication expectations.



The consultant is expected to provide the deliverables on the following timetable:

Activity	Timeline for activity completion and report submission						
	Q4	Q1	Q2	Q3	Q4	Q1	
Inception report	*						
Activity 1							
Activity 2							
Progress report (1)		*					
Activity 3							
Trainings, workshops (Activity 3)							
Progress report (2)					*		
Draft final report						*	
Final report							*

Gantt charts provide a clear guide for the expected timetable for deliverables.

**All reports should be submitted in English.**

Reports mentioned in 1-3 should be full reports in English.  
 Draft final report and final report should be submitted in English.

Required language of the deliverables.

## A6.5 COORDINATION PROVISIONS

**This section should define how bidders are expected to coordinate with the jurisdiction and PMR teams.** This helps to guide bidders on the level of local expertise they need to bring to the project, and how they are expected to work with the jurisdiction and PMR teams. The jurisdiction will likely be able to provide inputs pertaining to local context. This may include local consultants who can support data collection or help organize workshops with stakeholders. The PMR team may be able to provide technical input and insight on modeling from previous experience. Other coordination considerations should be outlined. This can include

- ▶ the expected schedule for project progress meetings over the course of the project,
- ▶ expected inputs from stakeholders that the bidder should plan to incorporate into the project, and
- ▶ the extent of stakeholder engagement expected, beyond that detailed in project tasks.

### A6.5.1 Colombia example: Inputs provided by the Word Bank team

DNP, the Colombian counterpart agency housing and managing the MEG4C CGE model, and MADS, the Colombian counterpart agency in charge of coordinating Colombia's low-carbon development strategy and NDC implementation strategy, will provide, as applicable, the following input and further grant/facilitate access to underlying policy documents, technical reports, technical/data appendices, and/or process reports, including

1. Modelo de Equilibrio General Computable de Cambio Climático para Colombia (MEG4C);
2. Colombian Baseline and Emissions Scenarios (MADS, developed in 2015);
3. Macroeconomic impact assessment of emissions scenarios (DNP 2015);
4. Preliminary assessment of mitigation policy instruments (MADS 2015);
5. Set of marginal abatement cost curves (updated in 2015), including identification and prioritization of mitigation measures, by sectors, and associated abatement potentials and costs; and
6. Previous DNP papers about preliminary carbon tax modeling using the MEG4C model.

Example drawn from a TOR developed by the PMR and the Government of Colombia

Brief outline of the inputs that can be provided to the bidder to aid delivery. This example includes links for further information.

### A6.5.2 Colombia example: Other coordination provisions for the assignment

This assignment aims to provide advice and support to DNP and MADS in carrying out the outlined modeling and analytical work. The consultant shall account for and respond to the orientations and requests, within the original scope of the assignment, received from the technical team designated by DNP and MADS, in close consultation and under supervision of the World Bank team. The philosophy to be pursued under this assignment is therefore to multiply interactions and consultations with the technical team at DNP and MADS, as a way to maximize the capacity building benefits and the integration of the produced knowledge in the government decision process, during and beyond the assignment period.

Envisaged technical missions to Bogota will be scheduled with DNP and MADS, to secure proper dedication of DNP and MADS experts and coherent mission objectives/activities vis-à-vis progress made along the assignment's work plan.

Example drawn from a TOR developed by the PMR and the Government of Colombia

Clearly outlining where bidders are expected to coordinate with the PMR team and the jurisdiction's local team.

## A6.6 OTHER

**This section contains important information to the bidder that does not directly relate to the contents of the project.**

This section should include

- ▶ **Level of effort:** While this may be detailed in the deliverables section it also should be detailed here because budget and resourcing is a key consideration for bidders on whether they are able to carry out the project and their price competitiveness for the project.
- ▶ **Team composition/qualification requirements:** This details the minimum requirements and desired characteristics of the bidder. This will stipulate, among other details, the qualifications and experience required from the bidding team, whether past experience with similar topics is needed, or language requirements.
- ▶ **Budget and contract duration:** This is vital for bidders to properly resource their proposal and complete their financial proposal and will aid with the administration of the contract. The contractor may also ask for a specific date rate per project team member. A schedule of payment should also be included here.
- ▶ **Contacts:** This should include at least one contact from the PMR and one from the jurisdiction.

### A6.6.1 Morocco example: Level of effort

This activity is expected to be undertaken by a team with a combined effort of approximately 200 person days, as estimated in Section C (Main Tasks/Activities). The work is expected to be carried out between April 2017 and May 2018. The firm will prepare a detailed budget and timeline to carry out the activities necessary to deliver the outputs specified in Section E, including number and profile of all team members, and planned field trips to Morocco (three field trips/missions expected), following the World Bank procurement template. The resulting contract will be a lump sum contract, including expenses. The remuneration will be paid as per the deliverable-based payment schedule provided in Section E.

Example drawn from a TOR developed by the PMR and the Government of Morocco

An overview of the level of effort and how the bidder should evidence the level of effort in their submission.

### A6.6.2 Costa Rica example: Qualifications

The **consultant team** shall meet the following criteria:

- ▶ Excellent track record of successful development and dissemination of new/original bottom-up modeling tool for the energy and transport sectors in developing countries and in small/midsize countries, ideally in Costa Rica;
- ▶ Extensive track record working in developing countries and in small/midsize countries, ideally in Costa Rica, on low-emissions development policies and instruments, including policy-relevant advisory work pertaining to low-carbon development strategies, sector mitigation plans, and/or GHG emissions reduction goal setting;
- ▶ Extensive experience in the design and delivery of capacity building and training programs on modeling/analytical tools;
- ▶ Sound knowledge of international climate policy, including the background, state, and prospects of the UNFCCC negotiation process, including Costa Rica's priorities and interests within that multilateral process;
- ▶ Demonstrated ability to draft clear and concise technical and policy papers and ability to present technical concepts clearly to both technical and nontechnical experts;
- ▶ Capacity to work with and take into account feedback from multiple sets of experts and policymakers from diverse backgrounds; and
- ▶ Experience in performing contracts for government authorities and international organizations.

Example drawn from a TOR developed by the PMR and the Government of Costa Rica

Clear specification of the requirements of the bidding team or firm.



The **team leader** shall meet the following criteria:

- ▶ Will act as project coordinator and serve as main point person for MINAE and the World Bank;
- ▶ Advanced academic degree in the field of economics, energy, environment, with at least 10 years of relevant professional experience;
- ▶ Proven track record in energy/economic/climate research project management, with at least five years of relevant experience; and
- ▶ Fluency in Spanish is desirable, including the ability to present technical concepts clearly to both technical and nontechnical experts.

Details on the requirements of the team leader for the project, including past experience, qualifications, and language requirements.

The **team composition** shall ensure that the following is covered:

- ▶ Sector expertise for the energy and transport sectors, with at least five years of relevant advisory and analytical experience; and
- ▶ Hands-on country-specific modeling experience with bottom-up modeling frameworks, with at least five years of relevant experience.

Details on the requirements of the bidding consortium composition. This relates directly to the proposed team for the project.

### A6.6.3 Colombia example: Budget and contract duration

Recommended indicative pricing for this contract is up to USDX. The consultant team is required to identify a budget and timeline to carry out the activities described in detail above and overall budget should fall in the recommended range. Also, the consultant team must provide a profile of each team member/s.

The resulting contract will be a lump sum contract, including all fees and expenses. The selected consultant team will be required to complete the work stated in its proposal. Payments will be made on the delivery of the contractually agreed outputs:

- ▶ 10 percent upon signing the contract and inception report submission,
- ▶ 20 percent on consultants' submission and the client's acceptance on the completion of progress report (1),
- ▶ 30 percent on consultants' submission and the client's acceptance upon completion of progress report (2),
- ▶ 20 percent on consultants' submission and the client's acceptance upon completion of draft final report, and
- ▶ 20 percent on consultants' submission and the client's acceptance upon completion of final report.

Total duration of this contract is 17 months, with expected launch of activities by November 2017.

Example drawn from a TOR developed by the PMR and the Government of Colombia

Clearly indicates the budget of the project and that a breakdown of the proposed project cost should be provided by the bidder.

Clear breakdown of when payments will be made.

#### A6.6.4 Colombia example: Contacts

The consultant team will report to

Focal point at National Planning Department (DNP):

- ▶ NAME X, Deputy Director of Environmental Sustainable Development, National Planning Department (DNP), EMAIL X

Focal point at Ministry of Environment and Sustainable Development (MADS):

- ▶ NAME Y, Director, Climate Change, Ministry of Environment and Sustainable Development (MADS), EMAIL Y; or his technical delegate.

Focal point at World Bank:

- ▶ NAME Z, PMR Secretariat, World Bank, EMAIL Z

Example drawn from a TOR developed by the PMR and the Government of Colombia

Contact details provided for each party involved.

# ATTACHMENT 7: RECOMMENDATION PAPER BEST PRACTICE

This attachment provides guidance on developing a clear, concise, and persuasive document to present the carbon pricing instrument (CPI) recommendation to stakeholders. The practices outlined here can help ensure that the structure and style of the paper allow easy navigation, while the content and analysis provide clear, actionable insights. Specifically, it describes best practice related to

- ▶ Structure and style of the paper (Section A7.1),
- ▶ Communicating the policy recommendation (Section A7.2), and
- ▶ Presenting the technical evidence base in an annex (Section A7.3).

## A7.1 STRUCTURE AND STYLE

- ▶ Adopt a simple, logical structure broadly aligned with that described in Section 4.2.
- ▶ Use annexes or appendices for technical content and details on modeling conducted.
- ▶ Use short sentences and avoid economic jargon.
- ▶ Signpost contents or findings discussed at the start of each paragraph for clear narrative flow.
- ▶ Use visualizations or graphics to communicate complex analysis or relationships.

**The use of a clear and simple structure ensures ease of navigation through the paper.** Short sentences and accessible language improve readability and deliver a concise message. Use of overly technical language and long, complex sentences can make the paper difficult to follow.

**The report should start with an executive summary that captures the key points made in the paper.** It should be a self-contained section that can be read independently of the rest of the report. This is useful for readers who require a high-level summary of issues.

**Chapters should follow a logical flow.** For instance, defining concepts and providing context on the modeling question before introducing technical details is important for clarity.

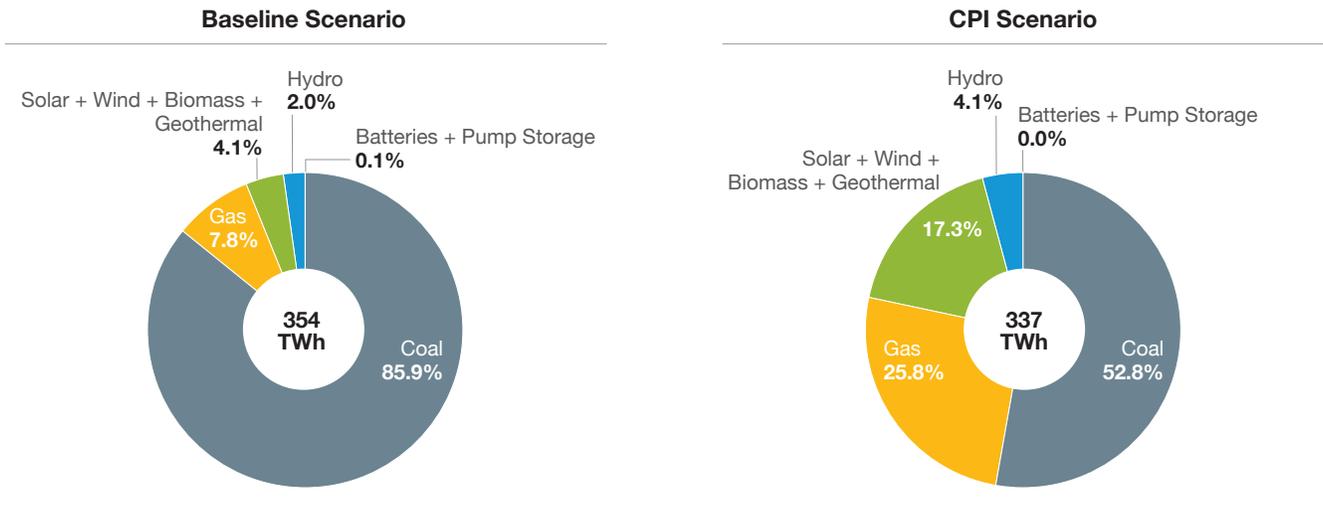
**Technical content, including methodological and modeling details, should be addressed in annexes.** This ensures that the narrative remains succinct and allows the reader to focus on the key points of the paper.

**Use plain language that targets a nonspecialist audience** to support engagement with the material.

**Try to capture key points at the start of the paragraph.** This can help readers follow the main arguments if they are skimming the paper and helps ensure that each paragraph has a coherent purpose. Further detail in the paragraph should expand on or justify the summary sentence.

**Use clear visualizations to illustrate options and findings.** For example, the changing capacity mix of electricity generation in the Philippines under different scenarios, as shown in Figure 15:

**Figure 15** Visualizations can help clarify key findings



Source: Adapted from ECA 2020 *Philippines: Policy Support for Low Carbon Development of the Energy Sector*.

## A7.2 COMMUNICATING THE POLICY RECOMMENDATION

The paper should clearly communicate the suite of policy approaches considered. If modeling is used, the scenarios that were modeled should be presented. Table 21 presents an example of a clear way to present each scenario. For each policy/scenario, there should

be an explanation why it was originally included and the reasons for it not being the final recommendation. If certain CPI options are excluded from the outset, the reasoning behind the exclusion should be included here.

**Table 21** Example of the effective communication of scenarios

Scenario	Instrument	Offsets	Permit allocation	Point of regulation		Threshold (Electricity only)	Target (reductions against BAU)
				Electricity	Transport		
Scenario 1	Carbon tax	No	N/A	Upstream	Upstream	N/A	20%
Scenario 2	Carbon tax	Yes	N/A	Upstream	Upstream	N/A	20%
Scenario 3	ETS	Yes	Free allocation to 2025; then 50% auctioning	Downstream	Upstream	20 MW	20%
Scenario 4	Carbon tax	No	N/A	Upstream	Upstream	N/A	30%
Scenario 5	Carbon tax	Yes	N/A	Upstream	Upstream	N/A	30%
Scenario 6	ETS	Yes	Free allocation to 2025; then 50% auctioning	Downstream	Upstream	20 MW	30%

Source: Adapted from Climate Focus 2019 *PMR: Exploring the Role of Carbon-Pricing Instruments (CPIs) in Decarbonizing the Power and Transport Sectors in Sri Lanka*.

## A7.3 TECHNICAL ANNEX

- ▶ Provide detail on the models used and assumptions made.
- ▶ Clearly communicate the key differences between modeling scenarios, for instance using figures and tables, and explain their role in the broader policy analysis.

**The technical annex should provide further detail on the modeling used in the report.** This detail aids transparency and is not part of the core evidence base for the selection decision. The annex should include a discussion of the models used along with the key assumptions of each, with technical detail going beyond the main report. Additionally, it should include a more detailed discussion of the modeling results than what is in

the main text, for example complete model results in data tables.

**If several scenarios are presented, the paper should clearly communicate the dimensions in which scenarios differ and why.** Scenarios should be mapped against policy options that were tested or key uncertainties that could affect the function of a policy. This allows readers to understand the impacts of specific recommendations.



